SYSTEMS RESEARCH *and* BEHAVIORAL SCIENCE

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SYSTEMS and BEHAVIORAL RESEARCH SCIENCE

RESEARCH NOTE

Environments: Observed With Social Systems Theory. An Introduction

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ABSTRACT

This article examines the concept of environments through the lens of social systems theory in the tradition of Niklas Luhmann, emphasising the inherent plurality and complexity of environments as observed by various systems. Rejecting the reductionist view of 'the environment' as a singular, universal entity, our discussion highlights the necessity of recognising environments as concepts shaped by the operations of a multitude of individual systems. Through the diverse case studies and theoretical insights united in this special issue on *Environments: Observed with social systems theory*, our article underscores the value of systems theory in addressing the multifaceted nature of environments, extending its application to social scientific, economic, political, religious and other functional contexts. This functionally augmented perspective on environments is shown to warrant sceptical attitudes to dominant forms of 'ecological communication' as well as further research in the systemic limitations of prevailing environmental concepts, particularly their overidentification with the natural sciences. The article concludes with a call for the development of practical toolkits for observing and managing environmental pluralism, enabling systems to navigate a broader scope of environmental complexities while maintaining a coherent focus.

1 | Introduction

Commonly associated with nature or ecology, the concept of environment is foundational to social systems theory. A 'system is the difference between system and environment' (Luhmann 2006), and we define as autopoietic those systems capable of maintaining the boundary between themselves and their environment. This definition applies not only to living but also to psychic and social systems, with each of the manifold systems creating its own environment. In social systems theory, there is hence no such thing as *the* environment, if by this generalised environment we understand an all-encompassing ecosystem of all living and other autopoietic systems. Rather, there is an ineluctable plurality of environments, for there are at least as many environments as there are systems. This realisation also implies that environment may not be confused with nature, that is, the environmental concept of the natural sciences and hence of only one branch of the broader function system of science, which itself is only one of the many social systems each operating (in) its own environment (Roth and Valentinov 2020). Moreover, the proliferation of information and communications technology has expanded the concept in terms of new media or virtual environments (Tække 2017).

This environmentally pluralistic perspective of social systems theory, however, is in sharp contrast to the swelling *semantic reservoir* (Andersen 2010; Neisig 2021) of what Luhmann (1989) referred to as 'ecological communication'. The core ideas here imply that *the* environment in fact is nature, which is death-threatened by prevailing modes of human production and reproduction. Consequently, human economies and other social systems are thought to require

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a major make-over (Roth 2021), which is typically expected to be brought about by policymakers. Thus, the claims for a transformation of capitalist market economies into ecological mission economies (Mazzucato 2021), for an expansion of interventionist health agendas to the level of a planetary ecosystem (Roth and Valentinov 2022), or for making the social status of first organisations and then also persons contingent on the ecological footprint of the lifestyle or decisions attributed to them. In want or realisation of this transformation from a modern society of organisations to an organised society (Hayek 1976) that would, in many regards, be defined by premodern forms of social differentiation, we witness extinction rebels stage-managing the total primacy of political-ecological goals over aesthetic and all other functional considerations, while comebacks of the selling of indulgences in the form of carbon offsetting business models in, for example, the aviation industry (Roth et al. 2018) prove that there still is juice in the pulp of functional differentiation.

Against the background of this informative contrast between the pluralistic ecology of environments in social systems theory and the monolithic ecosystem-thinking prevailing in mainstream ecological communication, the present special issue of *Systems Research and Behavioural Science* unites selected contributions to the Luhmann Conference 2023 on 'Environments. Observed with social systems theory', all drawing on social systems theory in the tradition of Niklas Luhmann to explore the multiple meanings and connotations of environment as one of the key terms of both social systems theory and contemporary public discourses.

2 | Environments: From Singular to Plural

'The central paradigm of recent systems theory is 'system and environment'. The concepts of function and functional analysis no longer refer to 'the system' (in the sense of a mass that is preserved, or of an effect to be brought about) but to the relationship between system and environment' (Luhmann 1995, 176). In this context, the

> The concept of the environment should not be misunderstood as a kind of residual category. Instead, relationship to the environment is constitutive in system formation. It does not have merely 'accidental' significance, in comparison with the 'essence' of the system. Nor is the environment significant only for 'preserving' the system, for supplying energy and information. For the theory of self-referential systems, the environment is, rather, a presupposition for the system's identity, because identity is possible only by difference. For the theory of temporalized autopoietic systems, the environment is necessary because system events disappear from moment to moment and subsequent events can be produced only via the difference between system and environment. The point from which all further investigations in systems theory must begin is therefore not identity but difference.
>
> This leads to a radical de-ontologizing of objects as such—a discovery that corresponds to the analyses of complexity, meaning, the pressure to select, and double contingency. This interpretation contains no unambiguous localization of any sort of 'items' within the world nor any unambiguous classifying relation between them. Everything that happens belongs to a system (or to many systems) and always at the same time to the environment of other systems. Every determinacy presupposes carrying out a reduction, and every observation, description, and conceptualization of determinacy requires giving a system reference in which something is determined as an aspect of either the system or its environment. Every change in a system is a change in the environment of other systems; every increase in complexity in one place increases the complexity of the environment for all other systems.
>
> (Luhmann 1995, 176f)

One of the most crucial conclusions we may draw from this highly pertinent paragraph from Niklas Luhmann's (1995) *Social Systems* is, first, that there is no such thing as 'the environment' as a singular. Rather, every system creates its own environment through the operations by which it establishes and maintains a border to this environment. As a consequence, we find that there are as many environments as there are systems. This circumstance is also highlighted by Roth and Valentinov (2020), who insist that every function system, too, creates its own environment. In the next step, the authors demonstrate that the common confusion of the concept of environment with the concept of nature implies a bias to science in general and natural science in particular at the expense of the relevance of the environmental concepts of other function systems such as religion, art or the economy. The authors therefore conclude that, not least in the context of social sciences, the concept of environment ought not to be overidentified with the natural environment or 'nature', which clearly is only 'one environmental concept among others' (Roth and Valentinov 2020, 4).

Another crucial difference is that between observations of systems in terms of the difference between system and environment on the one hand and observations of the difference between systems and other systems in their environment on the other hand. In this context, it is important to note that the possibility to distinguish these two observational options results from a re-entry of the distinction between system and environment as outlined in Table 1.

In looking at Table 1, we find that a re-entry of the system/environment allows for distinct observations not only of a system as distinguished from its environment, an environment as distinguished from its system, but also of environments within a system and of systems within a system's environment.

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TABLE 1 | Eigen-complexity unfolded by the self-application of a true distinction (Roth 2019, 92).

	System	Environment
System	System	System in the environment
Environment	Environment in system	Environment

With regard to systematic observations of systems within a system's environment, Luhmann (2013, 39ff) distinguishes three types of systems theories: analytical, concrete and autological.

> An 'analytic' systems theory leaves it to the systems theorist *qua* external observer to decide what he considers to be a system or the environment, which aspects of reality he groups together in a system and which ones he wants to exclude; or, to put it yet another way, how he draws the boundaries of a system. In contrast, a systems theory is 'concrete' if it starts with the assumption that system formation happens in reality and that the systems theorist must describe these systems exactly the way they are.
>
> (Luhmann 2013, .39)

From an autological perspective, however, systems theory must acknowledge 'that whatever is valid for my object is also valid for myself' (Luhmann 2013, 42). This recognition implies that observations of systems are brought about by systems, including both the observer itself and systems within its environment.

The distinction between these systems-theoretical perspectives is particularly instructive for observations of so-called ecosystems, which are often tacitly conceptualised as 'analytical' groups of ostensibly 'concrete' systems, perceived by other systems as relevant aspects of these other systems' environment. In other words, those ecosystems are not understood as systems independently distinguished from their own environment. Consequently, from the perspective of an autological, autopoietic systems theory, most observers who identify ecosystems as, for example, endangered in their self-organisation may not, in fact, be observing genuinely self-organised systems at all. This realisation is a third major takeaway from the quoted passage from social systems, which provides a compact outline of the systems-theoretical foundations upon which the subsequently introduced 14 contributions to this special issue approach their own observations of environments.

3 | 14 Systems-Theoretical Observations of Environments

Aal's (2024) article, *The World According to the Project*, explores projects as epistemic objects within social systems theory, emphasising their role in shaping environments. Using Niklas Luhmann's conceptual framework, his text examines how projects operate as mediators of knowledge production and environmental interaction. Erik demonstrates how projects not only reflect societal values but also actively create new organisational structures. One major takeaway of his article is that projects serve as tools to navigate both organisational and environmental complexities by structuring knowledge by which organisations change in order to achieve social environmental changes.

In *What is Green Capitalism? Insights from the Social System*, Brezovec and Schweiger (2024) critically appraise green capitalism through the lens of Niklas Luhmann's systems theory, whereby they particularly focus on green capitalism's self-referential nature. Eric and Stefan argue that green capitalism, while presenting itself as a solution to ecological crises, often perpetuates systemic challenges due to its intrinsic overemphasise of economic issues. Accordingly, they claim that green capitalism is unable to truly reconcile economic and natural-environmental systems, also stating that the systemic limitations of green capitalism prevent meaningful natural-environmental policy reforms. Thus, their paper highlights the paradoxical outcomes of green capitalist policies as a societal response to natural environmental issues.

In his article, *Environmental Law and Systems Theory*, Buitendag (2024) draws on social systems theory in the tradition of Niklas Luhmann to analyse the adaptability of legal systems to natural environmental challenges. Buitendag critiques the rigidity of legal frameworks in addressing ecological complexities. The major takeaway of his article is that environmental laws, as currently structured, struggle to integrate the dynamic and complex nature of environmental systems. This article contributes to the present special issue by zooming in on the interplay between systemic legal constraints and natural environmental adaptability, also proposing a framework for greater systemic responsiveness.

In *Observing Systemic Values in a Tax Avoidance Environment*, Hunt and Doyle (2024) examine tax avoidance strategies based on a Luhmannian concept of values. In so doing, they focus on how the legal system and the economic system prioritise their own code values over the code of morality or other codes of 'ethics'. Their article reveals that tax avoidance reflects systemic values emphasising procedural compliance rather than societal welfare. The article's major takeaway is the insight into how systemic values shape the function systems' interactions with systems in their respective environments.

Kaczmarczyk's (2024) article, *The Reality of Environment Reimagined*, revisits environmental sociology combining social systems theory and other constructivist paradigms to bridge gaps between constructivist and realist perspectives. This analysis critiques traditional approaches to environmental observation and advocates for a hybrid model that incorporates systemic and ontological nuances. This approach leads to a proposal of a refined Luhmannian framework for environmental observation based on an innovative reinterpretation of environmental ontology, which fosters a deeper understanding of the systems-environment relationship.

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The ambition of Kim's (2024) article, *The Paradox of Standards and Innovation*, is to address the paradoxical coexistence of standardisation and innovation within the context of a systems-theoretical framework. In drawing on Niklas Luhmann, he argues that standards can both constrain and enable innovation by creating stable points of reference while simultaneously fostering dynamic adaptability to organisational environments. Thus, standards appear as enablers of systemic evolution through controlled change. Consequently, his article provides a fine illustration of how systems adapt to environmental challenges while maintaining their internal coherence.

In her article, *Inclusive Education and its Potential for Irritation*, Lindacher (2024) examines the educational system's adaptation to inclusive educational policies, framing them as external irritations. Using systems theory in the tradition of Niklas Luhmann, Lindacher explores how the educational system processes these irritations to achieve structural couplings less with its environment in general, but rather with particular systems within that environment. One key outcome of her study is that inclusive education drives systemic adaptations, also enhancing structural awareness and resilience. Thus, her article demonstrates how function systems respond to environmental irritations, enriching the discourse on systemic adaptability.

In *Unilateral Consensus in Luhmannian Systems Theory,* Pretorius et al. (2024) analyse how social systems achieve consensus through legitimation processes. Their article focuses on unilateral consensus as a mechanism for legitimising cross-system decisions. By examining intersystemic structural couplings and divergent systemic meaning, the authors reveal how social systems navigate the tension between operational independence and social structural interdependence as they align on shared objectives. As a result, the authors demonstrate how consensus-building processes legitimise systemic decisions while maintaining differentiation, also addressing how societal systems negotiate environmental complexities.

Rainmaking. Observed with Social Systems Theory is the title of a study by Roth et al. (2024) that draws parallels between modern climate governance and archaic rituals like rain dances, using Luhmann's concept of functional equivalence. The authors argue that contemporary efforts to mitigate climate change often serve symbolic purposes in regulating social systems rather than achieving direct natural environmental outcomes. One major takeaway of this article is insights in the functional equivalence of prehuman or archaic rituals and modern governance in fostering societal cohesion. This paper contributes to this special issue on systems-theoretical observations of environments by recontextualizing climate governance as symbolic systemic interactions rather than interventions into natural environmental systems.

In his article, *From Media Evolution to the Anthropocene*, Tække **(**2024**)** explores the relationship between media evolution and the so-called Anthropocene, thereby emphasising the socio-environmental impacts of communicative systems. Blending Luhmannian and other socioevolutionary perspectives, Tække traces how media advancements shape societal and perceived natural-environmental dynamics. In stretching social systems-theoretical boundaries, he concludes that media evolution amplifies humanity's capacity to influence its natural environment.

Tortia (2024) examines *Stakeholders' Self-Organisation in Social Enterprises* and more concretely how stakeholders in these enterprises adapt to dynamic environments by means of self-organisation. Integrating social systems theory in the tradition of Niklas Luhmann, complexity theory and new institutionalism, his article highlights how governance models evolve to enhance resilience and adaptability. Tortia further emphasises that this adaptive governance enables systems to navigate natural-environmental and societal complexities effectively.

In *Moral and Managerial Perspectives on Cooperatives,* Valentinov and Iliopoulos (2024) attempt to reconcile moral and managerial perspectives on cooperatives using Niklas Luhmann's social systems theory. Their article examines the dual nature of cooperatives, navigating both economic and societal demands, the latter of which typically constitute political ones. Thus, Vladislav and Constantine show that cooperatives' systemic sensitivity to needs as identified by political players within their environment presents both challenges and opportunities for sustainable management.

The paper *Observing the Environment of Technology* by Steven Watson (2025) re-examines the controversial idea of technology as an autopoietic system, also critically engaging with instrumentalist, deterministic and human-centred perspectives on the relationship between technology and society. By examining the interplay of medium, form, codes and programmes within technological systems, the study illustrates how technology observes its environment and coevolves with social systems. Key examples, including the printing press and generative AI, are referred to in order to demonstrate how technological systems both shape their environment and adapt to environmental perturbations while simultaneously reshaping societal norms and expectations. The paper further addresses controversies surrounding the autopoiesis of technology, particularly in relation to its distinction from living systems. It argues that while Luhmann largely confined autopoiesis to social and psychic systems, there is no fundamental theoretical objection to extending this concept to technology.

In working *Towards the Sociology of Pets*, Žažar and Clausen (2024) analyse the social functions pets have and have had in past and present societies. Based on Niklas Luhmann's ecological communication framework, Krešimir and Lars argue that pets perform key roles across various function systems, crucially contributing to these systems' autopoietic reproduction. The major takeaway is the exploration of pets as environmental entities attaining societal resonance. This paper broadens the scope of environmental observations by incorporating non-human actors into the systemic analysis of socioenvironmental interactions.

The present collection of 14 articles reflects a dynamic interplay of ideas within the thematic framework of systems-theoretical observations of environments. As a result, several intertextual links emerge that display commonalities, complementary perspectives and productive tensions across the different articles.

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In fact, one recurring theme across the articles is the exploration of how social systems adapt to—predominantly natural—environmental challenges. In this regard, Buitendag's (2024) discussion on the rigidity of legal systems in adapting to ecological complexity resonates with Tortia's (2024) analysis of adaptive governance. Both authors highlight the necessity of creating flexible and responsive structures to navigate dynamic environmental contexts.

Similarly, Lindacher's (2024) examination of inclusive education policies as external irritations aligns with the work by Richard Pretorius and his colleagues' focus on consensus-building as a mechanism for systemic adaptation.

Another shared theme pertains to issues of symbolism and social cohesion. Most notably, the symbolic dimension of societal responses to perceived natural problems is central to Steffen Roth et al.'s (2024) comparison of attempts at climate governance with prehuman and archaic rainmaking rituals. This perspective connects to Žažar and Clausen's (2024) exploration of pets as natural-environmental entities that attain societal resonance and contribute, as topics, to the autopoiesis of social systems. Both articles demonstrate how seemingly nonsocial, dysfunctional or mere symbolic phenomena play a critical role in shaping social systems.

Yet another set of articles use social systems theory in the tradition of Niklas Luhmann to highlight perceived limitations of the economic systems in addressing natural-environmental challenges. Brezovec and Schweiger's (2024) observation that green capitalism's self-referential nature renders this capitalism blind to nature aligns with Hunt and Doyle's (2024) analysis of systemic values within tax avoidance practices. Both studies highlight how the economic systems, or organisations primarily geared towards economic goals, respectively, prioritise their internal logic over other societal and natural-environmental concerns. Such observations are complemented by Valentinov and Iliopoulos' (2024) investigation into cooperatives, which need to reconcile economic and other societal demands in an attempt to offer a sustainable alternative to mainly business-oriented corporations.

In yet another regard, Kaczmarczyk's (2024) reinterpretation of environmental sociology through a blend of social systems theory in the tradition of Niklas Luhmann and moderate constructivism provides a theoretical bridge that connects realist and constructivist approaches to systems and environments. This aligns with Aal's (2024) exploration of projects as epistemic objects, as both articles seek to reconcile social systemic observations with ontological ones. In so doing, their work underscores the importance of conceptual frameworks that integrate diverse perspectives both within and beyond social systems theory.

Moreover, Lindacher's (2024) explorations of external irritations in the educational system find parallels in Buitendag's (2024) and Tortia's (2024) discussions on legal and governance systems, respectively. Each highlights how systems evolve in response to pressures from their environments. These insights converge in demonstrating the adaptability of the respective function systems when faced with external stimuli, often triggering inflationary claims or tendencies as recently problematised by Teubner (2021).

The inclusion of non-human actors in systems theory and other social systems, as discussed by Buitendag (2024) as well as Žažar and Clausen (2024), extends the scope of traditional Luhmannian analysis. This aligns with Brezovec and Schweiger's (2024) critique of systemic boundaries in green capitalism and the corresponding attempts at challenging or transcending the theoretical boundaries of how systems may be thought to interact with their environments. By integrating pets into societal observations, Žažar and Clausen broaden the systemic perspective to include more complex ecological interdependencies, at least at the level of topics of communication.

One final dimension of intertextual connectivity is paradoxes and tensions. Most notably, Kim's (2024) article on the paradox of standards and innovation finds an echo in Valentinov and Iliopoulos' (2024) discussion of tensions arising the dual 'nature' of cooperatives. Both articles do indeed grapple with systemic tensions resulting from competing objectives—stability versus change in the former work and economic versus societal demands in the latter study. These dualities highlight the complexities of systemic self-regulation within dynamic environmental contexts. Yet another fascinating paradox emerges from a closer reading of Buitendag's (2024) systems-theoretical work on environmental law, from which one might conclude that extensions of human rights to nature might undermine the inviolability of human rights for humans.

The intertextual links across the articles united in this special issue illustrate a rich tapestry of ideas converging on the theme of *Environments. Observed with social systems theory.* From systemic adaptability to the integration of symbolic and non-human actors, these connections showcase how Luhmannian systems theory offers a versatile and adaptive framework for analysing the polycontextual relationships between social systems and their environments. By identifying these and further shared insights and theoretical tensions, future analyses may advance a more cohesive understanding of systemic observations of and within a multiverse of environments.

4 | Towards Toolkits for the Observation of a Plurality of Environments

If we take seriously the idea that environment always is a plural as soon as we observe more than one system, including the observation of a system observing another system in its environment, then it becomes evident that no single system, that is no single organisation (not even a very extensive one such as a hypothetical world state) and no single function system (or subsystem of a function systems such as the natural science) can claim supreme knowledge of an ostensible system referred to as 'the environment' or 'our planetary ecosystem' (Roth 2021; Roth 2024; Roth and Valentinov 2020; Roth and Valentinov 2023).

From a more down-to-earth perspective, too, the fact that there is no such thing as 'the environment' is consequential insofar as environmental observations reappear as a matter of scope rather than completeness. Even in the case of self-observation, where

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a system observes its own inner environment of comparatively well-demarcated internal operations, the self-observing system remains incapable of observations of those observations that perform its self-observation in real time.

Talking of scope, the major realisation prompted by a systems-theoretical insistence on the observation of a multitude of environments, therefore, is the acknowledgement of the inevitably localised, idiosyncratic and complexity-reductionist 'nature' of all environmental concepts (Valentinov 2022; Valentinov and Roth 2021; Valentinov and Roth 2024), including the natural sciences' environmental concept of nature, which is common as much as academic language far too often takes for 'the environment', and not just, as mentioned earlier, 'one environmental concept among others' (Roth and Valentinov 2020, 4).

In thus challenging the pre-eminence of the natural scientific concept of environment—which prevails even in neighbouring fields of cybernetics and open systems theories, where sophisticated ecologies of mind (Bateson 1972) boil down to mind/nature or system/nature relationships—social systems-theoretical approaches to the concept facilitate the observation of a much broader scope of environments, which includes, inter alia, social scientific, economic, political, artistic and why not also religious environmental concepts of environment, which, again ought not to be confused with or reduced to social scientific, economic, political, artistic or religious approaches to the predominant concept of nature.

In their article on 'multifunctional organizational models', Roth et al. (2018) build on the idea of a multi-environmental approach to how organisation may navigate and engage with a multitude of organisational environments, encompassing different function systems with their unique internal logics. Accordingly, the authors show organisations can screen their multifunctional environment and strategically adjust their own functional profiles. In doing so, organisations might discover or create new opportunities, including innovative business models. Such a multifunctional approach challenges traditional views of organisations as singularly or predominantly tied to one function system, emphasising instead their potential to engage across economic, scientific, political and other functional domains. As such, a multifunctional approach to the concept of environmental screening exemplifies how systems-theoretical observations of environments in plural can transcend the myopic focus on singular, reductionist environmental concepts. In a similar vein, Neisig (2024), Roth (2023) and Valentinov et al. (2019) have advocated for broader concepts of stakeholder management and stakeholder salience that transcend the narrow bias to political and economic stakeholders prevailing in contemporary management and organisation research. With regard to the internal organisational environment, Sales et al. (2022) provide a compelling example of how macrosocietal factors influence an organisation's function system orientations and culture. Their case study highlights the critical role of cultural profiling in understanding and navigating particularly challenging situations such as organisational mergers, which may result in significant cultural dissonances that can arise when the acquiring and acquired organisations exhibit divergent orientations towards function systems. In this sense, their case study exemplifies how the systems-theoretical concept of environmental screening can be practically applied both with regard to external and internal environments as organisations observe and manage a plurality of organisational environments (Roth et al. 2025).

5 | Conclusions and Outlook

The exploration of environments through the lens of social systems theory presented in this collection of contributions to the special issue of *Systems Research and Behavioural Sciences* has illuminated the inherent pluralism and complexity of the concept. By rejecting the reductionist notion of 'the environment' as a singular, all-encompassing entity commonly associated with nature as the environmental concept of natural sciences, this collection reaffirms the importance of acknowledging the multiplicity of environments created and observed by various systems. This recognition not only challenges conventional environmentalist or ecological discourses but also broadens the analytical scope to include social scientific, economic, political, religious and other concepts of environment alongside natural ones.

The contributions to this special issue therefore demonstrate the versatility of systems theory in addressing contemporary environmental challenges. From Michal Kaczmarczyk's (2024) hybrid model bridging realist and constructivist paradigms to the critical appraisals of green capitalism's systemic limitations as provided by Eric Brezovec and Stefan Schweiger (2024), the articles underscore the need for innovative theoretical approaches to the concept of environment, including frameworks that enable a deeper understanding of how systems observe and shape their environments, also revealing both the opportunities and the tensions inherent in these dynamic interplays.

Notably, this collection highlights the social dimensions of environmental engagement, as seen in Roth et al.'s (2024) comparison of climate governance to archaic rituals, as well as the inclusion of non-human actors in Krešimir Žažar and Lars Clausen's (2024) work on the social functions of pets. These perspectives challenge us to rethink the boundaries of systems-theoretical analyses and consider the broader implications of environmental concepts for research in both the natural and the social sciences.

Looking forward, the articles united in this special issue collectively advocate for the development of practical toolkits for observing and managing environmental pluralism. These toolkits would empower not least organisational systems to navigate the complexities of their environments while maintaining operational coherence and expanding their observational scope. By integrating insights from multiple disciplines and theoretical approaches, future research can continue to refine and expand the application of systems-theoretical principles, thereby ensuring their relevance in an era of rapid social, psychic and organic transformations.

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RESEARCH ARTICLE

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The world according to the project

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Abstract

The purpose of this paper is to address the communicative reality of projects, which has an organisational and interactional component. I argue that projects can either be seen as organisation-bound projects which are differentiated subsystems that progress along the decision premises of the organisation or as operationally closed projects with boundary-constituting decisions (autopoietic projects). These two types of projects operate with fundamentally different world constructs. The analysis of the case study accounts of four papers shows that with Luhmann's conceptual framework, we can make a significant contribution to the explanation of 'contextuality', the understanding of the role of interaction systems in the functioning of projects and organisations in general, as well as the modelling of the relational dynamic between organisations and their projects.

KEYWORDS

autopoiesis, decision-making, interaction systems, project communication, project studies, social systems theory

1 | INTRODUCTION

When we take the Manhattan Project as the first project that had a profound and lasting impact on the world (Shore & Zollo, 2015), it took the world about a half-a-dozen decades to elevate to the meta-level of projectification. Jensen et al. (2016) frame projectification as the shift from the disciplinary society to the project society, which they associate with reversing the influence relation between activity, on the one hand, and space, time and relations, on the other hand. In the disciplinary society, space, time and relations were the ordering elements, whereas in the project society, the activity itself is the ordering element and space, time and relations act merely as contingencies for activities. Jacobsson and Söderholm go as far as positing a 'homo projecticus' (Jacobsson & Söderholm, 2022). The authors argue that bracketing is a key mechanism for individuals in the projectified world to effectively deal with the multitude of temporal and factual contexts. The central concern is that impact on societies is mostly made through projects, and projects are not the exception but the rule. Wagner et al. (2021) argue that project management associations exert an influence on this projectification. These associations appear as rational-technocratic but are in fact highly normative. They do not always have a strategic orientation towards the requirements of society and corresponding stakeholders. The authors conclude that to 'be effective, associations must anchor themselves better in society and act from its midst' (Wagner et al., 2021, p. 11).

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Niklas Luhmann's sociological concept of the differentiated society (Luhmann, 2021a, p. 707 ff) can contribute to our understanding of projectification, when we draw on two fundamental aspects of the differentiated society. Firstly, the differentiated society has immanent steering limitations, because of the autopoietic nature of the functional subsystems (Buchinger, 2007; Luhmann, 1990, 1997; Van Assche & Verschraegen, 2008). The functional subsystems construct their own worlds (Van Assche & Verschraegen, 2008). Secondly, Luhmann argues that as the differentiated society advances, its decision-density increases. This causes the future to be evermore contingent, thus making again more decisions necessary (Luhmann, 2019). The dominant role of organisations in societies is also cause-and-effect of the increasing contingency (Luhmann, 2000). The fact that organisations increasingly resort to projects may find its cause in this increasing contingency as well, in the sense that only through projects they can respond effectively. At the same time, organisations—more exactly, structural couplings between organisations—are important to create (indirect) steering capacity in societies (Buchinger, 2007; Van Assche & Verschraegen, 2008). Projectification thus, from a steering perspective, brings up the question whether the project eventually did realise the intent that the organisation had when it initiated the project. This question has intensively been addressed in the project governance literature (Ahola et al., 2014; Bekker, 2015; Cicmil & Braddon, 2012; Müller, 2009; Müller et al., 2014; J. R. Turner & Keegan, 2001). In this paper, working from the principles of Luhmann's theory of organisations, I will elaborate that the world views of the organisation and the project may come to differ, and this can result in the project not delivering the outcomes that correspond to the organisation's original intent. Framed in the context of societal steering: projectification nests a secondary steering limitation within the indirect steering through structural couplings between organisations, on a broader scale.

This paper is structured as follows. In the next section, concisely situated in the broader Luhmannian organisational literature, on the one hand, and the current challenges in project studies, on the other hand, I will shortly review the work based on Luhmannian systems theory that is directly related to projects. The review shows that there has been limited attention to projects, and this gap by itself calls for scholarly work, both conceptual and empirical, to advance the Luhmannian contribution in this field. In Section 3, I will present a framework for analysing projects. This analysis draws on the duality of interactional and organisational communication in the total of the communicative reality of the organisation. It is centred around the extent to which decision premises of the organisation can foster the progress of a project. I will sketch the circumstances under which a project that is functioning as a part (or differentiated unit) of the organisation may evolve into an autopoietic project. Section 4 deals with the research questions posed for the review analysis of four case study accounts. This analysis serves a preliminary empirical test of the framework outlined in this paper, which will be the subject of further field research. In Section 5, the results of these reviews are presented. The paper closes with a section of discussion and conclusions.

2 | LUHMANNIAN LITERATURE ON PROJECTS

Luhmann's theory development on organisations, which started with his extensive analysis of formal organisations in the early 1960s (Luhmann, 1964) and culminated in *Organisation und Entscheidung* (Luhmann, 2000), lays out an overall theory on organisations. The core of this theory is that organisations (re)produce themselves through an operationally closed, recursive process of decision communications. Through this process, organisations uphold the difference between themselves and their environment. It constitutes the boundaries with which the organisation can observe itself and refer to itself as system, and observe and refer to its environment (Grothe-Hammer et al., 2022; Nassehi, 2005; Seidl, 2007; Seidl & Becker, 2006; Seidl & Schoeneborn, 2010; Tacke, 2019).

The field of project studies was oriented towards execution methodologies in its early stages, but gradually shifted its focus to understanding projects and their organisational aspects, and develop the theoretical background to accomplish this (Tekic et al., 2022). There is a call for the advancement of underlying theory (Geraldi et al., 2020; Geraldi & Söderlund, 2018) and reflexivity as fundamental for theorizing (Geraldi et al., 2021). At the same time, there is increasing awareness of the need to study the actual project practice (Carlsen & Pitsis, 2020; Hodgson & Cicmil, 2016; Sergi et al., 2020).

Luhmann's framework offers a magnificent potential for the study of projects and advance the field of project studies in the aspects mentioned above. Projects as temporary entities have continuous boundary dynamics and are decision-intensive (Kreiner, 2020). Luhmann's organisational theory provides a powerful lens to study this, given its very basic conception.

Dominantly concerned with the general aspects of organisations as social systems, Luhmann made only few, nevertheless quite relevant direct references to projects and the characteristics of projects. In his discussion

on decision programmes (Luhmann, 2000, 2018), he explains that complex projects need particular planning and purposive decision programmes. He points out that most of these specific programmes are lost in time because project staff turns to new duties after completion of a project. Luhmann points out that a 'narrative culture', institutionalised debriefings or involving experienced project staff in decisions on accepting/rejecting projects could be possible means to retain valuable knowledge (Luhmann, 2000, pp. 272–273). Although he considers this forgetting of project experience as a cost, it should be put in the light of Luhmann's own notion of the reduction of complexity by means of continuous forgetting (Luhmann, 2000, pp. 261–275). Because each new project is in a way unique, storing and actively retaining project memory, of which it cannot be said how and when it will be of any use, may just be too much of a burden for organisations that frequently have to deal with the variety that comes with new projects.

Luhmann addresses the particularities of projects, especially their heightened need for ongoing renewed reflection. He attributes this to two causes. Firstly, projects are more in a flux situation in terms of where they are, compared to where they planned to be. Secondly, because of the relation with the organisation, touching on this point Luhmann states that '[r]eflection loops must be installed – partly to correct the normal functioning of the system memory, partly to run the project as a non-trivial, self-reflective machine and to ensure that information is constantly renewed.' (Luhmann, 2000, p. 274) (author's translation). Luhmann refers here specifically to megaprojects (Großprojekte) and points out that such projects need self-reference, that is, establish autopoiesis. I will point out that it is not so much the size of the project but the distinction with the initiating organisation that is relevant when it comes to establishing autopoiesis. This is actually more in line with Luhmann's theory as it works with distinction as the underlying concept.

Luhmann's outline of differentiation inside systems does not specifically mention projects as differentiated units but is clearly relevant for projects though. He views differentiation within organisations as a means to reduce complexity. I argue that in this way a project can be viewed as a protective measure of an organisation against undesirable complexity increase. If projects are considered as temporary, differentiated subsystems of an organisation, it is important to follow Luhmann's assertion that, whilst it only is concerned with a part of the system–environment distinction, the subsystem still reconstructs the system on its own behalf (Luhmann, 2021b, pp. 262–263). Therefore, the self-reference of a project overlaps with the self-reference of the system. Nevertheless, this internal differentiation calls for observational adjustment mechanisms, in order to maintain the integrity of the observations and perceptions of the various subsystems (Luhmann, 2021b, pp. 262–265).

There is a limited number of studies in the field of project research that apply a Luhmannian framework. In a recent paper, Lies (2020) presents an interpretation of agile projects along Luhmann's theoretical principles. The author asserts that a critical factor for success in agile project management can be found in the fact that agile project teams are closed systems, possibly using their own codes (binary schemata). Lies emphasises the agile team as observing itself as well as its environment, thus also fostering other philosophies of control inside organisations. Instead of aiming at radical shifts, agile projects rather enable continuous incremental development of an organisation. The observation of the closed-system agile teams itself turns into a source of change. Relating to the complexity adaption of organisations, the author states that '[s]crum exemplifies the means of systems differentiation as a result of observation' (p. 1426). The fact that agile project management is associated with other orientations and measures of control is generally acknowledged. Lappi and Aaltonen (2017) show that much of the steering ambition is relinquished in the agile approach, as the focus shifts towards greater autonomy of projects. However, the argumentation of Lies that scrums and/or agile project teams are closed systems per se, because they are subsystems inside the organisation system, is in my view questionable regarding Luhmann's framework. On the one hand, as stated above, differentiated units inside an organisation will still constitute the self-reference of the organisation, and as such are a part of the autopoiesis of the organisation. On the other hand, even if we treat the agile project team as an interaction system and thus attribute operational closure to it, we cannot simply explain the presumed benefits of agile management to this operational closure, as this is true for any of the interaction systems that continuously occur within any organisation. Still, and this is the real point in Lies' argumentation, the agile approach likely allows more room for interaction episodes that, if effectively tied back to the organisation, can contribute to the organisational dynamic. I will address the question when a project should be considered as a differentiated unit and when as a separate closed system in the next section of this paper. A highly relevant and insightful contribution was made by Grothe-Hammer and Schoeneborn (2019). This research is situated in project-based organisations (PBOs) and investigates the migration of decision premises between PBOs and the projects they initiate and execute. The authors point out that this migration is limited in both directions. The authors conclude that

'temporary organizations cannot deterministically influence the elements of the PBO, while PBOs have difficulties to adopt changes and learn from the temporary organizations' (p. 77). Grothe-Hammer and Schoeneborn attribute this to their assumption that the projects are operationally closed entities and thus the project and the PBO are environment to each other. Because we are talking about systems that are based on decision premises, we can more precisely say that the authors claim that both the PBO and the project are organisations in the Luhmannian sense. This is where I disagree with the authors. As I will elaborate in the next section, in the Luhmannian terminology, projects can be conceived as differentiated subsystems or as organisations. This is not to say that none of the cases that the authors investigated concerned projects 'as operationally closed organisations.' The authors researched film production and consultancy projects, and in the case of the film projects, the information provided in the paper would show some support for that, whilst for the consultancy projects, this seems much less assumable. Whether a project operates as a differentiated subsystem or as a separate organisation is a matter of affirmative investigation.

A case study analysis of Vazquez et al. (2016) is not directly based on the Luhmann framework but is situated in the closely related CCO stream. This study analyses how order–disorder–order sequences are transmitted through communications. The authors are not primarily interested in the project itself but chose projects because of the observation that while project '... endeavours are marked by conscious efforts to establish order and control, there is a constant need to grapple with contingencies' (p. 633).

3 | A FRAMEWORK FOR ANALYSING PROJECTS

Projects are referred to as temporary entities that are to undertake a specified endeavour (R. Turner & Müller, 2017). This implies that the concept project is not confined to the setting where the term 'project' is explicitly used and a 'project manager' is appointed (Hallin & Gustavsson, 2010).

In a recent paper, I laid out a conceptual framework for projects that builds on the relation between the organisation and the project (Aal, 2022). The foundation of this framework lies in the proposition that distinction between the organisation and the project may set in motion particular communicative and structuring dynamics. There are five distinction dimensions: output, know-how, time structure, human resources and technology. In case significant distinctions develop, the decision premises of the organisation may not suffice to support the progress of the project. In the time dimension, for example, organisations have created time structures for their communication and decision-making that essentially solve their time requisites. Here, we can think of the deadlines that are given for decisions or processing communication, or the cycle times of decisions and communication exchanges. Projects may at some stage require faster cycles and shorter deadlines, and this would reduce the viability of the organisation's decision premises. As for the output, technology and know-how dimensions, the question is to what extent the existing decision premises (adequate decision programmes, competence along the hierarchy and redundance in communication channels) provide the selection operations—which are the essence of communication and decision-making in organisations—which are needed to advance the project. Lastly, the human resources dimension refers, on the one hand, to the extent external staff is allocated to key positions in the project and, on the other hand, to the extent existing positions as such or as proxies are of use for the project. Decision premises are closely related to persons (personalised memory) and positions (Luhmann, 2000, p. 201 ff). This concept of distinction dimension can be illustrated with the example of IT projects in financial institutions. Such organisations will typically have multitude of IT projects running, often resorting under a Project Management Office. Projects concerning the extension of functionality of specific modules of the IT systems, system adaptions for reasons of complying to changed regulations and maintenance projects are examples of projects that are associated with low distinction on the various dimensions. Typically, these projects appear as a pipeline of tickets and are administrated with project management and tracking applications. Thus, in terms of decision-making time structures, they can be well integrated. As far as the dimensions output, know-how and technology are concerned, we can expect low to moderate distinctions. Although all these projects will have their uniqueness, most of them will resemble previous projects. Involving relevant staff across the organisation will ensure sufficient know-how, whilst new technology is usually not involved. In case external staff is involved, this is often recruited from a known pool of firms, who on their behalf are also familiar with the organisation; hence, the involvement of external staff will not cause necessarily high distinction on the HR dimension. This is not to say that such projects are always easy, and no wrong decisions are taken. It implies that the existing, shared and acknowledged decision premises mostly suffice to generate decisions with connectivity. So called Next-Gen IT projects are an example of projects that will go together with moderate to significant

dimension distinctions. The implementation of AI-based applications, transition to next-gen core system modules and complex cybersecurity projects, amongst others, typically belong in this category. The involvement of external parties is higher and also often more in key roles. The technology can be new to the organisation. Such projects are not recurring, so familiarity with the output is lower in these projects. Whilst the organisation will have the know-how to understand larger parts of these projects, they have significant blank patches as well. As the complexity of these project will often lead to bursts of decision-making needs, the time-structures of the organisation will be pressured at times. Finally, the (experimental) implementation of supercomputing would be an example of a project associated with critically high distinctions on all dimensions. In this case, the output is completely new and likely only partially known. The organisation has no familiarity with the technology and hardly any own know-how. External parties are likely to be dominant. Decision-making patterns are unpredictable. Therefore, few of the existing decision premises are relevant for such a project, mostly only the general common-sensical ones.

When significant distinctions emerge, the project may start to develop its own premises, that is, decision programmes, communication channels and positions. This will push the project towards the *horizon of autopoietic gravity*, which can be regarded as the systemic boundary within which the organisation can still retain the project in its own autopoiesis. Before I continue, the term of horizon of autopoietic gravity should be further elaborated. In organisations, recursive mass builds up (in Luhmann terms: system memory and self-descriptions), which creates a recursive inertia. We can model communications as taking place in a recursive force field. This force field has a horizon, which expresses the limit of the recursive mass effectively (referentially) influencing communication. Luhmann treats the orientation of self-reference as variable (Luhmann, 2000, pp. 47, 193–220, 275–278), but this is principally a variation in content. Inconsistencies with the system memory will be solved through adaption (p. 74–75). If we allow that the variability extends to the strength of the recursive force in particular situations, then, instead of treating the organisation system as a communicative monolithic, it is possible that changes in the communicative morphology develop. This conception offers, in my view, a purposeful analysis of transient organisation settings like project dynamics, relationships between organisations and subsidiaries, divisional relations, and also mergers and divestments.

Returning to the situation of a project facing the need to develop decision premises to advance its own operations, the organisation has several adaptive measures to retain the project within the horizon: amongst others, it may accept new or modified decision programmes (i.e. learning), or change the project staff, increase control, change the scope of the project, or even terminate it. In case these measures are not effective and the dynamic of the project effectively deciding about its own decision premises reaches a critical level, a project 'escapes' the autopoietic gravity of the organisation and forms a self-referential organisation system on its own. From that moment on, the organisation and the project are environment to each other. It is hypothesised that in their initial stages, projects are organisation bound, after that some projects remain organisation bound (as differentiated units) whilst others may transform into autopoietic projects. Inter-organisational projects are likely to operate as autopoietic projects early on as they do not originate inside an organisation. In such cases, the presence of a dominant project owner organisation may be of influence and can still make the project organisation bound, at least in its early stages.

A central issue is of course, how such systemic changes process-wise can be brought about. My central tenet here is that it basically runs over interaction systems. Luhmann argues that an essential aspect of organisations is that they are able to feed the thousands of interactions that occur between the members of the organisation back into the decision-making autopoiesis of the organisation. This is made possible by the existence of decision-making premises, which we can imagine as acting as a router to channel interaction communication into the recursive decision-making process. Luhmann actually speaks about the 'miracle' that organisations accomplish, when he refers to their ability to adjust enormous amounts of interactions to each other (Luhmann, 2021a, p. 837).

Although the interaction systems form 'within' organisations, they do not coincide with the organisation system, as they are themselves operationally closed in their communication. Moreover, they can eventually 'usurp' the influence on decisions (Luhmann, 2000, p. 25). Interaction (systems), although in principle ephemeral, can assume structural qualities if repeated over time; Luhmann uses the terms 'eigen-states', 'eigen-developments' and 'eigen-selectivities' (Luhmann, 2020, p. 448). We can consider a project as consisting of members who operate (partially) outside the standard operational structures and channels of the organisation (otherwise, it would not be necessary to initiate the project; in PBOs, this will be habitual though). We can assume that over time this project will form an interaction system with such eigen-properties. Kieserling, building on Luhmann's insights, extensively dealt with the subject of interaction

systems within organisations (Kieserling, 1994, 1999). He reasons interaction systems as acting as a reservoir of adaption and flexibility for the organisation. Organisational overload and issues the decision premises cannot handle are shifted-off into interaction systems. Interaction systems are simple in structure and are highly flexible in processing and changing themes. Thus, they can come up with material that the organisation can use to adapt its decision premises (Jäger & Coffin, 2011). Interaction systems can 'solve' the problems that result from the formality of the organisation or feed them back as irritations (p.64). The flow of themes in the interaction systems is not made up of the themes of the organisation; however, they always are the themes of the interaction system itself. In this sense, the interaction systems cannot be controlled by the organisation, but organisations may condition them to a certain degree. Kieserling calls this technification of interaction systems (Kieserling, 1999, p. 191). Within this approach, interaction systems are seen from the interest perspective of the organisation, and in the base case, the interaction systems are 'assisting' the organisation.

Jäger and Coffin discuss intensively what happens if the interaction systems turn into conflict systems: they get stalled and do no longer provide the elasticity and flexibility the organisation could potentially benefit from (Jäger & Coffin, 2011, pp. 121–143). In my view, there is another function of interaction systems, namely, that under certain conditions they are able to catalyse the genesis of autopoiesis of a project. We can say that as long as the decision premises still work as a proper router for a project, this project can effectively work within the organisation system, which is to say, constituting and contributing to the autopoiesis of the organisation system. However, if significant distinctions between the organisation and project emerge, the decision premises are not an effective router anymore; this implies that the communications that occur in the project interaction system are in effect decoupled from the decision autopoiesis of the organisation. Because projects are decision intensive and their progress is based on decisions, the eigenproperties of the project as an interaction system provide the leverage to make some own decision premises. When this occurs, the project is moving towards the horizon of autopoietic gravity. Normally, this will not go unnoticed by the organisation. The decision premises have alarm bells that will be triggered when some non-compliance is detected (Luhmann, 2000, p. 319). Some typical examples are the following: someone who should have been included was not involved in the decision, information was used to take a decision that was not circulated outside the project team, the project team defends a decision just by referring to time pressure and unavailability of staff, etc. Of course, this is where tensions and conflicts can occur, also in the principal sense in which Luhmann positions the conflict dynamics between the various social systems (Luhmann, 2019, pp. 22–24). The organisation will make efforts to keep the project within the horizon, applying some of the earlier mentioned retention measures, in order to effectively process the material produced by the interaction system. Should the router function of the organisation decision premises deteriorate further from the perspective of the project, the project will work increasingly with decision premises of its own. The deciding on decision premises triggers self-organisation (Luhmann, 2000, p. 226) and will propel the project further towards the autopoietic horizon. This dynamic is reinforced by the fact that projects are generally quite decision-intensive and a project will easily generate plenty of themes that contribute to this build-up. Another factor is that a significant part of the decision premises the project gradually generates is in fact parallel decision premises, and this parallel build-up does not necessarily trigger the alarms of the organisation. Decision premises are distinctions, and like any distinction, they have a marked and an unmarked side. If no crossing is made, the unmarked side remains the unmarked side, and then the organisation has little clue what is going on in the unmarked side. In other words, the project can make decisions, respectively develop decision premises, of which the organisation may not observe that these should be decided upon.

The distinctions between project and organisation generate a new level of dynamic when these distinctions take the form of the re-entry of the distinction interaction organisation into the project interactions. With this re-entry, the distinctions are factually reified and serve as the basis for the establishment of increasing self-reference of the project, propelling it closer to the autopoietic horizon and possibly beyond. The determining feature of crossing the autopoietic horizon is that eventually the project decides on its own decision premises. This constitutes the eigencausality that enables (decision communication) operational closure. It is not necessary, and in fact highly unlikely, that the project detaches from all of the decision premises of the organisation. From the perspective of the project, in order to pursue its objectives, there may be particularly good reasons to decide not to sever certain decision premises. The essential point is that a self-referential momentum has developed inside the project, and the project will uphold boundaries to sustain that self-referential moment. For a third observer, there may be a partial merge in the autopoiesis of the organisation and the autopoiesis of the project, but system technically, this is not a merge but communication in the contact system (Mohe & Seidl, 2011) between the project and the organisation. To

put the above into perspective, the gravity of autopoiesis principally causes interaction systems to work in the two ways that Kieserling describes. Still, in case significant distinctions exist between the organisation and the project, the decision-making urge of projects (they cannot pile decisions up) and, in particular, the teleologic nature of projects are two factors that may give the project sufficient momentum to move beyond the autopoietic horizon.

The organisation constructs its world through its decision premises. The world is the result of its decision history (Luhmann, 2000, p. 216). The world according to a project that crossed the autopoietic horizon is therefore another world than that of the organisation. When the above line of reasoning is accepted, it has the system-theoretical implication that a series of disparate reflective observations of an interaction system may enable the constitution of autopoiesis and thus world construction.

4 | RESEARCH QUESTIONS AND METHODOLOGY OF CASE STUDY REVIEW

The framework outlined in the previous chapter is the foundation for a theory-led qualitative longitudinal field research, which will follow several projects over the period of 1 year starting mid 2024. The research will investigate the operational meaning of the five distinction dimensions for the communication and decision-making processes that occur in the project and between the organisation and the project.

As preliminary research for the above-mentioned field research, several acknowledged papers on case studies of projects have been critically reviewed using the theoretical framework presented in the previous chapter. Papers were selected that contain sufficient detailed information on what happened in these projects and that provide clues regarding the five dimensions of distinction. Four reviews are presented in this paper (see Table 1). This analysis is intended to yield basic insights into the validity of the conceptual model. Furthermore, it contributes to the operationalisation of the distinction dimensions and investigative directions when it comes to dedicated field research. In the next section, the results of this case study review are presented.

The review of the case study accounts is oriented along the following research questions:

1. Based on the case study account, what inferences can be made regarding distinction on the five distinction dimensions?
2. Based on the case study account, what inferences can be made regarding decision-premises used by the organisation, respectively the project?
3. Based on the case study account, what inferences can be made regarding the organisation bound or autopoietic character of the project?
4. Based on the case study account, what inferences can be made regarding the dynamic of the project as an interaction system?
5. Based on the case study account, what inferences can be made regarding the world of the project in relation to that of the organisation?

Associated with the research questions, the analytical framework predicts the following tendencies to be found in the case study review.

In case of no or moderate project–organisation distinctions, projects are more likely to use decision premises that are shared with or acknowledged by the organisation; projects are likely to be of type organisation bound; the dynamic of the interaction systems will be assimilative; and the world views of the project and the organisation will largely overlap.

TABLE 1 Reviewed case study papers.

	Project	Basic topic of source paper(s)
1	Heathrow Terminal 5 (Brady & Davies, 2014; Davies et al., 2009, 2016; Gil et al., 2012; Gil & Tether, 2011)	Analysis of two megaprojects from the perspective of complexity, dynamic capabilities; trade-off and risk management with respect to adaption of innovations
2	Swedish rail tunnel project (Eriksson & Kadefors, 2015, 2017)	A longitudinal case study design phase of a major railway tunnel project regarding the usage and impact of heuristics
3	Real estate construction project in a Nordic country (Toivonen & Toivonen, 2014)	Case study analysis of a construction project which suffered huge cost overrun and the consequential changes in the governance relation between the parent and the project organisation
4	Implementation of CRM system in France (Beldi et al., 2010)	Case study analysis of the implementation of a new CRM system in a French telecom firm. The study follows the various stages of the project, from inception to implementation and roll-out, and pays particular attention to the reactions the project team encountered

In case of high or critical project–organisation distinctions, projects are less likely to use decision premises that are shared with or acknowledged by the organisation, and struggle between the organisation and project associated with decision-making is likely to be indicated; projects are likely to classify as type autopoietic; the dynamic of the interaction systems will be divergent from the organisation; and the world views of the project and the organisation may show deviations of significance.

5 | RESULTS

5.1 | Project 1 – Heathrow terminal 5

The extension of Heathrow Airport with a new fifth terminal was a project of BAA (British Airports Authority), a state enterprise that was privatised in 1987. Given the number of external staff involved, the technical challenges, the pressured time frame and external know-how involved, a megaproject like this is almost inevitably destined to emerge as an autopoietic project. I will argue that until the very end it actually operated as an organisation-bound project. This is equivalent to stating that the T5 project could rely on the decision premises of the project owner organisation BAA, and there are three major reasons for this.

First, there was a very long preparation phase which lasted from 1989 to 2002, in which year the T5 project was formally kicked off (Gil & Tether, 2011, p. 421). During this period, decision premises and particularly decision programmes could be firmly established. BAA devised a project structure such that its decision premises were in fact capable of handling the decision load. A differentiated unit was created, headed by an executive director who was a member of the executive board. Furthermore, BAA positioned the best of its own staff on all key decision and communication points (Brady & Davies, 2014, p. 28). This way BAA created a business unit of around 200 people, predominantly of its own staff and persons specially recruited for the project (Davies et al., 2016, p. 33; Gil et al., 2012, p. 456). Instructed by the CEO of BAA, who worked in manufacturing industry, the T5 unit abandoned the project-as-a-tabula-rasa approach and strived to 'adopt successful lean production techniques found in automobile, retailing, and other high-volume industries to achieve an orderly, predictable, and replicable approach to project design and delivery' (Davies et al., 2009, p. 114).

Second, the project owner assumed the cost risk, implementing an innovative cost-plus agreement closed with all contractors (Brady & Davies, 2014, p. 27). This logically implied that important decisions necessarily were routed through the decision premises the organisation had available for this, and thus an essential part of the decision-making was tied into the recursive decision-making process of the organisation itself through the transparent governance structure, in which the operative T5 project board reported to the T5 Executive Board, which in turn reported to the BAA board (and had a linking pin with the BAA board) (Gil & Tether, 2011, p. 420). Time was another essential risk factor as BAA had publicly committed to the delivery deadline. This decision premise was consistently maintained when making decisions on change proposals or other factors that potentially endangered the schedule (Gil et al., 2012; Gil & Tether, 2011). This shows how cost and time were clearly 'BAA matter' and dealt through decision premises that were essentially BAA's.

Third, throughout its duration, the project relied heavily on written documents. These contributed strongly to the self-description (Luhmann, 2000) of the T5 project organisation. Examples of this are the T5 agreement (the standard [sub]contractor contract, containing many contextual-steering parameters), the T5 handbook containing detailed project management processes and procedures, as well as BAA's Continuous Improvement Project Process (CIPP). The CIPP was implemented in the preparation phase, but the approach continued during the project phase (Brady & Davies, 2014; Davies et al., 2016).

As a result, the recursive decision-making of the organisation itself was upheld. Mention should also be made of the inclusive project culture that was established by BAA and strongly iterated during the course of the project, and deviant behaviour was 'brought back into line' (Davies et al., 2009, p. 33). This resulted in a sense of identity of the project and contractor staff (Brady & Davies, 2014, p. 28), the identity in fact belonging to the organisation of the project owner. So, we can say that this sense of belonging to the project was in its effect a sense of belonging to the organisation of the project owner. This can be seen as reinforcement through interaction systems (informal culture).

Conclusively, we can state from a social systems perspective that the project configuration of integrated (sub) project teams operated within the boundaries of the project owner's organisation as a differentiated unit. The world according to the T5 project was therefore the world according to BAA.

5.2 | Project 2 – Swedish STA railway tunnel design phase

This project concerns the basic design phase of an urban railway project which took place in the period 2011–

2014. The project owner organisation, Swedish Transport Administration (STA), no longer performs any construction work and does only little design work; its task comprises top project management, project managers, technical experts to supervise and review supplier designs, and administrative personnel. The case study account reveals little about the relation between the project and the wider STA organisation. Nevertheless, I will be able to make a statement on this relation, as I will argue that autopoiesis could not develop within the project, the project logically operated as an organisation-bound project by default. Moreover, I will argue that missing self-referentiality was the root cause of the problems this particular project configuration came to face.

Large parts of the design work were contracted to external engineering firms (Eriksson & Kadefors, 2017, p. 496). Significant for this project was that in the early design phase, the project work was separated into two major categories: a technical block responsible for requirements and a design development block. The first block comprised 11 small technical assignments, divided based on discipline, whilst the four larger design assignments in the second block were divided geographically. This setup was chosen in order to maximise the involvement of specialised firms (p. 496). An STA-expert (pp. 496–497) headed all assignment teams. Both the technical and the design assignment resorted under a technical, respectively design leader who reported to the design manager, who was a direct report to the project director (all STA staff). In addition, there were two coordination assignments staffed fully with consultants (p. 496). This rigorous split-up created a configuration of relatively small subprojects, in which each subproject was highly dependent on input from other subprojects and decisions from STA. The assignment teams were kept as small as possible. However, this limited the contact the subproject leaders had with project top management and other areas of the project (p. 498). The project was characterised by struggle for coordination and ensuring an adequate flow of information throughout the project structure. An example of this can be seen in the cooperation workshops: organising issues were brought up in Increased Cooperation workshops, but these were infrequent and included only a subset of consultants. The situation of frequent information hold-up was recognised by the project top management, and as a result, project staff was told to use existing meetings, talk informally directly to each other and be more active in seeking the information they needed to perform their tasks. This was not effective, however, and participants still experienced that the information did not flow as intended. As a result, the STA project top management started to communicate essential information more broadly and, eventually, introduced lunch seminars involving all STA experts (pp. 488–500). During the course of the project, it was decided that the design content should be decreased (less detailed, limited to conceptual designs) in a move to reduce complexity and coordination of information. However, this led to uncertainty on what should be the allowed minimum and maximum content (p. 489). Although many bottlenecks in coordination and information were perceived and voiced, no substantial changes were made in the project setup. Project staff, particularly the external staff, perceived they were very often involved in ad-hoc coordination work (p. 500).

Because the decision-making was evidently made in the STA organisation, this project can be classified as an organisation-bound project. The individual assignments can be seen as interaction systems, and as a result, little formal decision-making occurred in the internal cycles of these subprojects. This severely limited the extent to which the subprojects could mutually adjust to each other, as they were lacking the decision-making capacity to do that effectively. This explains the great need for coordination that emerged during this project. The authors mention the lack of attention for this need for coordination (p. 489,499), but using my theoretical lens, the issue is not whether there was more or less attention to coordination, but rather that the chosen model required much more coordination to be able to operate, that is, to uphold the recursive communication and decision-making process. The account indicates firmly that decision premises were not clear for the project staff. The essence of decision premises is that they are widely recognised and are undisputed, but this can only be achieved through intensive reflexive work. The project director mentioned in the interview that everyone wants to know everything and complained about the attitude 'I don't believe it, unless I hear it from you' (p. 498). From the perspective of the project director, this was a shortcoming of the project staff and an exaggerated need for information and confirmation without real added value. Using the social systems lens, it is about the establishment of system boundaries and creating self-reference, for which decisions about what communication belongs to the (decision-making) organisation and what does not, are essential. The fact that only a (varying) subset of persons participated in the coordination meetings implies that no effective reflexive activity to build self-reference occurred; therefore, decisional autopoiesis could neither operate within the full project structure. Furthermore, the account that there were few formal occasions where project members evaluated and reflected on project organising implies too that there was no reflexive activity to build self-reference. The authors discuss the routine-like use of heuristics as instances of organisational practice.

One heuristic was that the results should be 'good enough' (pp. 501–502). This was a repeated message to the consultants from the project director and design manager. From my theoretical perspective, is it interesting to recognise the function of such a heuristic in this particular project setting: in fact, this was a move to limit the decision-making capacity that would need to be built, which must be understood in the context that there was an overburdened situation in the first place. The lion share of decision premises that were brought to the project was contained in the expert knowledge and routines of a previous project. What was missing were the governance-type of decision premises, which with the integration and coordination problems that were created as a result of the fragmented structure (which was used for the first time) could have been addressed. STA itself had no clearcut decision premises regarding the way of running a project; hence, this was at the discretion of the project director, a fact that is underlined by the observation that the first and second project director had quite different ideas about the importance of integration in the first place (pp. 496, 498). We can speak thus of scattered decision premises. Only at the very end of the project, when an end product had to be delivered, some integrations were inevitably made: closing of design reviews and connection between permitting and design (p. 500). The interaction systems were too much in the margin of the decision-making configuration and too scattered to be able to contribute to initiation of reflexivity. Scattered decisions went hand-in-hand with scattered observations. This can be illustrated with the account on the bonus system that was used in the project (Eriksson & Kadefors, 2015). A bonus system was introduced to foster innovation and creativity. The task to manage this bonus system was given to the Cooperation Group. As already said, only six external project staff could sit in on the Cooperation Group, less than half of the 15 subprojects. The criteria applied were quite fuzzy, and less nominations were made than expected. After 1 year, the task of managing the bonus awards was taken over by the design management team of STA. Most of the awarded nominations were for cooperation rather than innovation (Eriksson & Kadefors, 2015, pp. 152–154).

An interaction system like the Cooperation Group, in the situated context of scattered decision premises and representing, can hardly be expected to come up with a clear and transparent decision frame for defining the criteria for nomination and evaluating them. So, in order to get decisions, this had to be moved to the STA organisation, where the overall project decision-making process occurred. During the project, most of the external staff had no clear picture of the nomination process. The assignments that were not represented in the Coordination Group said that the bonus system did not affect their efforts in any way. None of the external staff stated that the bonus system had any influence on their way of working. Additionally, amongst the STA staff on the project, there were mixed views. Whilst the project director was relatively positive, the design manager was quite sceptical (Eriksson & Kadefors, 2015, pp. 155–156). These scattered observations of a system that is actually intended to foster common goals could exist because of the lack of decision premises and the incapability to build recognisable decision premises, which in turn was caused by the incapability of the interaction systems to produce 'material' to contribute to this.

5.3 | Project 3 – Millbrook real estate construction project

The Millbrook project scope is the construction of a shopping centre in a Nordic country during 2010–2013. The project was awarded to a real estate and construction company. A particular division of the company was responsible for the execution of the project and the division assigned this task to a project team (Toivonen & Toivonen, 2014, p. 1362).

Within the chain client—construction company—project, the object of analysis is the relation between the construction company and the project. The relation between the client and the construction company is sketched as purely contractual, so the issue of organisation bound versus self-referential is not relevant here. As for the relation between the construction company (as a PBO-like organisation) and the project, I will argue that the project was an autopoietic project, which is to say that the project organisation operated with its own operationally closed decision-making process. The case study account states that the project manager and his team formed a unity; the core team under the project manager largely remained the same and they shared similar values that had been enhanced over several years of working together—there was strong loyalty and sense of identification with the team (pp. 1364–1365). Moreover, relative distance from the subsidiary office further reinforced the strong unity amongst the team members. The project manager had the authority to sign virtually every document pertaining to the construction site, whilst the need for the division manager's presence on the site was limited to delivering ceremonial speeches. The authors therefore conclude that '...neither the top nor the subsidiary management had a meaningful or visible role in the monitoring of the site' (p. 1365).

The above-mentioned points clearly to the existence of a closed operational process of decision-making. The

unity the project displayed, the fact that the project employees trusted their project manager and were loyal to and identified with their project organisation, are all indications for strong self-reference of the project organisation associated with the autopoietic operation. Moreover, autonomy and empowerment were granted to the project team by the division organisation, which leads us to conclude that the parent organisation contributed to enabling this autopoietic operation.

The organisation–project relationship, in which the organisation was hetero-referential for the project, is illustrated by the observation that the project team was not particularly reliant on receiving the bonuses which were allocated by the organisation (p. 1365). The self-reference versus hetero-reference was manifested very sharply when it had become clear that the project was not going to be financially successful. The client was considered by the project team as failing to be a responsible client, and this view of them as a common enemy initially strengthened project team unity. At the same time, the top management held the project team responsible for the serious budget overruns (p. 1365). The account furthermore states that the project team engaged in a sense-making process of the situation which led to instances of blame finding and scapegoating. The construction of an enemy and the scapegoating can be seen as distinction-generating means of sustaining self-referential mechanisms in face of threats. The reactions of the project team to the interventions of the organisation further illustrate the self-reference versus hetero-reference issue. The behind-closed-doors cooperation of the top management with the client amid an ongoing legal battle raised some intense informal discussions around the coffee table and corridors that were coloured with cynicism and disbelief. In the perspective of the project manager, there was a hidden agenda, and he was quite suspicious of the actions of the organisation (pp. 1366–1367). This indicates that the project viewed its interests as standing apart from the interests of the organisation. The worlds of the organisation and the project stood very much apart from each other.

The account of the project tells us that after a new CEO was appointed, the governance relationship between project and organisation changed dramatically. So far, governance interventions had been fairly absent, and the organisation pursued a laissez-faire approach. The direct intervention made by the top management was a trigger particularly detrimental to the team unity of the project, which in the social systems lens tells us that the intervention compromised the autopoiesis of the project. As so far neither the top nor the subsidiary management had had a meaningful or visible role in the monitoring of the site, for obvious reasons, the new CEO opted for monitoring and tight supervision of operations to close perceived information gaps. Top management initiated a recovery plan, prepared and implemented under the direction of an external consultant (pp. 1365–1366). This is a typical switch of governance approach in times of project crisis, in my lens it can be seen as an effort to 'bring back' the project into the organisation and to create unified perspectives between the organisation and the project. Nevertheless, this severely compromised the autopoiesis of the project organisation: the atmosphere within the team was destabilised, the project manager was compromised as a person and in his leadership, a blaming game was set in motion. Thus, the respective world views did not consolidate.

The project was finally completed with a substantial loss and the overall conclusion was that the real mistakes had been made in the tender and contracting phase and the project team was not responsible for the great loss that was incurred. It was only at this moment that we can speak of a reconciliation of the world views of the project and the organisation. As a lesson learned, a new position for supervision of large projects was created, as a liaison between large projects and top management at the group headquarters. It is precisely the emergence of different world views that can be managed (to an extent) by such a liaison function.

5.4 | Project 4 – CRM project at French telecom firm

This case is interesting because it follows a project from inception until implementation and roll-out (2001–2003). In my theoretical model, in the inception phase any project operates as an organisation-bound project, and under certain circumstances, some projects emerge in later stages as autopoietic projects. I will show that for reasons in accordance with the model, this particular project operated as an organisation-bound project throughout its existence.

Projects like this will as their base case tend to be organisation bound because the own organisation is the scope of the project, but still may emerge as autopoietic projects. In such relatively complex projects, involving both technological and organisational changes, 'techno-change' as the authors call it (Beldi et al., 2010, p. 341), unexpected emerging perspectives necessitate both a detailed understanding of the dynamics of the organisational processes, as well as knowledge of the intentions of the actors and the IT characteristics. Such circumstances may function as a distinction, and the further course of the project then depends on whether the organisation has the decision premises available to handle the

situation or can initiate the reflection that is needed to modify the relevant decision premises. However, because these are 'business projects' that are directly related to the business model—in this particular project even directly to market share and profitability—the autopoietic gravity of the organisation will always be strong.

As outlined in my conceptual model, several dimensions of distinction are ultimately responsible for the emergence of autopoietic projects. The account of this project provided several clues regarding the dimensions of distinction in this particular project. There was a low distinction on human resources: the central project team is composed of the project director, the change management director, senior users representing the CRM modules to be introduced (i.e. sales process national manager, national manager of customers' claims process and national manager of direct marketing process) and the human resources change director. As for the technical IT scope, an internal unit was charged with the technical customisation of the CRM software and its adaptation to the needs of the end users, as defined by the project central team. This unit was affiliated to the central information system department. This, too, points to low distinction on HR as well as low distinction on technology. The account mentions that 'typical' tools of IT projects were used in standard processes. Furthermore, it is stated that 'the way the development of a software package evolves depends on a series of routines and accepted norms, which guide IS project management in our corporation' (pp. 344–345). This is indicative of low distinction on know-how and informs us that existing decision premises sufficed. The case study account shows that the organisation and the project team were generally in agreement with their decisions, for example, the key decision to implement only the frontend CRM (p, 344). An important characteristic of organisation-bound projects is that they, unlike autopoietic projects, are heavily dependent on the decisions of the organisation, and the timeliness of these decisions impacts directly on the progress of the projects. In this particular project, before the piloting phase, organisational and managerial problems appeared in unexpected ways, which were as a consequence difficult for the project management team to resolve. This is indicative of organisation-bound operation. Because the project team was linked to organisation operation, it could not proceed. Stress on decision-making occurred in this organisation-bound setting, as both the organisation and the project team had to accommodate. The two phases of piloting and rolling-out were characterised by uncertainty, ambiguity, confusion and the emergence of unforeseen factors (pp. 345–346). The account of the authors gives a particularly good example of what happens when, in situations like this, the decision premises of the organisation are (temporarily) not adequate and the project will move towards the horizon of autopoietic gravity. In the phase that internal/external pressures and political conflicts affected the project team directly, from the perspective of the organisation, it seemed incapable of conducting the required changes in a predictable and linear way. In this phase, the project director limited the role of the team project to that of an advisor, who provided support and aid to local agencies (p. 346). In effect, the project team's wings were clipped, and thus escapades beyond the autopoietic horizon were blocked beforehand. At the same time, turning the project team into an advisor relieved the project team from decision-making load, which might have enhanced its role as an interaction system that provides reflexive information to the organisation. Referring to the feedback of the local managers, who were responsible to implement the CRM system with the support of the CRM team, this did not happen. Local managers perceived the communication content as too global and not relevant to the specific constraints they faced (p. 347). The authors point out that the scope of the CRM team was too narrowly focussed on technical issues, neglecting the organisational issues (p. 348). Given this limited assignment, it may have been an obstacle for the project team to become reflexive on the organisational issues and 'problematise' them in the interest of the local agencies. The organisation-bound operation of this project was also mirrored on the other side of the project, the local offices where the new CRM system was implemented. First of all, the achievement of the BPR associated with the CRM seemed to cause a modification in the boundaries between the different functions in the local offices. Several local managers perceived the communication content as too global and not relevant to the specific constraints they faced. Therefore, likewise to the project team, local managers too were on their behalf limited by the organisation-bound nature of the project, and their progress was dependent and at times stalled by the decisions that were made on an organisational level, to make it quite clear, decisions taken by the organisation and not decisions particularly made by the CRM project itself.

6 | DISCUSSION AND CONCLUSIONS

We can regard a project as the completion of a task, in that sense as a unity, although this unity is composed of many subtasks of varying complexity over a shorter or longer period of time. This is the perspective that Luhmann takes when he argues that projects cannot be seen as organisation systems because they funnel towards

TABLE 2 Reconstruction of case study accounts according to social systems approach.

	Distinction	Organisation bound/ self-referential	Decision premises	Role of interaction systems	World view of project
P1	No significant distinctions for output, know-how and technology as a result of long preparation period; no distinction for time structure as BAA staff on all key positions and delivery date was priority from start till end; no critical distinction for human resources as BAA staff on key positions and strong integrative culture	Organisation bound	Long preparation period put essential decision premises in place; T5 contract ensured involvement of BAA executives in major decisions; only proven technologies were admitted; priority of delivery date provided strong rule for decision programmes	Because of high number of BAA staff, most interactions would have had BAA staff amongst those present; intensive effort on integrative culture of trust and cooperation; T5 handbook was likely practically supporting; reflexive ability was established through quality management early on in the project	World view of the project coincided with that of BAA: a landmark project was going to be delivered, in cooperative approach and on time
P2	Certain level of distinction for output and know-how, as STA had stopped doing in-house engineering and was heavily reliant on external firms; significant distinction for human resources; no distinction for time structure as this was the discretion of project top management; technology was not relevant in design phase	Organisation bound	Decision premises were located in STA organisation, feeding the decision premises with synchronised information was a major issue; efforts to reduce decision load (satisficing)	Subprojects as interactive systems did not have an interactive or reflexive role; setup of configuration was too fragmented;	Exploitative world view: Extract as much know-how as possible with lowest cost possible, this probably coincided with the view of STA organisation; it is questionable whether on the subproject level this view was shared
P3	Distinction for output, know-how and technology as these were highly localised; low distinction for human resources as project relied on organisation's staff; high distinction for time structure, as this was also highly localised	Self-referential	Decision premises were predominantly localised in the project	No overlapping interaction systems between project and organisation	Project regarded client and organisation as not trustful; this was reinforced by negotiations between client and organisation. Organisation regarded project as staffed with loose cannons
P4	Some distinction for output, as CRM system was one-off project; no critical distinction for know-how and technology as mostly standard software solutions were applied; distinction for organisation change know-how is an issue though; no distinction for human resources as project was staffed with organisation personnel; no apparent distinctions for time structure	Organisation bound	The project could run with decision premises of the organisation (business, IT, HR, etc., executives represented in central project team); as for organisational change, the decision premises were reduced to the person of the local managers, who then struggled to establish a connection to previous decisions	Frequently views emerged from interaction systems, labelled as 'political', 'pressures', 'issues'; these could not be used as reflexive input as applicable decision premises were not present nor developed	The new CRM-system is a tool that will improve competitiveness; therefore, the local agencies will benefit from implementing and using it; 'political' issues are an impediment to this

a natural ending, with continuously decreasing margins for decision-making (Luhmann, 2019, p. 419).

In this paper, I addressed the communicative reality of projects, which has an organisational and interactional component. I argued that projects can either be seen as organisation-bound projects which are differentiated subsystems which progress along the decision premises of the organisation or as operationally closed projects with boundary-constituting decision premises (autopoietic projects).

I reviewed the case study accounts of four papers to assess whether this conceptual lens offers relevant insights to the study of projects. This approach rendered some valuable and specific interpretations. The analysis indicates that the presence of distinction on the five dimensions can be related to the organisation-bound or self-referential operation of a project. Differences in world view between the organisation and the project were much more pronounced in the case of a self-referential project. The analysis further provides support for the thesis that interaction systems have an important role in the project dynamics and the connection with decision premises, which is particularly sensitive in the case of projects, appears to be a key factor.

The major observations are summarised in Table 2.

The analysis of the four case studies, and that of the Heathrow T5 project in particular, shows that Luhmann's conceptual framework makes a significant contribution to the explanation of 'contextuality' as is put forward by several scholars on temporary organisations (Bakker, 2010; Burke & Morley, 2016; Koch & Sydow, 2013; Sydow et al., 2004; Sydow & Braun, 2018). In particular, the deployment of the concepts of decision premises and interaction systems constitutes a fine-grained analytical level. In addition, the concept of distinction dimensions is a useful alternative to the seminal taxonomy of Lundin and Söderholm (1995).

The STA project case and the CRM project case demonstrate that the binary perspective of the decision-making system (organisation) and the interaction system (Kieserling, 1999; Luhmann, 2000) renders a great depth of analysis. From this binary perspective, we can understand why the STA project meta level was faced with a huge decision-communication task, it could not timely handle. This caused information shortages in the interaction systems, which would again lead to increased demands to the meta level. The meta level was equipped with the decision premises to do the 'basic job', but lacked the reflexive capacity to achieve real improvement, because the interaction systems were too deprived to provide this. In the CRM-project, it can be seen that the CRM team was focussed on technical issues; thus, the project structure lacked the reflexive capacity to deal with the organisational and political ambiguities that were voiced.

The Millbrook project appears clearly as autopoietic, with strong self-reference and boundaries towards the organisation. The strong deviations in 'world views' between the organisation and the project can be interpreted as a result of this. Furthermore, this project shows decision premises that are localised inside the project and have no equivalent on the organisation level. The lack of transfer of decision premises from projects to the organisation is subject of the studies of Grothe-Hammer and Schoeneborn (2019) and Scarbrough et al. (2004). In connection with the Millbrook project, we may elaborate a further variation of the world according to the project, related to a fundamental element of Luhmann's theory, namely, that organisations are the only social systems that can communicate on behalf of themselves (Luhmann, 2000, pp. 388–394). This implies that projects can also communicate with their environment, whether they are organisation bound or self-referential projects. In the latter case, although the project then communicates on its own behalf, from the perspective of the environment it may appear that the organisation is communicating, as institutionally the project is perceived as belonging to the organisation. In this regard, a *The Matrix*-like parallel communicative reality is established. This 'disguise' actually facilitates the self-referential project in maintaining its autopoiesis. The intense cynicism, disbelief and individualistic conduct that took hold of the project team when the organisation started negotiations with the client and thus effectively took over the communication with the environment can be interpreted as breaking this 'matrix' and thus severely damaging the self-reference of the project.

If we follow the approach outlined in this paper, it transpires that the assumption of projects as external organisations, like it is posited by Grothe-Hammer and Schoeneborn (2019) or Mohe and Seidl (2011) is not tenable. Nevertheless, the 'follow the decision premises' approach that the aforementioned authors adopted makes a deeper understanding of the relation organisation—project possible. This paper makes moreover another strong case for the project-as-practice approach (Blomquist et al., 2010; Brunet, 2019; Hodgson & Cicmil, 2006). Furthermore, it shows that the study of interaction systems in organisations has a contribution of its own to understanding organisations, and in this case understanding the functioning of projects. The excellent contributions that have been made by Seidl (2006), Cour (2018) and Hendry and Seidl (2003) should be followed-up by studies of the intermediation between interaction and organisation systems.

As a closing remark, is it necessarily problematic if the world views of the organisation and the project diverge? Not necessarily, as the divergent world view of the project can ultimately result in a better project outcome (Kreiner, 2020). However, considering the uncertainty that often surrounds the decisions that have to be made in and with respect to projects, such divergent world views need a sufficient degree of reconciliation in order to come to effective decisions. Reflexivity is needed to achieve this, and this is a basic task for the governance of projects. I have proposed an outline of such project governance in a previous paper (Aal, 2022). Contextual steering (Fichter, 2003; Naujoks, 1994) in the form of structural couplings is a particularly important instrument. The essence of structural couplings is that they are reliably available for either party anytime when needed, and perceived beneficial for both sides. This can be achieved in the form of legal frameworks (PPPs), codes of conduct and standardised procedures. Structural couplings can only be very basic in scope though and should not be overcomplicated. As for situational steering, governance efforts should be addressing differences (Luhmann, 1997). Transparent metrics are an adequate reference, but steering on differences should be directed to the level of the decision premises that are in play in a given situation. This catalyses more reflexive discussions and prevents governance actors from jumping into the project, which is generally not helpful.

As stated in the introduction, projectification implies that impact on societies is increasingly made through projects (Wagner et al., 2021). Against this backdrop, the responsibilities of project governance take shape as well (Munck Af Rosenschöld, 2019). In the light of Luhmann's risk-danger distinction (Luhmann, 1991), this responsibility is even sharper visible, as projectification shifts the locus of generation of dangers increasingly into projects. Still, the observation and communication concerning these dangers, as well as eventually dealing with them, inevitably involves both the structural coupling-based steering between organisations as the project governance-based steering between the organisation and the project. Both levels of steering have their limitations, which ultimately adds to the complexity of society.

The critical review of the four case study accounts has of course obvious and significant limitations regarding the claims that can be made on such analysis. However, as a test of the feasibility of the proposed conceptual approach, it has served its purpose. The case study review results described here are a first step and must be further elaborated through in-depth multiple case studies in order to achieve a more profound and firm level of findings.

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RESEARCH ARTICLE

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What is a green capitalism? Insights from the social system theory

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Abstract

In this paper, it is argued that the economy as a social system is a *conditio* sine qua non to the environmental observations of the other social systems. Economic code of payment or nonpayment pre-code environment, observed from the other social systems (for example, politics and science). By using this approach, the paper discusses the ways in which capitalism as an economic program is interpreted by other systems most of the time as the conditio sine qua non for their own autopoiesis regarding ecological challenges.

It is debated that green *capitalism* is a form of a functionally differentiated economic system which is made as a *conditio* sine qua non for the other systems observation of ecological challenges. In the time dimension, money as a medium of economic system (and payment or nonpayment) comes first, and with it, tries to determine the ways other systems can observe ecology - and it is successful.

KEYWORDS

conditio sine qua non, ecology, economy, green capitalism, social system

1 | INTRODUCTION

In this paper, we address green capitalism from the perspective of social system theory. We explore how the economic system in contemporary western societies possesses certain qualities that position economy as a *conditio* sine qua non-system. In doing so, it enables the manifestation of phenomena such as green capitalism. In sociological literature, there has been an extensive critique of green capitalism (Johnson et al., 2020; Perez, 2016; Williams, 2024). These include the problem of integrating sustainability challenges into the framework of market reasoning and capitalistic inquiry - leading to the commodification of environmentalism or *greenwashing* - addressing climate change but in the service of a profit (Ferrón-Vílchez et al., 2020; Ruiz Córdoba & Candón-Mena, 2020). Hence, research has often concluded that capitalistic frameworks are not beneficial to contemporary environmental challenges. These approaches seek the comprehensive reevaluation of economic systems and priorities, proposing a shift towards collaborative, non-market-based solutions to foster genuine sustainability and address the root causes of environmental issues (Fox, 2023) - for example - *yes* to technology but no to the market mechanisms of late capitalism. Some approaches also invoke a metabolic school of thinking, which it is claimed can serve as a critical engine of change to the capitalist mode of environmental change. This critique is grounded in the concept of "metabolism," a term originated by Karl Marx to describe the interaction between society and nature, particularly in how capitalist modes of production inevitably lead to a "metabolic rift," a disruption of the natural cycles and processes essential for life on Earth (Prudham, 2009: 1600).

In this article, we start from a similar premise, but with a different aim. Rather than present a rift between the possibility of autopoiesis of the economic system and the performance capacity of the natural environment,

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observed by the economic system, we outline the nature of the evolutionary outcome of green capitalism. We aim to present green capitalism as a consequence of the economy as a social system in relation to other social systems and the natural environment. The theoretical basis for this draws on the social systems theory developed by Niklas Luhmann. With our approach we suspend moral judgments about capitalism, to facilitate a more analytical stance. Thus we posit green capitalism as an aspect of the dynamics and interconnectedness of the social systems where the system of the economy is pervasive in communication concerning climate change hence, economy is a *conditio* sine qua non in discourse about the environment.

Our innovation is interpreting through the time dimension in the scope of systemic analysis regarding green capitalism in particular. By introducing the systemic *conditio* sine qua non the thesis is that in capitalistically organized economics, sustainability must be ascribed as a potential for economic growth and economic-cultural hegemony in order to be considered viable for realization and the future. However, in a globalized society and free markets, capitalism is pervasive across most jurisdictions across the world and in the impact on the environment. The role of globalized capitalism suggests that attempts to address climate change economically are more compelling than generating economic growth at a planetary scale (Richardson et al., 2023).

The question posed in the title of this article requires a definition of the terms capitalism in general and green capitalism in particular. By capitalism we mean a structure of the allocation of goods and services under the condition that more capital is generated through the use of capital in various forms, to which an exchange value can and is assigned via a system-related operant construction of markets. Additionally, its primary characteristic is to build up capital in order to accumulate more capital (Wallerstein et al., 2013), making growth a necessity. This quantitative growth, or rather the construction of the possibility for it, is *the conditio* sine qua non for connectable communication in the economic system. In green capitalism, this growth, which can be measured in terms of monetary currency or gross domestic product, should be decoupled from resource consumption and the burden on natural sinks for greenhouse gasses and waste (Brand, 2016). We can differentiate between relative and absolute decoupling. Relative decoupling means a reduced natural impact of economic activity per unit produced or service invoiced. Absolute decoupling, on the other hand, is the reduction of the impact on nature with an overall growing economy. In order to maintain the habitability of the planet for humans in its current form, absolute decoupling must be achieved (Heyen, 2019: 40, Haberl et al., 2020: 34). Apart from the fact that many authors do not believe that absolute decoupling is possible (f.e. Haberl et al., 2020) and that it has not yet been empirically proven (Haberl et al., 2020: 5), the sequence that enables or prevents climate and resource-conserving actions in all forms of society appears to us to be negatively asymmetrical in the time dimension compared to the scenarios of the scientific system.

2 | THEORETICAL BACKGROUND AND THE STATE OF RESEARCH

Systems observe each other, and even if contradictions exist, it is treated as a sort of environment by the system to which some other system is opposed. Even in these contradictions (to the structural couplings), the system will respond rationally - in its own interpretation of its environment making autopoiesis with it - possible. However, that does not mean that society functions as a whole purely because of system communication alone. According to Luhmann, system closure and binary code ensure and prioritize its own rationality (Luhmann, 1995). Every system exists for itself, and every functional system, along with observing the environment, reconstructs society (Luhmann, 1989: 107). Luhmann extends his thoughts about the relations of the social systems:

> [...] *every binary code claims universal validity, but only for its own perspective. Everything, for example, can be either true or false, but only true or false according to the specific theoretical programs of the scientific system. Above all, this means that no function system can step in for any other. None can replace or even relieve any other. Politics cannot be substituted for the economy, nor economy for science, nor science for law or religion nor religion for politics, etc., in any conceivable inter-system relations*. (Luhmann, 1989: 109).

For Luhmann, attempts at replacing or even positioning a system as dominant are manageable and real, but come at the cost of dedifferentiation, which negates functional differentiation (an example being socialism, which attempted to create a social/cultural program for the economic system, what means that the political systems determined, what should be paid or not (see Županov, 1995).[1] Systems operate in perpetual support or

[1]Luhmann would call these phenomena *programs*. For Luhmann, capitalism as well as socialism or any other form of exchanging money for goods for labor is a program. This program indicates the way in which binary coding is used. (Luhmann, 2021b: 750).

burden, but the principle of non-substitutability of functions always holds. The economy, therefore, cannot replace politics in its code or functions and vice versa.

Yet, despite all that, it's hard to overlook the empirical ways the economy is infiltrating other functional systems. It can be explained via the term structural coupling (Luhmann, 2021b: 779). However, the code of the economy – payment/no-payment – becomes influential in the functioning of other system codes. Uwe Schimank and Ute Volkmann even speak of an economization pressure on other spheres of the functionally differentiated society (Schimank & Volkmann, 2017: 33). Elena Esposito speaks of an adoption of the economic in the dimension of time and says that "today's time is the 'time of money' - a time that is obsessed with money and tries to find a trace of the meaning of society and its developments in money and in money movements" (Esposito, 2010: 11) and is "maintained by both capitalists and anti-capitalists" (Roth, 2015: 108–109, See also: Boltanski & Chiapello, 2003: 68). For instance, to address something scientifically as true/false, we need to pay for the publishing of the truth. We need funding for scientific projects. And this funding brings with it economic expectations, ranging from fixed budget ceilings to research targets that enable profit maximization for specific, unspecified organizations or even for the project itself (Schimank & Volkmann, 2017: 35). For example, the commodification of science extensively researched (Baskaran & Boden, 2007; Jacob, 2009, 2011), can be viewed in two distinct ways. Firstly, as the imposition of capital logic and neoliberalism into the scientific realm (de Oliveira & Barbosa, 2013) or as an ideology - program or a narrative of a one-sided economically globalized world society (Lambach & Hofferberth, 2024: 98). Here, the scientific system is both adapted to and dependent on the economy. Psychic systems within it (academics) reproduce economic dominion over themself. Thus, academics are both promoters and victims of this commodification (Jacob, 2003).

We could use system theory to explain this intrusion. The intrusion is neither absolute nor does the economic code wholly dominate the scientific system. Considering Luhmann's notion of autopoiesis and systemic closure, we might argue that this economic intrusion is merely how the scientific system responded to the economy as an environment. The challenge with this environment is that it benefits the economic system (Baecker, 2020: 104). Mazzucato (2019: 21, 2011) and Göpel (2021: 142-144) show some examples of how the state enables economic communication through funds that generate innovations in science. One could argue that the state is in charge of money, but even the state needs to regulate spending (payments) and decide who gets what. Payment/no-payment has become an integral part of the environment which is reduced in its own complexity by the scientific system – and by it making it an integral part of science. Transparency in academic science is hindered by the closed nature of entrepreneurial scientific events due to patents and other exclusion of the general public due to events in the political system structurally linked to the legal system (Stichweh, 2016: 131–132) so unequal conditions apply in the temporal dimension, in which knowledge can produce scientifically or economically connected communication.

The science-economy example is just one of many. The same could be said about the structural coupling of the economic system in the same place as education, politics, religion, law etc. Some aspects may seem as dedifferentiation of the social system as a whole from one perspective, but also as ongoing functional differentiation of subsystems with the economy playing a significant role. However, to say that the economy plays a significant role does not imply that the economy is hierarchically superior in the conventional understanding of hierarchy as a term. There are also observer positions based on systems theory. Roth et al. (2018: 45) come to the conclusion that religion is "the most dominant system in the 19th century, whereas the political system is dominating the 20th century". They observed the frequency of certain word combinations of observers (social dimension), while in our approach we observe the temporal dimension in the sequence of observable systemic events. In this way, both results can be true at the same time in an ambiguous world with different observer positions.

In our systemic approach, to assert that the economy is *conditio* sine qua non-means that it is a system with a wider potential to grasp the environment with its own code (basically it depends on the time dimension). The code of the economy has become a precondition for system communication, because "a current operation creates the premises for subsequent operations" (Esposito, 2010: 36). In order to fulfil their purposes or expectations, the subsequent operations require resources that can only be procured through events in the economic system. Whether the economy is perceived as an intrusion (environment) or engaged through structural coupling, the code of payment/non-payment sets the stage for further reduction of complexity in other systems. Thus, the economy, for other systems, can be viewed as a gatekeeper for their further autopoiesis. To reduce complexity one must take into consideration an environment that is already, in some manner, reduced by the payment/non-payment dynamic.

It is not just about the point of communication or irritation between different systems but about an entanglement in which the economy determines the ways other systems will reflect on the environment, because,

dominantly, the economy is environment for other systems, but the non-economic environment is also predefined with economy as a condition sine qua non. So it is a structural coupling but one which in a time dimension sets up the condition on which the situation plays out. The condition is economy via the medium of money.

This does not suggest that other systems no longer operate on their codes or lack the capacity to be autopoietic. It's about the economy being a mandatory requirement for other systems to enact these attributes in the contemporary world. Thus, we refer to the preconditioning of the environment for other systems in society. It is all about time in which the economy jumps on the pure environment and by doing so, it makes this environment already of a sort for other systems to observe and reduce complexity. In a way, the process of re-entry (reference Luhmann) is facilitated by the economic code.

We have already considered the relationship between the scientific and economic systems in this matter, but we can also examine the relationship between education and the economy. The core code of education, conveyance/non-conveyance (Baraldi & Corsi, 2017, p. 61), is influenced by the economic code of payment/non-payment. The commodification of the world around us provides numerous examples, but one of the most common are increasing costs of student loans (Jawahrani, 2022; Watson, 2019). After all, for the conveyance/non-conveyance code to function, certain preconditions are necessary, one being that this conveyance should serve the market's needs post-graduation. Every conveyance must ultimately be payable. Shumar (1997) critiques this commodification, arguing that such a treatment of education disrupts its primary purpose. However, in our approach, the market does not undermine the purpose of education but rather gives it a direction. As long as students repay their loans, they receive a transfer of knowledge. Thus, the code of education has not been replaced; it has merely observed the environment, with the help of the economic code (which is also the environment being observed). It is about an economy, which responds more swiftly to the environment and provides its own input for other systems in observing the environment. Therefore, we could say that it is a condition sine qua non-system in the manner of opposing itself as an environment to the other social systems.

3 | ECONOMY AS A CONDITIO SINE QUA NON SYSTEM OF WESTERN CIVILIZATION

By our analysis, the economy has more importance, only if we consider the temporality of the complexity reduction that is happening. It is the economy that comes before other systems in environmental observation. Before actions happen that a system theorist would interpret as a destination value in a system, in almost all imaginable cases in capitalist systems there is first an action that a system theorist would interpret as a destination value or at least its expectation. The economic system thus becomes a sine qua non in the Western world. So, we must add a time dimension to our definition. It is not that the economy dominates other social systems. They are still operationally closed. But the economy deals with the environment, contaminating it with its own code; it reduces the complexity of the environment, presenting itself as an environment to other social systems and not as Fritz B. Simon (2013: 114-121) seems to reduce it to investment in order to generate more money out of money. The spending of taxpayers' money is also a communication-based event of the economic system. Then, social systems receive some phenomena from the environment already in fixed terms of economic management, which they then use to reduce their own complexity.

Adding temporality to the analysis of social system relations provides insight that every society functions through some systems which, in the time dimension, come first in grasping the environment. As such this particular system defines the ways other systems can internally operate. For example, if the economy is at the first site of an event with its own code - pay/not pay, it will transfer to the educational system with its view on the environment. The result is that the educational system processes this environment through its own code, having to adapt to the predefined definition of the environment of the economy. That's why it is hard to view student loans as a sort of structural coupling, but rather as a direct influence of the economic code on the code of education, which finds its own rationality, but in a limiting way considering the economy. Most actions take place on markets or are at least oriented towards markets and their social construct of supply and demand, whereby this construct only remains indifferent in the economic system if the medium of money can be used as a symbolically generalized medium for communication. If this is not the case, then demand remains without supply. For example, to convey knowledge, we need the possibility to pay for this conveyance. Conveyance of knowledge specific to the educational system will, after all, create a good employee for the labour market - with which the code of payment/no-payment will continue. So, we could say that the economy, as a temporally first system - as the condition sine qua non, is not only important as the primus of the first response to the environment but it uses the outcomes of this environmental primus when

other social systems are done with their own reduction of complexity.

When this other system opposes itself as an environment to the economy, it is an environment that has already been pre-coded as payment/no-payment and, with it, is resolved with more efficiency than it would be if the systems were independent. This has consequences for the "specific `rationality' of democracy (Barbehöhn, 2022: 99), since the possibilities in the education system are not eliminated but de-actualized (Luhmann, 1969: 320), but nevertheless tend to prescribe which programmes do not receive positive funding decisions.

There is one more important notion that needs to be addressed here. Luhmann speaks of a world society in many places (f.e. Luhmann, 2021a: 145–170, Luhmann, 2021b: 585–588). We consider this to be a strongly Eurocentric view. Although the tendency towards functional differentiation applies to all regions, the systems show different results in their structural couplings. Every system, as we have already discussed, observes the environment through its own code. Yet if we discuss these systems, and see their mutual relations from a certain wider perspective, we can note that in the late functionally differentiated societies one system proposes itself as a system that is *conditio* sine qua non. As we have already discussed the ways that the economy is a sort of gateway system, it can work with other systems - religion, politics, law ... Economic system as a *conditio* sine qua non, thus works for the so-called, western civilization or global north. The other systems work the same way in some different societies - for example, religion in Afghanistan or politics in North Korea.

Now, if we take this theoretical approach into consideration (mainly in the context of western civilization), we can begin analyzing the phenomenon of green capitalism. How did the economic system respond and change the way we perceive environmental "challenges"?

Only the economic system itself - under capitalistically organized conditions - does not necessarily require communication in another system. The economic system itself has *no conditio* sine qua non, but merely an enabling context, which, however, does not have to be invoked, but only becomes effective *ex post*, e.g., when it comes to contract law and then subsequently differentiates between permitted/not permitted in the legal system. In the discourse of a capitalistically organized system, communication in the economic system appears to precede all climate protection action. This prioritization of communication in the economic system above all climate protection raises three problems: Firstly, economic activity, which is considered necessary and unquestioned in advance, itself leads to emissions and resource consumption; in other words, it certainly creates first what it only attempts to prevent or reduce in a second step. Secondly, it gives the impression that climate protection costs (a lot of) money, which must first be generated through economic growth so that state and business organizations can prepare for the great transformation. However, if you look at emissions per capita within countries or in a comparison between countries, you realize that it is precisely the poorer people and countries that have the lowest environmental impact. Thirdly, all climate protection is therefore subject to an economic system reality, even though the question of the habitability of the planet (Chakrabarty, 2023: 146–149) has been raised within a scientific rationality.

In order to implement our theoretical considerations, we will elaborate on each of these presented problems with specific examples in the following text.

4 | GREENHOUSE GASSES AS A WAGER ON THE MALLEABILITY OF THE INDIVIDUAL

To put it succinctly: "You can't drink yourself sober." Climate protection in Germany is driven by budget allocations. For example, funding programs are being set up to create jobs in offices whose task is to change the awareness of psychic systems in such a way that the systems ultimately function in a more ecologically sustainable way. For example, local authorities in Germany are setting up climate protection staff units, which then primarily carry out public relations work. They organize public sustainability days, invent games for children, print flyers and posters and order catering for talks behind closed doors that are intended to bring about a major transformation. The symbolically generalized communication medium is usually values. They differentiate between desirable and undesirable actions. This public relations work requires workers with wages and salaries. These people need at least a basic knowledge of sustainability issues and linguistic talent in order to fulfil their role in the political system. This requires a corresponding salary. This salary gives them the opportunity to purchase scarce goods that have a corresponding ecological footprint. They can also use their money as capital and invest it profitably in order to trigger economic activity. In addition to personnel costs, material costs are incurred for the moralized communication of values with the corresponding negative ecological ballast (see Magnuson, 2018). Climate protection, which is part of the administrative system, starts with emissions and resource consumption. The ecological bag is thus tied up before even one individual has changed their consciousness in such a way that this also has an impact on their actions and not just

on their conscience. The effects on the psychological systems are almost incalculable. Attempts in a liberally organized society to change individual consciousness can trigger defiant reactions, if only because government agencies have the audacity to want to finance this and instrumentalize scientific organizations because of their high level of trust by only funding the positions for a limited period of time, so that the scientific system cannot determine the relevance of questions itself, but has to react to the politically developed questions and legitimize policies with transformative science. The structural link between the political system, the economic system and science makes science dependent on the flow of money from politics. The economic system as a conditio sine qua non of the scientific system can thus be used by ministries to maintain power by using science as a means of paradox management, which in turn serves as a means of increasing or maintaining power.

Here, one might argue that politics controls the distribution of money across various systems, thereby asserting its importance over the economic system discussed earlier. While this may indeed be the case, we must bear in mind that resources are always finite. Although politics can determine what should or should not be done, ultimately, it all falls to the question of what will be funded or not. As we have pointed out, the issue is not the strict domination of the economic system but rather how other systems adapt themselves to the environment presented to them by the already defined proto-environment by the economic system. In the case of politics, it deals with resources that are predefined by the environment. We cannot allocate funds for something if the resources are insufficient; we can only decide where to focus our attention.

5 | CLIMATE-PROTECTION IS FOR FREE

In capitalist systems, ideological-narrative flexibility is achieved by labelling goods and services with monetary prices. This makes it possible to abstract from the factual content. This becomes clear in art, which primarily appears as an art market that oscillates between the binary codes of numbers/non-numbers and like/do not like. In this way, it is unquestioningly assumed that climate protection also costs money. However, climate protection does not cost money - on the contrary. It can be assumed that laziness, low education or poor economic prospects/low economic growth have a positive impact on resource and climate protection. What costs a lot of money is climate protection under the condition of maintaining or increasing prosperity and maintaining the capitalist system. In this sense, we are not dealing with a major transformation, but merely with an additional cost factor for companies and the state, which should be included in the programming as a sustainability factor. In this case, the great transformation consists of transforming everything in such a way that nothing has to be transformed. This also means that two tasks must be mastered simultaneously: on one hand, maintaining planetary boundaries and, on the other, maintaining the political and economic system. This is to be achieved through price control, which makes sustainability a corporate cost factor. However, this cost factor is then again partly emissions-laden, as it is a matter of course that marketing is part of corporate sustainability, for example. In addition, companies have a tendency to reduce costs, which is particularly evident in the organization of corporate reporting.

6 | WHAT KIND OF REASON IS APPLIED TO SUSTAINABILITY?

In Luhmann's systems theory, there is no cross-system rationality. Each system follows its own system of rationality. The aim is the continuation of communication, the content is determined by the respective program of the system and the adaptability of further communication by the positive value of the binary coding. Due to the fact that the economic system comes before all other systems in capitalistically organized societies, an action must at least be rational in the sense of the economic system in order to be effective in the long term. This results in feedback loops, such as greenwashing by companies, which constitutes a system-rational action. This then violates the normative expectations of protesters, who then resort to more radical instruments of protest. More radical instruments have a higher news value than monotonous protest, which distracts the public discourse from the topic of protest and instead focuses on the form. The protest then also becomes less connectable and thus loses its energy of irritation. This in turn promotes normative disillusionment, which in turn leads to radicalization or a turn to new topics. In the case of Friday for Future, this occurs in the focus on the Middle East conflict (Nirjanjan, 2023). An expansion of the topics in turn increases the fragility of the protest, as the environmental complexity is perceived more strongly. The time dimension plays a special role here. Social movements must be visible in the media in order to cause irritation in the other systems in their environment. This is primarily limited by three selectors of the mass media: Marked discontinuity (Luhmann, 2000: 28), topicality (Luhmann, 2000: 33) and the routines of the mass media (Luhmann,

2000: 34). Mass media become mass media by being bought en masse and they are bought en masse when they use their selectors (Luhmann, 2000: 28) sensibly. In this way, the mass media take on a life of their own as a special form of the economic system and the respective mass medium degrades itself into a specific program of the economic system that specifies how protest must function in order to achieve the goal of irritating other systems. Thus, here too, the economic system not only precedes a target-achieving protest in terms of time as a condition sine qua non but also more or less determines its form.

If climate protection means that a great many economic actions, and in some cases even climate protection efforts, certainly mean emissions and resource consumption, but their consequences and side effects are uncertain, then they are only moderately suitable for being offered on markets. However, when the heat rises, offering air conditioning, cool drinks and green roofs meets with a more certain demand - so that adaptation tends to have a higher communicative connectivity in the economic system than mitigation. Politicians are already picking up on this and funding climate adaptation managers in local authorities. They can reconcile their goals with the goals of commercial enterprises much more easily. In addition, climate change causes suffering and this suffering can be alleviated by buying goods and services, whereas prevention of a global problem does not depend on individual action and renunciation, failure and laziness are generally better for one's own carbon footprint than the diligence, success and growth of companies.

7 | GREEN CAPITALISM AS A RESULT OF FUNCTIONAL DIFFERENTIATION

Now it is important to mention that green capitalism is a rational outcome of systemic communication with the economy as a *conditio* sine qua non. Green capitalism in that sense is not isolated to the economic system alone. Capitalism itself can be seen as a sort of program, which (with our concept of economy as a conditio sine qua non-system) is observed by other social systems. For Luhmann (2021b), programs guide how codes are applied but they also underline the system's operational closure and autonomy. The programs provide criteria for the correct attribution of the code values of the binary coding of the social systems so that a system oriented towards them can achieve structured complexity and control its own course. Programs "soften" the binary coding. They are complexes of correctness conditions within systems. Programs underline the contingency assumed by systems theory and firstly make it possible to differentiate subsystems of functional systems in the factual dimension and secondly to describe processes from a systems theory perspective (Baraldi et al., 2022:139).

While it may be so for the earlier versions of capitalism (Capitalism is a program of the economic system), later on, as the economy became in the late 20. centuries a *conditio* sine qua non of the western civilization, it makes its own re-entry by being first with its own code to grasp the environment and therefore presenting already limited convergence for other system's re-entry.

By doing so, re-entry of the economic system in general assured functionality and reduced irritation of the environment. But that does not mean that irritation does not exist. Irritations re-enters the economic system as the set of opportunities (as irritation was pre-coded by payment at the very start). Hence, the green colour becomes an integral part of further economic endeavours. Green capitalism is a program then, which comes before the other programs but it is, as Luhmann suggested, mainly part of the economic system's reflection on the environment. It is a result of functional differentiation of society under the (pre)term of payment.

So, in the end, it may seem that "green capitalism" is considered both (quite paradoxically) immoral and desired (depending on the approach – for example, see Fox, 2023 in contrast to Markopoulos et al., 2020), but after all, it is only a way of communication in society. To analyze it, we cannot deal with moral categories, but with paradoxes. As system theory of society (as well as science in general) does not deal with questions of *should* but with the questions of *if*, the presented analysis may serve as a ground for future discussions of both ecological communication but also of the functionality of the very systems that rely on the economically defined environment.

8 | FUTURE IMPLICATION OF CONDITIO SINE QUA NON CONCEPT

As established in our discussion, the economic system precedes other social systems in influencing and configuring the environment. This precedence not only structures current societal operations but also sets itself as a gateway for the future evolution of society. The inherent ability of the economic system to act as a gatekeeper means that its influence will likely intensify as societies continue to face complex global challenges, such as climate change and technological disruption. In contrast to many discussions (e.g. Wallerstein et al., 2013) ecological crisis is not purely a threat to the capitalistic program or contemporary system of economy. It is easy to conclude

this type of argument if we start either from a moral stance or from a deterministically paradigmatic one. Green capitalism, ecological issues and communication of the contemporary western civilization cannot be understood by posing a certain social system or program as a "root of all evil". By doing so, we are determining, and ontologizing autopoetic processes which social systems internally possess. While this may work for our meaning creation, it does not mean that autopoiesis stops - leading us to wishful but deluded answers.

What we claim here is that the evolution of the functionally differentiated society is progressing and the investigation is an investigation in an environment that is always unreadable by science. In politics, for example, the state seems to have taken on a stronger role again. However, it has only ever done so subject to financing provisions, debt breaks and sudden cost explosions. The state is thus caught in the paradox of being a creative power, but not being able to control what makes it creative, as the goal of creativity and the possibility of creativity in enabling economic systems as current events coincide. This is especially so in the face of ecological challenges (for example, farmers protesting in some countries of the EU - ecology is desirable but it makes people struggle on the market). An attempt could be made to see the creative power in the educational system. A place from which one could wish for innovation, constructive criticism and ecologically motivated exnovations. But there, too, the emergence of an economic system is both the origin and the goal, so that new things can happen in a largely predetermined form.

To revisit the concept of conditio sine qua non, one could wonder whether ecology could come first regarding environmental observation in relation to other social systems. As environmental constraints intensify, ecology is increasingly essential for systemic functions. Thus, the evolution of functionally differentiated societies in the global West could eventually shift toward recognizing adaptation to the changed natural environment as a new conditio sine qua non. Whether this ecological priority manifests through politics, education, or as an entirely new social system remains a topic for discussion and theoretical debate. The possibility of this shift, and the form it could take, is still uncertain but remains a critical subject for further exploration.

9 | CONCLUSION

In this paper, we proposed the idea that there is a time dimension in the observation of the environment by the various social systems in the contemporary world. In that time dimension, there is a precondition which is opposed by the system that gets "in touch" with the environment first. By it, the first observational system determines itself as a predefined environment for other systems. Other systems are observing and are rational by their own rationality but the environment is already pre-coded. In contemporary capitalistically oriented societies that system that imposes itself as a *conditio* sine qua non is an economic system. So the code payment or non-payment presents itself as an environment to other systems in which observation is done but internal coding is (in a time dimension) conditioned (contaminated) by the time first system. This of course does not mean that systems are by the classical hierarchical understanding lesser than the economic system. Systems are operationally closed but they respond to the environment that has been in touch with the time-first system. In that matter, we can talk about the economic system as a conditio sine qua non of contemporary western civilization. It reflects the time of observation only. In a way, this can be seen as a structural coupling but as a coupling in which, if we consider *time*, some systems are "playing" the leading, first role in future development. In that sense, we discussed the ways that the contemporary world regarding ecological challenges can be explained. Moreover, we discussed that green capitalism is a functionally differentiated program by which economic code is *first* in observing the environment. Code of payment or nonpayment is a part of the environment which other systems observe alongside the other components of the ecological environment.

With these notions in mind, we analyzed the ways of development of ecological questions in the contemporary world. To stay within the planetary boundaries, actions of the economic system as a sine qua non for effective action in everything are not a good starting position. In our opinion, however, there are far worse ones. The programming of the economic system by a capitalist economy can be seen as a challenge, but also as an opportunity. After all, no economic system in history has proved to be so flexible. Capitalism can even put a price on its own criticism and sell it to its critics. What matters now is that there is a structural link between law and politics that prescribes non-debatable preconditions of the natural environment with constitutional status for legislation as a condition sine qua non. This can lead to laws that restrict the economy in terms of sustainability and the program of capitalism can ensure adjustment processes in companies under fair, equal, market conditions. Many researchers critical of capitalism will consider this to be utopian, but we believe that a socio-ecological revolution is firstly much less realistic, secondly more undemocratic, thirdly full of foreseeable and unforeseeable complexity-increasing side effects and fourthly we are

very unsure whether such a revolution can also lead to greater sustainability. In our opinion, systems theory does not have the task of criticizing the fact that the economy is the conditio sine qua non of all sustainable actions in a time dimension. The task of systems theory is firstly to reveal this and secondly to show what possibilities there are by means of reprogramming to bring this function of the economy into harmony with the requirements that the physical world imposes on us. This will mean impositions, but no economic system that humanity has tried so far can deal with impositions as well as the capitalist program. There will have to be green capitalism or there will be a pressure of complexity on primary social differentiation, the effects of which we cannot yet foresee.

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RESEARCH ARTICLE

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Environmental law and systems theory

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Abstract

In 1985, German sociologist Niklas Luhmann published a monograph on ecology, which appeared in English translation in 1989 as *Ecological Communication*. It contained many original insights for ecological thinking and, despite being well-reviewed upon publication, has had a relatively minor impact on Anglophone environmental discourse. This inattention is also present in environmental law, which has recently seen an increase in legal theories that challenge its mainstream. This contribution first investigates why *Ecological Communication* has received scant attention, pointing to changes in the climatic context in which it first appeared and the reactionary nature of its arguments. Recognising that the work nevertheless contains critical theoretical insights for environmental law scholarship, the second aim of the article is to spotlight what from *Ecological Communication* remains relevant at the hand of three common claims progressive researchers level against mainstream environmental law: The critique of law's marriage to Cartesian dualism, that law should be better informed by climate science,of and law's anthropocentrism. Finally, environmental lawyers are called upon not to ignore *Ecological Communication* but to engage with it fruitfully.

KEYWORDS

Anthropocene, environmental law, nature, Niklas Luhmann, rights of nature, society, systems theory

1 | INTRODUCTION

Among many international environmental legal scholars, a palpable frustration with the impotence of their discipline has arisen (Howes et al., 2017; Montini, 2017; Scotford, 2022). Despite decades of sincere effort and a near-continuous cycle of Conferences of the Parties, the rate of social change seems to fall bewilderingly short of what climate scientists' project is required. This state of affairs has led many environmental law scholars to question the foundation of the discipline's approach. A not-insignificant number of voices are thus advocating for various new (or, arguably, the reanimation of much older) guiding principles. These have assumed various labels, such as Earth systems law (Kotzé, 2019b), Cosmolaw (Cirkovic, 2022), *Lex Anthropocenae* (Kotzé & French, 2018) and the Rights of Nature tendency (Wesche, 2021).

Despite their differences, these new environmental law paradigms share much in common. Some of the *leitmotiven* that one observes include but are not limited to an environmental law more sensitive to the communication or irritation originating from the (natural) science system; a critique of anthropocentrism in the law

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(Burke, 2023, p. 203; Boulot & Sterlin, 2022); criticism of the society/nature distinction (Artman, 2023; Cirkovic, 2022, p. 149); an appeal to indigenous knowledge systems (Pope et al., 2021, p. 9; Gellers, 2021); greater normative ambition (Adelman, 2021, p. 49; Kotzé, 2019a); and extending legal rights to nonhuman phenomena (Bleby, 2020; Schmidt, 2022), effectively creating new forms of legal subjectivity.

With a few noteworthy exceptions (Leach, 2023; Petersmann, 2021), the work of Niklas Luhmann has not had a profound impact on most of this line of scholarship. This silence is understandable, given that Luhmann has generally not been very influential in ecological thinking more broadly (Bergthaller, 2018, p. 1). This contribution aims to address two questions. The first is to ask why Luhmann's contribution has not had a warmer reception among environmental lawyers. In the second part, the benefit of Luhmann's work to new environmental law paradigms will be suggested through three examples. The purpose is not to defend establishment environmental law but to make its critics aware of theoretical critiques of their criticisms. The three cases invoked relate to the possibility to transcend the society/nature distinction; the functional differentiation of society into subsystems like law and science; and the paradoxic of anthropocentrism when speaking of the rights of nature. Environmental law has become aware and sensitive to the existence of planetary boundaries and the limits of natural and physical systems. However, it will be argued that the benefit of a Luhmannian analysis is to delineate the boundaries and limits of social systems, including law.

The table will be set in the following section, providing a brief background on the nascent paradigms in environmental law scholarship. It will be argued that these are genuinely legal-scientific paradigms in the sense of Thomas Kuhn (Kuhn, 2012) and that their appearance is due to a moment of disciplinary crisis in environmental law.

Following thereupon, Luhmann's ecological writings are interrogated. The question of why *Ecological Communication* has not proved more popular will be addressed. First, it is suggested that the book was written in a very particular context and aimed at a specific audience, which should be considered when reading it today. Second, the mode of argumentation in *Ecological Communication* will be submitted to textual analysis to identify certain reactionary rhetorical tropes that might have stymied the work's reception among ecological scholars.

The final substantive section will attempt to show that Luhmann's ecological work, despite its shortcomings, has much to offer to new environmental law paradigms. To illustrate the point, three of the paradigms' most commonly shared features—the critique of the society/nature distinction, the call for closer collaboration between science and law and the critique of legal anthropocentrism—are isolated for further discussion. It will be argued that, at least for Luhmann, these three features of the new paradigms are 'easier said than done', for they present society with an *aporia* between society and nature that must be - but cannot be - overcome.

The hope is that this contribution's structure reflects a dialogue between current environmental law and Luhmann's ecological writings, both being approached critically. The latter's shortcomings are identified, but valuable insights are also preserved. On the other hand, new developments in environmental law are welcomed. However, they will be shown to fall short of some of the challenges posed by systems theory. Between these two 'voices', this study hopes to further the theory of environmental law, ecological humanities, the history of ideas and 'Luhmannology'.

2 | NEW PARADIGMS IN ENVIRONMENTAL LAW

In perhaps all spheres of life, panicked communication over the looming environmental crisis abounds. The legal system is no exception. Since the 1970s, environmental law has come into its own as a subdiscipline in its national and international manifestations. The rise of classic environmental law is, in itself, a development that should be applauded. Nevertheless, many legal scholars, joining many outside of its hermeneutic community, are dissatisfied with the ground made by the discipline.

An important reason for this dissatisfaction can be ascribed to environmental law's inability to fulfil its legal function. After Luhmann, we know that the law's function is to stabilise future expectations (Luhmann, 2004). This function practically means, among other things, that a wronged party can expect, after the failure of another legal person to act as expected, the state to place him or her in their expected position or, at the very least, compensate them in another way. Perhaps part of the anxiety that the climate crisis induces is that it represents the impossibility of a disappointing party (or the state in its stead) to satisfy the nonfulfilment of expectations. Courts fulfil their function through orders, punishments and, when all else fails, money. When society has crossed enough climate tipping points, we collectively understand that imprisoning polluters or ordering corporations to pay damages will not restore the damage done. In other words, the climate represents not simply a possible failure of the legal system but is (perhaps) a problem operating at the very limit of what the legal system can address.

The anxiety awakened by the limits of classic environmental law has led to a search for alternatives. In these

cases, the hope of refining classical environmental legal tools seems abandoned. One can, of course, not deny that much of the mainstream scholarship follows the traditional vein, and resources are still devoted to such research. However, this situation reminds one of the framework Thomas Kuhn created to describe scientific revolutions (Kuhn, 2012). In that model, it might be said that the existing paradigm of classic environmental law is experiencing a crisis phase in which anomalies abound, if not in its explanatory power, then in the effectiveness of its norms on the environment. This has led some scholars to advocate for a fundamentally new paradigm in environmental law (Adelman, 2021; Kotzé, 2020). It must also be noted that this paradigm shift, as would befit Kuhn's theory on scientific change, is observable in the realm of legal scholarship (in the science, not legal, system) and is decidedly less present in legal practice, at least for the time being.

In the last few years, these competing paradigms have presented themselves under many names: Earth System Law, Cosmolaw, *Lex Anthropocenae* or, more generally, the Rights of Nature tendency. Although there are essential differences between these, several shared features can broadly characterise them. Many of these features are to be welcomed, such as a detectable tendency to want to think beyond the state (Buitendag, 2022b). Other features pose similarly inspiring and theoretically and practically equally complex challenges. The first commonality is the criticism that environmental law is too married to a Cartesian society/nature dualism. Second, it is pled that environmental law be more open to direct influence from climate science in shaping laws and policy. Finally, it is commonly insisted that law is too anthropocentric and that its scope should widen to include nonhuman subjects. These claims draw inspiration from many sources in environmental humanities, such as Bruno Latour and Donna Haraway, but, with few exceptions, have not engaged with the work of Luhmann. Those who have, such as Leach and Petersmann, have done so with the theory in general and not specifically on its ecological aspects (Leach, 2023; Petersmann, 2021). In the next section, possible reasons for *Ecological Communication*'s muted reception will be given, after which the three common claims above will be subjected to a Luhmannian critique.

3 | 'THIS IS AN IMPORTANT BOOK, THOUGH NOT A BOOK THAT EVERYBODY SHOULD READ': THE *REACTION TO* AND *REACTIONISM OF ECOLOGICAL COMMUNICATION*

Undoubtedly, Luhmann provides vital insights for the ecological movement, but, unfortunately, these are largely ignored beyond small circles. Bergthaller writes: 'Niklas Luhmann made no significant contribution to environmentalist thought. He was one of the most radically ecological thinkers of the 20th century' (Bergthaller, 2018, p. 1). Nevertheless, the question of the climate crisis remains: What is to be done? As much as we know that the steerability of society is limited and that a coordinated response is impossible, it also seems apparent that the status quo is leading us to disastrous consequences.

This section aims to think, along with Bergthaller, why Luhmann's thinking might have been uninspiring to mainstream ecological thinking. It will begin with a brief overview of *Ecological Communication*'s reception. The relative unpopularity of the work is then attributed to two causes. The first is the profound change in the environment of the text, and it is argued that a significant part of the ecological writings spoke to a *milieu* that no longer exists. The second reason is that while some of Luhmann's ecological insights are valuable, they also risk falling into certain reactionary tropes that, rather than being taken as sound advice, come off as discouraging for those interested in social change around environmental problems.

At the time of its publication in English, *Ecological Communication* received numerous reviews in academic journals with favourable conclusions, such as the book offering readers 'refreshingly new theoretical insights' (Krippendorff, 1991). However, despite the appreciative tone of most reviews, many point to the uninspiring message at the heart of the monograph. Stephan Fuchs noted that '[r]eaders who expect practical suggestions as to how to solve the ecological crisis will be disappointed. If anything, Luhmann's book leaves us with a heightened sense of alarm because his argument implies that such solutions are extremely unlikely' (Fuchs, 1990, p. 747). Another assessment concludes that those 'who exert the energy required to wade through the laboriously written prose will be amply rewarded by Luhmann's insightful conceptualisation of the relationship between society and its physical environment' but that 'those who are looking for either a description of, or a guide to, more effective environmental discourse will be disappointed' (Peterson, 1992, p. 258). One reviewer was left existentially shaken. He wrote that *Ecological Communication* 'leaves me with a "Weltschmerz," a pain in my association with my own environment. [...] Things I never questioned after my formal education ended in degrees in science and engineering have now become disturbing paradoxes'. The concluding sentence of this review perhaps best resonates with the book's ultimate fate: 'This is an important book, though not a book everybody should read' (Narodny, 1991, p. 365).

Why has *Ecological Communication* proved less influential, given the generally favourable critical reception? The title of a later, article-length study of the work sums it up: 'Neither Cited nor Foundational' (Mathur, 2005). Contemporary reviews had already pointed to the uninviting prose and the uninspiring message of the work. One reason argued here, naturally not reflected in reviews of the time, is that the book appears to have been written as a response to a drastically different climate reality than the one currently experienced. The current climate crisis is undeniable, and its effects are far-reaching. This is not the context of Luhmann's book. Instead, it represents an environmentalism concerned with the ozone hole and Chornobyl (which occurred 1 year before the book's appearance). It was aimed at the polemics of the German Green Party and anti-nuclear protestors. It is a work that attempted to intervene in a very 1980s—and one even dares to say—West German discourse.

Another reason for the relatively unenthusiastic reception of Luhmann's ideas, and one well-attested to in reviews, is its realist but uninspiring disposition. Luhmann has been unfairly characterised as a conservative thinker, something Hans-Georg Moeller, Andreas Philippopoulos-Mihalopoulos and others have done much to dispel (Moeller, 2012; Philippopoulos-Mihalopoulos, 2007; Buitendag, 2022b; Harste, 2021; Richter, 2023b). Nevertheless, his default stances of modesty, detachment and description rather than prescription demand greater analysis than reviews are intended to give. In what follows, the tone of *Ecological Communication* will be examined closely to show how Luhmann's book often falls into the typical conservative argumentative forms identified by Albert Hirschman (Hirschman, 1991). This tendency contradicts the typical activistic disposition of ecological thinkers and environmental lawyers.

Hirschman identifies three common argumentative tropes conservatives use: perversity, futility and jeopardy. In short, the perversity thesis holds that any liberal reform of society will only achieve the opposite effect of what it has set out. For example, introducing a minimum wage to alleviate poverty would only lead to less employment and, thus, greater poverty. The futility thesis is even more straightforward: Attempts at change will achieve nothing. The final argument, namely, jeopardy, holds that a proposed social reform will endanger some other social good (Hirschman, 1991, p. loc 175). When scrutinising the text of *Ecological Communication*, it is possible to evaluate to what extent these forms of argument are present.

The perversity argument hinges on agreeing with the ultimate aim of any proposed social action (e.g., that stopping climate change is essential and worthwhile), but that the proposed method can have the unintended consequence of exacerbating the problem (Hirschman, 1991, p. loc 226). This motif is present in *Ecological Communication*. On the topic of our complex society's self-observation, it says that

> The horizons of what is possible have expanded so radically that every non-realisation must have causes in society. Intentions have unintended results while good intentions have bad side-effects. Rationality appears increasingly as perverted and in communication inevitably encounters mistrust and rejection.
>
> (Luhmann, 1989, p. 124)

In another passage, the anxiety of the German Green Party over the climate is painted as its very obstacle:

> Anxiety over what is bad as politics returns as a political factor within politics. This does not mean that the scope of resonance is extended. On the contrary, there are only a few possibilities of dealing with anxiety. It is not surprising then that the politics of the "Greens" as long as it operates this way does not seek a rational attitude towards ecological questions but approaches the objects of its fears directly. This amounts to the politics of obstruction: no nuclear energy, no concrete *pistes*, no cutting-down of trees, no razing of houses.
>
> (Luhmann, 1989, p. 90)

Furthermore, 'the attempt to ease anxiety increases it' (Luhmann, 1989, p. 129). The perversity thesis rejects Enlightenment optimism over progression and replaces it with pessimism (Hirschman, 1991, p. loc 273). Hirschmann singles out the discipline of economics, with the doctrine of the self-regulating market, as one of the prime culprits of this line of reasoning (Hirschman, 1991, p. loc 423). Given the similarity of that doctrine to the theory of autopoietic systems, it is perhaps unsurprising that arguments of perversity are tempting.

The second reactionary argument of futility claims that attempts at societal reform may not have any negative consequences as in the perversity thesis but will instead have no effect at all: Such changes are shallow and cosmetic. They cannot shift the underlying structures of society (Hirschman, 1991, p. loc 674). This attitude, too, is present in *Ecological Communication*. As early as in the preface, Luhmann offers the modest disclaimer

that the theoretical writings to follow cannot be immediately and obviously practicable. However, 'the significance of the theory will always remain that a more controlled method of creating ideas can increase the probability of more serviceable results – above all, it can reduce the probability of creating useless excitement' (Luhmann, 1989, p. xviii). On the topic of increased ecological consciousness, it is said that 'Even if an "ecological awareness" would arise in some conscious systems or others it would have properties that would be almost useless for society' precisely because of the determining role that systems, not individuals, play in society (Luhmann, 1989, p. 30). However, even individual social systems appear to be useless (which is arguably the central thesis of the book). For example, when writing about the political system's ability to affect climate change

> The crude application of such [political] power is almost useless for the regulation of ecological problems because no one can be forced into any specific behaviour that would improve the relation of society as a whole to its environment. Besides, political power, because it ultimately rests on the threat of physical violence, i.e., on fear, possesses the real limitation *that it can neither prohibit nor prevent anxiety*.
>
> (Luhmann, 1989, p. 89)[1]

Later a pessimistic, if not prescient, prediction is made about the ineffectiveness of politics when he writes, 'the "Greens" will also lose color as soon as they assume office and find themselves confronted with all the red tape' (Luhmann, 1989, p. 126). To be fair, Luhmann immediately acknowledges the reactionary nature of that statement in the immediately following sentence, writing that 'This outlook may serve to appease "conservative" observers, but it ought not to conceal the fact that the real problem resides in the question of whether modern society is too dependent for self-description on the entirely inadequate basis of social movements' (Luhmann, 1989, p. 126). We see in these writings much of the adage that the more things change, the more they stay the same. Hirschmann identifies this attitude as one which paints the progressive as naïve and the conservative as worldly, wise and conscious of scientific laws (Hirschman, 1991, p. loc 693). In this sense, it becomes possible to say that Luhmann's theory creates the possibility of systems theory's split personality: on the one hand, the pioneering, sophisticated, posthumanist account of society; on the other, a society ruled by laws, structures and systems which, while historically contingent, cannot be reformed by mere mortals, no matter how good-intentioned or necessary.

The final form of conservative argument is that of jeopardy, which does not seem present in the usually clinical Luhmann's writings. The rhetoric of jeopardy holds that a social change, while perhaps good, will come at the cost of another essential good (Hirschman, 1991, p. loc 1192).

To his credit, Hirschmann spends a brief amount of time on the dangers of stereotypically progressive rhetorical devices. They include an overly optimistic evaluation of the synergy between different sections of society if they could only be more harmonised—such as the relationship between climate science and climate law (Hirschman, 1991, p. loc 2123). *Ecological Communication* is a scathing indictment of such claims. Another typical progressive attitude is regarding the preponderance of danger lying in social inaction rather than action, and a theme Luhmann is prescient on 'The possibility also exists that the systems act on their environment in such a way that they cannot exist in this environment later on' (Luhmann, 1989, p. 14).

Hirschmann concludes his study on a serendipitously Luhmannian note. Rather than completely dismiss conservative arguments, he gives some acknowledgement that

> Modern pluralistic regimes have typically come into being, it is increasingly recognised, not because of some preexisting wide consensus on 'basic values' but rather because various groups that had been at each other's throats for a prolonged period had to recognise their mutual inability to achieve dominance.
>
> (Hirschman, 1991, p. loc 2354)

As Gorm Harste has effectively argued, the insistence on difference and dissensus lay at the root of Luhmann's theory, being the main point of contention with the consensus-based theories of Jurgen Habermas in their well-known clashes during the 1970s (Harste, 2021; Buitendag, 2022a).

Although a certain reactionary bent is present in *Ecological Communication*, its message is not entirely hopeless. It was written with the goal of theoretical refinement around ecological thinking as a, at least ultimately, positive social intervention. It commendably calls for a degree of modesty and care when engaging with undoubtedly serious threats. As early as 1959, Charles Lindblom argued that public policy should

[1]Emphasis in original.

employ the 'science of muddling through' in the face of hypercomplex problems where competing values would be too numerous for individuals to evaluate (Lindblom, 1959). It calls for policy to not move in 'leaps and bounds' but to be incessantly remade to avoid making significant mistakes (Lindblom, 1959, p. 84). This sentiment is echoed by the systems theorist when he urges that 'To the extent that technological intervention changes nature and problems result from this for society, *greater* rather than *less competence for intervention* has to be developed, but practised according to criteria which *include reaction on itself*' (Luhmann, 1989, p. 14). Today this shared insight has been applied to the 'super wicked' problem of climate change, arguing that rather than being overwhelmed or driven to anxious overreaction by the complexity of the climate crisis, a more constructive approach would be to steadily and decisively 'muddle through' with reforms that continuously reflect upon the feedback of its environment (Gilligan & Vanderbergh, 2020). Thus, while Luhmann might not have been an influential ecological thinker, his proposed ideas and attitudes have not entirely disappeared.

Ecological Communication should not be read uncritically nor used as a cudgel against bona fide environmental concerns today. Keeping its reactionary rhetoric in mind, adopting Luhmann's ideas might still be fruitful for today's environmental lawyers. However, it would require greater theoretical exertion than nearly 40 years ago. The following section will attempt to illustrate the utility of the theory using three examples of how it can aid new environmental law paradigms.

4 | *ECOLOGICAL COMMUNICATION*'S LESSONS FOR ENVIRONMENTAL LEGAL THEORY

As mentioned, all is not lost, and some of the insights from *Ecological Communication* can prove productive in nascent environmental law theories. In Luhmannian terms, a common challenge seems to underlie all three of the following ambitions of the new environmental paradigms, namely, that they present *aporias* of boundary crossing. Nevertheless, like Tolstoy's unhappy families, each has boundary problems in their own way. In what follows, they will be treated programmatically. The section is aimed mainly at environmental law scholars (thus operating mainly within the science and education systems rather than the legal system proper), highlighting alternative positions in social theory and problematising three critiques usually levelled at mainstream environmental law.

4.1 | The Cartesian society/nature distinction

A recurring target of critique in the writings of the new environmental paradigms is the so-called Cartesian society/nature distinction. Inspired by thinkers like Latour and Haraway, the argument is that humanity must recognise its entanglement with nature and rid itself of the distinction altogether (Latour, 2017, p. 16; Haraway, 2016). While some want to expose the artificiality of the distinction, Luhmann insists upon it. Placing all human and nonhuman actors on a level plane certainly has a certain democratic appeal. However, such a manoeuvre is in no way simple.

From a Luhmannian perspective, human or system observation of nature must necessarily begin from inside society. The difficulties that this distinction introduces is foremost that while 'nature' serves the function of the unmarked side (i.e., all that is outside of society), thus allowing for a theoretical 'other side' that is essential for constituting society, it is itself an empty vessel. This vessel must be observed and filled with content from within society. That nature can only be observed from within society is underlined by Luhmann's analysis of the semantic transformation that the concept of nature had undergone in the transition to modernity (interestingly, in his work on semantic structures, Luhmann proposes that, like law, an essential function of semantics is to maintain the validity of expectations) (Luhmann, 1999).

In the Middle Ages, nature was understood as something that inhered to things and could be corrupted or perfected. In a mode of thinking inspired by Aristotle, everything strove (or should have striven) for greater perfection (Bergthaller, 2018; Schipperes, 1978) in what we could call entelechy or, decidedly after the Middle Ages, Hegelian *Geist*. In modernity, as Luhmann says, the concept of nature was split into two. On the one hand, the nature of science existed: the observable, measurable, predictable, and importantly, describable. On the other hand, by the time of the Romantics at the latest, one finds the nature of the environmentalist, the tourist on safari, the greenwashing marketing strategist and the environmental lawyer.

By being idealised, this second nature inevitably assumes a prescriptive, normative character (Luhmann, 2013). It could serve as a standard of certainty where political or moral debates seemed uncertain. It is emphatically not the nature of the scientist, nor is it the unmarked side of society. Like a Roentgen cabinet with more space inside than outside, the term nature opened a position inside society that could critique society as if it was not socially constructed. It also became a measure of validity for competing moral arguments (e.g., the entire

doctrine of natural law and, in conjunction, human rights, which will be dealt with below).

This argument—that nature provides a standard for human behaviour—can be traced back to antiquity (Bergthaller, 2020, p. 52; Schipperes, 1978, p. 217). However, compared to the static and ideal nature of Aristotle and the other ancients, modern science has taught us that the natural world is marked by dynamism, change and instability. Additionally, the term Anthropocene effectively illustrates that society and nature are intertwined and that humanity and society are inextricably tangled with the natural world (Bergthaller, 2020, p. 58; Bookchin, 2005). Bergthaller points out that arguing about whether the ancient or modern approach to the ontological character of the society/nature distinction is preferable is to miss the novelty of what the Anthropocene presents: that humanity is a geological force (Bergthaller, 2020, p. 61). In this light, we are confronted with the paradoxes that a multitude of internal differentiations bring: Through humanity, nature is both for and against itself; society, in its differentiation, both expands and critiques itself.

Recently, Hannah Richter has read Luhmann's insistence on the society/nature distinction in a positive light (Richter, 2023a). This re-evaluation aligns with a movement in the last decade or so to uncover the radicality of Luhmann's thoughts (Philippopoulos-Mihalopoulos, 2007; Moeller, 2012; Buitendag, 2022b; Richter, 2023b). It correctly insists on the fundamentally posthuman character of systems theory, emphasising the epistemological or knowledge network rather than individual agency as the basis of social action (Richter, 2023a, p. 2). It makes traditional semantic distinctions (society/nature, mind/body, individual/society) less relevant. It allows for a smooth continuity 'between thought, social structures and material-ecological relations' (Richter, 2023a, p. 7). This does not mean that the constitutive outside of a system can be eliminated. Importantly, it is contingent, meaning that the frame in which we approach the totality matters and can be changed. In other words, rather than doing away with the 'outside' (whether one prefers to call it nature or not), society should recognise that it needs its outside, but that what that is can be changed.

The above insights are of cardinal importance to environmental law. Society, in general, and the legal system, in particular, has no direct access to nature but can only project an image of nature within the system using its own constructs. If law speaks of a right to a healthy environment, such an 'environment' would require legal definition and would become only a legal concept divorced from anything natural (as would, for that matter, terms like 'health' and, of course, 'right'). The legal system is, perhaps, the crowning achievement of social construction. It would be operating beyond its limit to ask it to step outside of itself into the natural.

In the above, we have seen one type of appeal to nature as a moral or authentic space from which to criticise society. While attractive to nascent movements within environmental law, it can never escape its inevitable position inside society. This gives rise to the temptation for a second type of appeal to nature, namely, nature as described by the science system. Rather than arguing in the form of ideal types or natural laws, this argument points to empirical knowledge of the world and urges society to remain within its reasonable working limits. This form will be the topic of the next section.

4.2 | Natural science and the law

The second claim of new environmental law paradigms is that science must better inform the law. Such a claim is appealing because it never has to vouch for its modernity (Luhmann, 1994, p. 9). Here, science is seen as a possible bridge between society and nature, as the method through which the entanglement between humans and the world can be understood. Again, it is Latour who provides a model for such thinking when he invoked the metaphor of society's 'bicameral parliament' consisting of politics in one chamber and science in the other (Latour, 2004, p. 175; Tynan, 2022, p. 9). Science is represented only in the latter and is thus depoliticised. The hope for a new environmental law is that, through science, nature can be represented in law and thus find a political voice.

Again, the devil is in the details. As much as society needs an external other, so do individual systems require an environment. The science system is no different. The nature of science remains a system-internal construction selectively observed in science's environment.[2] This means that environmental law relying on scientific knowledge must account for at least two boundaries that need to be crossed: The first is that between nature and society, specifically into the science system. We can no longer believe scientists have direct access to nature (Luhmann, 2002). The science system observes its objects and cannot help but communicate its observations *as communication*.[3] The second boundary emerges from here: the legal system's observations of scientific communication, which must be articulated anew as legal norms.

[2]'Science is not discovery but construction'. (Luhmann, 2002, p. 70)
[3]This argument rests on the same logic of the difference between signifier and signified.

Let us pause momentarily on the second movement, touched upon in the section above, namely, how the legal system can receive and absorb scientific knowledge. Scientists (natural or otherwise) believe in the universality of their knowledge, which is valid to the extent that it enjoys universality within the science system. It is nonuniversal regarding other domains of society: Scientific facts cannot buy a car nor grant political power. Luhmann calls their effect 'virtually nonbinding' (Luhmann, 2002, p. 63) and says that 'knowledge – and indeed particularly demanding, advanced knowledge – is consequently only one form of social potency among others' (Luhmann, 1994, p. 11). Science cannot serve to select action.[4] Naturally, this poses problems for a legal doctrine that presupposes it can base its normative project on scientific consensus. We cannot talk of scientific-legal decision-making, for scientific truths are only accessible to the legal system as potential legal facts, among many others.[5]

Luhmann pointed out that because science has no direct access to reality, it is ill-equipped to guide what to do in the world (Luhmann, 2002, p. 63; Luhmann, 1993, p. 530). The science system successfully creates knowledge because it can simplify the world drastically. However, it means that it cannot give broad prescriptions. This means that scientists, lawyers and society at large must adopt an attitude of modesty that acknowledges risk and uncertainty and discard the 'Cartesian-Baconian confidence in more knowledge' (Luhmann, 1993, p. 536).

This state of affairs creates problems for environmental law. The popular concept of planetary boundaries serves as a helpful example. Even if scientific consensus is attained on specific points, such as what measurements are most relevant, where we stand on those scales, the risks of transgression and more, what exactly the legal system should do seems like a wildly complex question (Luhmann, 1989, p. 69). Law's normative, conditional 'if ... then ... ' form (Buitendag, 2023) developed along the basis of stabilising society's expectations *of society*. Introducing society's environment into the legal system, an 'if ... then ...' based not on normativity but on scientific causality (Kelsen, 1967) appears to be at the breaking point of what the legal system can process. Luhmann teaches us not to overburden environmental law and to remain cognizant of what norms can regulate and cannot.

Thus far, it has been argued that society is predominantly governed not by human action but by systems and their particular rationalities. This element is what makes systems theory a posthuman one. One branch of posthumanism, we have seen, calls for the politicisation of nature. The following section will discuss one such attempt, namely, the critique of legal anthropocentrism and the rights of nature.

4.3 | Legal anthropocentrism

It has become common today to read of accusations of anthropocentrism. Such criticism is not entirely misplaced; it seems apparent that much of the climate crisis can be explained through reference to human society's unbounded and myopic selfishness, which is implicit in the very name Anthropocene. However, the two paradoxes above have illustrated that whatever the opposite of anthropocentrism is, accessing it is no simple matter. This is true of science and law, systems that cannot 'step outside' society. In the case of law, the problem seems even greater: where science can satisfy itself with descriptions, law trades in prescriptions (norms) and human expectations (Luhmann, 2004, p. 71).

The road to extending rights to nature, undoubtedly paved with good intentions, leads us back to where we started. What was first argued by Stone (Stone, 2010) and more recently and widely known outside the law by Latour (Latour, 2017) would see humans as proxies or agents for trees, rivers and animals. As mentioned above, our question becomes: How can human agents divine the wishes of nonhuman 'subjects'?[6] Keeping in mind that the legal system's function is to stabilise expectations, and without forgetting Richter and Moeller's convincing arguments for Luhmann's posthumanism, attempting to ascertain the 'expectations' of nonhumans would, again paradoxically, involve no small degree of anthropomorphising.

One of the major offshoots of the anthropocentrism argument is for extending human rights to nonhumans. From Luhmann's article on the three paradoxical phases of human rights, we know that the semantic grounding of human rights had to shift whenever crises arose (Luhmann & Buitendag, 2022). The first generation of human rights had to anchor themselves in talk of the

[4]In fact, science serves to multiply problems rather than solve them (Luhmann, 1989).

[5]See especially footnote 25 of the essay in (Luhmann, 1998, p. 88).

[6]The topic of the 'legal subject' is also no simple matter. In legal history, we have seen important shifts in who or what can be considered a legal subject. It seems apparent to us that an individual human should be a legal subject, but this would be to ignore centuries of intellectual labour and meaning-making to make this idea plausible. Should nonhumans be given legal subjectivity, a good question would be what it is that gains this subjectivity: and individual animal or a herd? Indigenous plants over alien vegetation? Endangered species or the entire ecosystem they find themselves in? Many variations on this problem can be imagined.

'natural rights of man' (again, who can ascertain these and attest to their naturalness?) and had to solve the problem of social unity in an individualised modern society. It was solved in part a century later through positivisation (Luhmann & Buitendag, 2022). Rights were not natural but granted by the State through basic norms. However, post-WW2, in Luhmann's third phase of the rights discourse, rights find their legitimacy in the moral outrage they cause. Through a process of 'symbolic inflation', they function, once again, more like moral categories than legal ones.

It appears that society and the legal system are again finding themselves in a type of crisis, and the semantics of human rights are shifting again. Latour's call for politicising nature seems to be becoming a reality through various court judgements worldwide. Extending human rights beyond the human represents aspects of all three phases. As in phase one, the question of what is natural resurfaces. As in phase two, states are asked to recognise and positively enact human rights explicitly. Moreover, much of the debate rests on large-scale moral outrage. The paradox of being seemingly anti-anthropocentric by dragging nonhumans into legal subjectivity seems lost on many of its advocates. In the evolution of human rights through three phases, with the final's emphasis on moral arguments, one also finds oneself back at the first of this paper's three problems: An imaginary 'natural' space from which society can be shown to be morally corrupt and unnatural.

It might seem curious that systems theory, described as posthuman, would stand in the way of lessening the anthropocentrism of law. It may be granted to certain environmental lawyers and philosophers that the distinction between humans and nonhumans is, from a particular perspective, difficult to draw (Latour, 2017, p. 57). Unfortunately, however, this does not settle the debate. Luhmann becomes indispensable for his unique posthumanism by insisting on the nonhuman category, 'system'. Only the legal system can communicate legal communication, and it is not changed as simply as by granting standing. Trees do not step into the law; the system merely communicates about it in a new way based on existing forms such as subjecthood.

In the case of rights of nature, we see a trend already enjoying some recognition in courts. The Luhmannian question will perhaps raise itself later in its application. Accessing nature and determining its rights and how it will be filled and weighed against competing rights remains to be seen. Additionally, in a generation when the trust among critical legal scholars in human rights seems lower than ever, the endeavour to set nonhumans up for the same disappointments humans have suffered seems misguided. All this is not to argue against the greater protection of the environment. Instead, it is an indictment of the limits of the legal imaginary and a plea for more innovative solutions.

In summary, we see that despite his reactionary rhetoric, Luhmann points to an alternative for theorising about environmental law. Current trends begin with the premise that 'everything is connected' and then quickly confront environmental legal practice with examples of disconnection. Luhmann's novelty lies in insisting that if everything is connected, it is so only because of and through boundaries (Luhmann, 2013, p. 196). As Aidan Tynan has recognised, the gap between society and nature is not a dualism that must simply be crossed, but rather that it is an *aporia*. It is a gap that must be crossed but is impossible to cross (Tynan, 2022, p. 4). Inclusion always comes at the cost of another's exclusion (Luhmann, 2013, p. 17). The challenge, in short, is thus: What can a progressive environmental legal theory look like that embraces difference, not unity?

5 | CONCLUSION

This contribution began by pointing to a general disappointment regarding environmental law and its achievements. This can be seen in the abundance of new environmental law approaches in academic legal literature. A survey of these new approaches reveals that, despite differences, many similar ideas are proposed as the foundation of a renewed environmental law. Among these similarities, three are highlighted: the universal criticism of the society/nature distinction of classic environmental law, the need for environmental law to be guided by the newest developments in climate science and finally, the law's anthropocentrism.

It was argued that Luhmann's *Ecological Communication* is a largely ignored work that might be worth revisiting to temper the claims from certain corners of environmental law. Before that could be done, the reasons for the book's relative obscurity had to be investigated. Two reasons were explicitly raised. The first is that the book was written with a specific understanding of its climatic reality and was aimed as an intervention within a specific national and political context, which does not apply directly to a diverse readership today. Second, with reference to specific passages, it is shown that the text displays certain reactionary rhetorical tropes, which could have impacted the broader dissemination of Luhmann's ideas among ecological thinkers. However, it concludes by arguing that it contains valuable lessons for those thinking about environmental law.

The work's utility was investigated at the hand of three common themes in current environmental law

scholarship. It was posited that any reference to nature inevitably remains trapped within society and is often used for little more than a rhetorical space from which moralising arguments are made. Additionally, the possibility of law being guided by science is problematised. The functional differentiation of society makes any direct transfer or even 'translation' of such information impossible. Turning descriptive facts into prescriptive norms is so complex that it seems improbable for the legal system to process. Finally, the accusation against the law's anthropocentrism is also challenged, specifically regarding the rights of nature movement. This tendency is not the opposite of anthropocentrism but rather the anthropomorphising of the nonhuman.

New developments in thought, both environmental and legal, are crucial, and the attempts by environmental lawyers to contribute to the possible solution to the climate crisis are to be lauded. Such attempts are made more robust by considering thoughtful critique, regardless of the source's obscurity (or popularity). In this spirit, environmental lawyers are invited to engage with *Ecological Communication*.

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RESEARCH ARTICLE

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Observing systemic values in a tax avoidance environment: Using systems theory to examine the Ireland–Apple tax relationship

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Abstract

Tax has been the site of many battles between ethical behaviour and formal compliance with tax law, particularly in an international context. This paper accepts the functional differentiation of society and explores the amorality of systems. The environmental noise about unfair tax competition by states and tax avoidance by multinational enterprises is extensive. The autopoietic legal system cannot be relied upon to deliver a concurring view, instead producing its self-referential and sometimes contradictory communications. The empirical setting considers Ireland and Apple and the legal system's verdict on the legality of their tax relationship. This legal verdict changes as the case progresses from European Commission to one court after another, a contingent and uncertain outcome that may be prompted by systemic irritation but which is not co-ordinated with moral commentary on Ireland or Apple. The absence of coordination by the legal system with environmental commentary on fairness means that, as the legal verdict changes from court to superior court, moral commentary is not a reliable predictor of legal outcome.

KEYWORDS

competition; functional differentiation, fairness, Luhmann, tax avoidance, values

1 | INTRODUCTION

An exchange between Tim Cook, CEO of Apple,[1] and the late Senator McCain in 2013 illustrates the gulf in characterisation of tax behaviour by taxpayer and politician. Senator McCain, referring to how Apple was not subject to US taxation on overseas income, asked whether this gave rise to an advantage for Apple over smaller companies operating solely in the United States. This was dismissed by Apple, who said that "by law and regulation" overseas profits earned by Apple are not taxed in the United States (Senate, 2013, p. 45). Senator McCain, not arguing the existence or extent of that "law and regulation," goes on to say:

Senator McCain:	Can you understand there is a perception of unfair advantage here, Mr. Cook?
Tim Cook:	Sir, I see this as a very complex topic that—I am glad that

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> we are having the discussion, but, honestly speaking, I do not see it as being unfair. I am not an unfair person. That is not who we are as a company or who I am as an individual. And so I would not preside over that, honestly. I do not see it in that way. (Senate, 2013, p. 45).

Swerving from engagement with "law and regulation" towards a discussion about fairness is an explicable response to the complexity of the tax system. Complexity makes informed discussion about tax difficult (Picciotto, 2015; Prebble, 1994). It is easier to have recourse to the concept of fairness—categorised by Senator McCain as a perception rather than an actual advantage—than to delve into the "obscene" (Clemens, 1999, p. 518) complexity of tax law and regulation. Separating unfairness from tax behaviour—as Mr Cook does—is an expression of the division between law and morality (Christians, 2017; Hart, 1961; MacCormick, 1981), a division that is far from universally accepted (Finnis, 1980; Fuller, 1957). Senator McCain and Tim Cook appear to be talking past each other, something that is endemic in discussions about taxation (Hasseldine & Morris, 2013; Sikka, 2013). The complexity of taxation might explain this but so also might the practices of discussing taxation within many disciplines: philosophy (Murphy & Nagel, 2002; Nozick, 1974), political science (Genschel & Schwarz, 2011; Rixen, 2008, 2011), accounting (Hanlon & Heitzman, 2010); economics (Riedel, 2018), law (Freedman, 2005; Snape, 2011), sociology (Martin et al., 2009); regulation (Braithwaite, 2007), and corporate social responsibility (Gribnau, 2015; Lanis & Richardson, 2015). The interrogation by the body politic of the business titan is, in microcosm, a continuation of a broad discussion as to the exercise of state sovereignty in tax (Rixen, 2008), the damage done to other states through a "race to the bottom" (Palan, 2002) and the criticism of peripatetic multinational enterprises who self-organise on a global scale to reduce liability to taxation (Hashimzade & Epifantseva, 2017).

Acknowledging that tax spans systems, this article draws upon Luhmann's theory of functional differentiation to place taxation in a closed, self-referential legal system. A single communication of the legal system about taxation is then observed from the environment of that system (Luhmann, 1995). System and environment are mutually constitutive. Yet, while the systemic communication is devoid of (overt) moral or ethical content, the environmental observations of that communication are replete with moral expression. Thus far, this is consistent with the proliferation of moral communication (Valentinov, 2019), which has seen a blurring of the strict autonomy of functional systems that is a hallmark of modern society (Luhmann, 1995). This paper examines the place of morality in observations on the legal system and asks what it means to invest the legal system with moral importance. The contribution of this paper is to trace communications from the legal system on single phenomenon and combine this with observations of morality. The legal system is self-steering and autopoietic (Luhmann, 2004) and the designation of legal or illegal switches as the legal system communicates, again and again, on the legal construction of event(s). Such designation—legal/illegal—may, or may not, be coterminous with moral or immoral.

Ascribing a moral or ethical stance is pervasive and not exclusive to the legal system (Valentinov, 2019). Such designations abound: in matters as diverse as doping in sport (Wagner, 2010); the boundaries of abortion care (Deflem, 1998); the distinction between health and illness (Gibson & Boiko, 2012); the construction of suicide as a social issue (Michailakis & Schirmer, 2014); the reliance on law to address moral predicaments in education (Novak, 2019); and the moral conflict on measures taken during COVID19 epidemic (Clausen, 2022). What this paper offers is a temporal examination of a changing verdict of the legal system on an economically consequential (€13 billion plus interest), but highly technical, tax problem. This could be described as an argument about which nation state exacts tax from multinational enterprises and how much they should pay (Beer et al., 2020). The paper presents the juxtaposition of the ostensibly valueless—but changeable—verdict of the legal system on the tax affairs of Ireland and Apple with the environmental noise about morality and ethics in taxation.

The point of departure is to describe the tax relationship between Ireland and Apple, the same relationship that was the subject of the discussion between Senator McCain and Tim Cook in 2013. After that Senate (2013) discussion, the legal system challenged the Ireland–Apple tax relationship, seizing on Tim Cook's categorisation of the relationship as having involved a "tax incentive agreement" (Senate, 2013, p. 46) to entice Apple to Ireland. This legal pursuit of Ireland and Apple by the European Commission brought further details of their tax relationship into the public domain; the tax rulings granted by Ireland to Apple, which regulated this relationship, dated from 1991 to 2007. In 2016, the European Commission found that Ireland had given illegal state aid (the "2016 Commission Decision")[2] and estimated that state aid to have amounted to €13 billion plus interest.[3] The reception of the 2016 Commission Decision is probed

in interviews with 16 experts in either or both of state aid and tax.

This paper has seven sections. We begin with the "Theoretical Perspective," which enlists Luhmann's systems theory for its explanatory power at presenting a nuanced view of morality and values within functionally differentiated systems. The section dealing with "The Case—Ireland and Apple" describes in more detail the tax relationship between Ireland and Apple, which came to the notice of the European Commission, placing it against the background of state competition in the area of tax and the behaviour of multinational enterprises in avoiding tax. In the section entitled "Qualitative empirical material and methodological approach," the focus is on the interview data, which are used to generate the environmental noise on the 2016 Commission Decision. In the section dealing with "The Observation of Values," we dissect the moral values ascribed to tax relationships and place them within the context of proliferating moral communication. In the "Discussion: the Value of Values," we assess the environmental noise on values against a systemic change in categorisation of the Ireland—Apple tax relationship from illegal (2016) to legal (2020) and, possibly, a future reinstatement of illegality.[4] In the "Conclusion," we discuss the implications of investing the legal system with a moral stance, noting that the legal process of assessing the Ireland–Apple tax relationship is now completed and is viewed as illegal.

2 | THEORETICAL PERSPECTIVE

At this point, it is necessary to introduce the theoretical perspective through which the Ireland–Apple tax relationship is examined. There are three intertwined strands to this theoretical perspective, all of which derive from Luhmann's (1995, 2004) systems theory. These are, first, the fundamental concept of functional differentiation, which, secondly, informs the distinction between system and environment, and, thirdly, the place of morality within systems theory.

Luhmann's systems theory is often viewed as conservative, possibly elevating the legal system to something from which Fuller (1957) would "recoil in horror" (Sinclair, 1992, p. 97). Yet Luhmann provides a nuanced perspective on the perennial question of the relationship between law and morality. Influenced by the positivist legal theories of Hart and Kelsen, Luhmann rejects any justification of the law as based on an ideal of universal or natural morality (King & Thornhill, 2003): "morality as such has no legal relevance" (Luhmann, 2004, p. 112). This is a heavily disputed view: Natural law theories vary but generally embrace, to some degree, the necessity of substantive moral constraints on the content of law (Finnis, 1980; Fuller, 1957). This paper does not deal with this dispute head-on: instead proceeding on the basis that a communication from the legal system can be the subject of a "moral judgment" (Luhmann, 2004, p. 225), but this does not have a legal consequence (Baxter, 2013). This is consistent with the perspective of systems theory, which views the legal system, like all systems, as subject only to its own operational constraints and (partially) immune from external influences. This approach can be uncomfortable, but systems theory is useful in comprehending the complexity of society (Valentinov, 2019) and the dissonance between the "violent arbitrariness" (Teubner, 2001, p. 31) of the distinction between legal and illegal.

2.1 | Functional differentiation

Functional differentiation is an evolutionary process whereby, in response to the complexity of modern society, society self-organises along functional lines as a means of reducing this complexity (Luhmann, 2013; Valentinov, 2019). The economy, politics, and law, amongst others, are identified as functional systems (Luhmann, 1995, 2004). Each functional system differentiates itself from its environment or, as Luhmann (1992a, p. 1420) says, "the unity of the system is produced by the system itself." This self-drawn boundary is effected through "elaborate semantics of self-interpretation, reflection, autonomy" (Luhmann, 2013, p. 88). The differentiation—a boundary—between the system and the environment is replicated at the level of each system and each system is within the environment of all other systems.

Each functional system communicates in its peculiar medium, drawing on its own prior communications and using its own terminology to construct its view of society. A binary, antagonistic code renders the world comprehensible (Andersen & Born, 2007) through the medium of, in the case of the legal system, a designation of events as either legal or illegal. In this kinetic constellation of mutually influential but operatively isolated systems, the communication of this code is the product of a systemic construction of events. Each system assesses what can meaningfully be communicated, restricted by previous systemic communications and unable to dictate to—or steer—other systems as to what should ensue (Luhmann, 1997). Functional differentiation recodes all aspects of social life (Roth et al., 2020). While a certain synthesis of political and legal functions is indispensable, Luhmann notes that this is achieved only on the basis of their different functions (Luhmann, 2004). The systems

lack transparency; they "are opaque to each another and therefore cannot reciprocally steer each other" (Luhmann, 1992c, p. 257), thus posing a "dilemma of systemic anarchy" (Buckel, 2020, p. 20). Such anarchy allows the political system and the legal system to reach different descriptions of—or perspectives (Roth et al., 2019) on—the "tax incentive agreement" (Senate, 2013, p. 46) publicised by Tim Cook to the US Senate. The legal system, irritated by a tax incentive agreement, applied the "law and regulation," which the political system did not, in this microcosm, consider. Different systemic responses display the very essence of functional systems, which is to "create order out of chaos: they give meaning to events which otherwise would be meaningless for society" (King & Thornhill, 2003, p. 9).

While each system has a monopoly on its function, there is no hierarchy of systems: No precedence is accorded to the economic over the political, or to the political over the legal. Systems distil the essence of events from different points of observation. This is a vital insight into the focus of this paper: The political system may describe a tax relationship as unfair or immoral but the autopoietic legal system (Nobles et al., 2002; Teubner, 1987), while bombarded with political and media accounts of this unfairness, is not controlled by these accounts (Moeller, 2013). Determining its own boundary requires the system to know, in advance, which "norms are legal norms, and which norms are simply opinions in its environment" (Luhmann, 1992a, p. 1427).

2.2 | In the environment of the system

What Luhmann (1992a) labels opinions in the environment brings to the fore the meaning of environment. In a functionally differentiated society, each system operates within an environment composed of all other systems. The environment of a system is what is not that system (Philippopoulos-Mihalopoulos, 2009). Nonetheless, it cannot be reduced to a "residual category" (Luhmann, 1995, p. 176) with merely accidental significance. System and environment are intertwined (Luhmann, 1992a) through mutual influence or coupling (la Cour, 2006). There has been much work done on the irritation of the system by the environment, whether the metaphor of irritation or structural coupling is used (Hikaka & Prebble, 2010; Teubner, 1988). Nobles and Schiff (1995, 2004) examine the media presentation of miscarriages of justice, viewed through a systems theoretical approach where the binary code of the legal system is (mis)interpreted by the media. This is a particularly apt example of the system issuing a communication, but it being read differently in the environment.

Tax is an excellent subject for examining the functional differentiation and the boundary between the system and its environment. Luhmann (2013, p. 111) identified the coupling of politics and the economy as being achieved through tax. Certainly, tax exists at the confluence of a number of systems: political decisions as to what should be taxed, and what should not, which are underpinned by beliefs in property rights and the role of the state (Murphy & Nagel, 2002; Nozick, 1974), economic implications relating to the obligation to pay (Shaviro, 2014; Stiglitz, 1985), and legal implications as to how tax is described and levied (Thuronyi, 2000; Weisbach, 1998).

A tax relationship can be the subject of various interpenetrative systemic communications: The political system can express disapproval or enact legislation; the economic system can quantify the tax paid, or unpaid; and the legal system can apply its binary code of legal/illegal to recalibrate a tax relationship between Ireland and Apple which was in place since 1980.[5] This recalibration ripples through the environment. These ripples can be observed, either through their effect on other systems[6] or through a construction of environmental noise, captured at a particular moment in time and with an awareness that further systemic communication will occur. Figure 1 visualises some different functional systems overlapping each other in a representation of interpenetration or structural coupling of one system with another (Luhmann, 2004). Tax is shown at the confluence of the political, legal, and economic systems, something that chimes with the multidisciplinary gaze on taxation outlined in the Introduction.

2.3 | Morality within systems theory

The theoretical perspective also needs to integrate the place of morality or values in a functionally differentiated society. This is because, when generating interview data, it became evident that a moral or ethical view on both parties to the tax relationship—state or multinational enterprise—was consistently, although not universally, expressed. This is the "moral judgment on law [which] can be made independently from law" (Luhmann, 2004, p. 225). Luhmann was suspicious of recourse to morality within social communication and argued: "In normal everyday interaction, after all, morality is not needed anyway; it is always a symptom of the occurrence of pathologies" (Luhmann, 2000, p. 79). Ethics are a reflection of morality (Luhmann, 1996) and a moral stance informs the expression of values (von Groddeck, 2011). These values are a shorthand way of indicating approval or disapproval (Luhmann, 1995). They can be disputed:

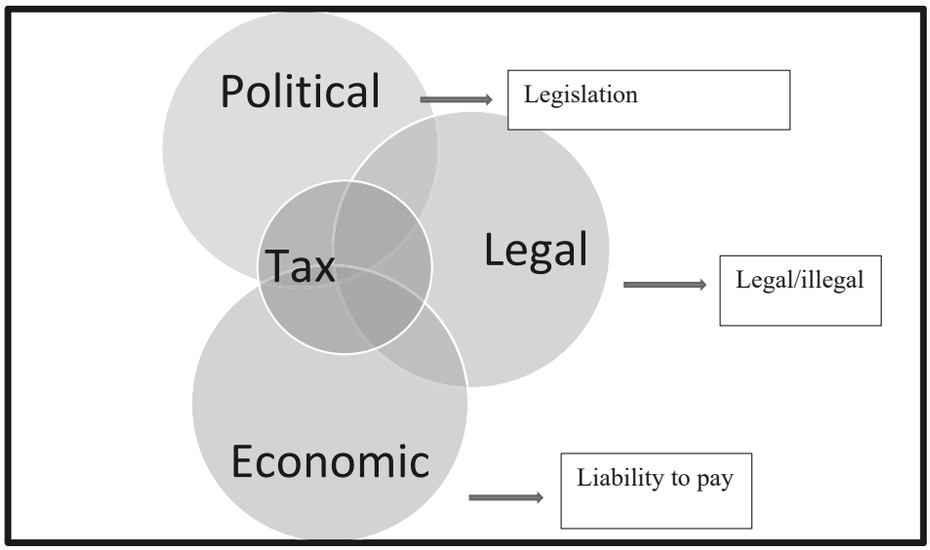


FIGURE 1 Various functional systems and structural couplings, showing taxation at the confluence of various functional systems. [Colour figure can be viewed at wileyonlinelibrary.com]

"Values do not express consensus but motivate others to observe one's observations critically" (Luhmann & Fuchs, 1988, p. 32). Deciphering the environmental noise involves identifying the latent values in these observations and provides an orientation in complex situations (von Groddeck, 2011) or, as Luhmann notes, facilitates a probe of more concrete expectations (Luhmann, 1995).

Moral communication has proliferated (Valentinov et al., 2016) and is often an indicator of social conflict (Moeller, 2006). But it is diffuse. Morality is no longer societal; the precarious position of morality is matched by the semantic individualisation of moral reference, its insistence on "inner conviction (as opposed to external coercion)" (Luhmann, 2012, p. 149). This individualisation of moral reference is consistent with von Groddeck's (2011) analysis of organisational values, where the point of recourse to values is their fuzziness, which she established empirically. The contested nature of values is also evident from the ubiquitous copying of value semantics from corporate websites (Roth, 2013). Corporations, Roth argues, use values as "moral shields" (Roth, 2014, p. 178).

The elasticity of values (Besio & Pronzini, 2014; Thyssen, 2009) bears out Luhmann's objection to a moral code, which is that paradigmatic ethics are not possible (Luhmann, 1991). This view has been labelled cynical (Nobles & Schiff, 2012), but, nonetheless, Luhmann's view is that moral communication polarises and has been implicated in "a rapid fixation of positions, to intolerance, and to conflict" (Moeller, 2006, p. 113).

Morality has a unique status as it operates as a bacterial infection, a parasitic invader (Rasch, 2000) that would paralyse the autonomous functioning of the system, eventually causing it to lose its identity and disappear. Morality is viewed as an indeterminate force (Besio & Pronzini, 2014), which can be a façade (Roth, 2014) or meaningful. Thyssen (2009) gives examples of values of "respect for the customer" being variously complied with by adhering to, and contravening the rules, thus demonstrating its elastic meaning. This chameleon nature of morality chimes with an example, proffered by Luhmann (Rasch, 2000), which may serve to elucidate Luhmann's mistrust of morality. The political system employs the distinction government/opposition but cannot allow good to attach to only one side of this distinction. Government is not "the only good and respectable one, while the other side acts immorally and reprehensibly" (Rasch, 2000, p. 146). The autonomous functional systems are amoral (Valentinov, 2019). Legal cannot be coterminous with good, nor illegal with bad. The switch in views of Ireland and Apple's tax relationship, from illegal (2016) to legal (2020) and back again to illegal (2024), embodies the distinctness of the binary code of the legal system from an observation of goodness or badness.

Thus far, the focus has been on the system and some of the implications of functional differentiation: the unique autonomous function expressed through resistance to steering and amorality. It is now necessary to outline the background to the 2016 Commission Decision, the timetable to which is shown in Figure 2, which is the empirical focus of this paper.

3 | THE CASE—IRELAND AND APPLE

Apple formed two subsidiaries, ASI and AOE, after it first established itself in Ireland in 1980. Although incorporated in Ireland, ASI and AOE were "stateless" companies,[7] resident in no jurisdiction for tax purposes

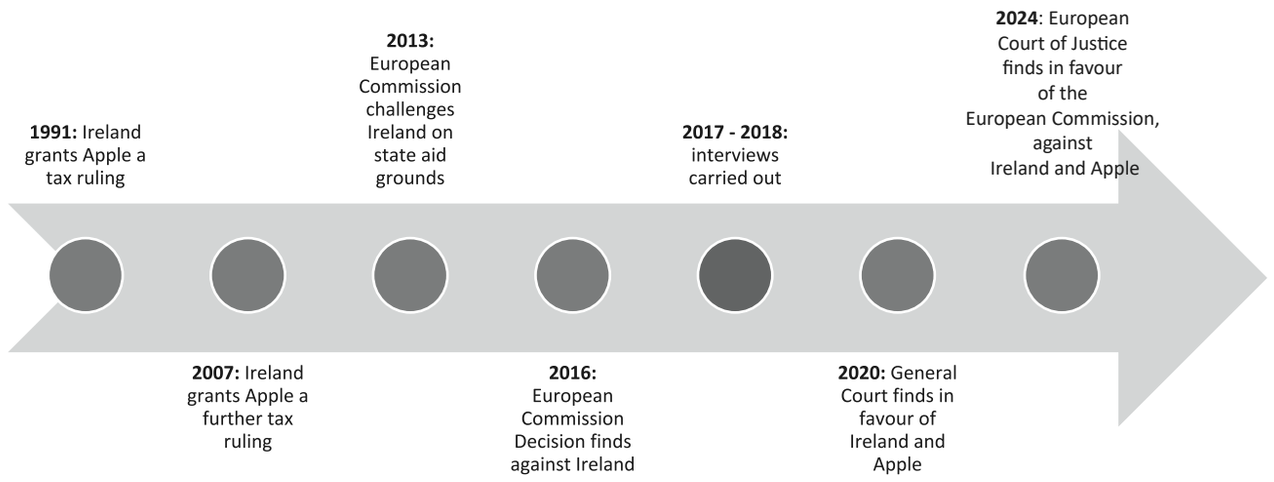


FIGURE 2 Timeline of events. [Colour figure can be viewed at wileyonlinelibrary.com]

(Kleinbard, 2011). ASI and AOE operated in Ireland through branches, and these Apple branches purchased Apple products from equipment manufacturers and sold Apple products outside North and South America to both third parties and related parties. The Irish branches employed a substantial number of employees.[8] The legislative basis for taxing the Irish branches of ASI and AOE is that direct or indirect trading income would be attributed to the branch.[9] There must be a method to quantify this attribution of trading income to the branch and two tax rulings, negotiated by Ireland and Apple in 1991 and 2007, set out an agreed method.[10] The rulings provided that the net profit of ASI and AOE, for the purposes of Irish tax, would be calculated as a percentage of the operating costs of ASI and AOE, variously calculated.[11]

These rulings enabled a certain level of income to be attributed to the Apple activities in Ireland, but by agreement with Ireland, no income relating to the exploitation of intellectual property was attributed to Apple's Irish operations.[12] Between 1991 and 2013 (the year in which the European Commission opened its investigation in Ireland and Apple), there is no evidence of any legal attack on the viability or effectiveness of these tax rulings either at EU level or, for example, by the Irish tax authorities seeking to resile from the rulings.

Developing the methodology of attributing income to branches operating outside its jurisdiction of residence is exactly the focus of much work by the Organisation for Economic Co-operation and Development (OECD) over decades, involving the OECD issuing nonbinding, soft law standards that coordinate various attribution methodologies (Christians, 2007, Brauner, 2002). Furthermore, while the two tax rulings granted by Ireland to Apple were attacked by the European Commission on state aid grounds, the European Commission consistently clarified that tax rulings were, in principle, an important component of tax administration.[13]

Turning to the state aid argument advanced by the European Commission, the heart of the legal argument is that Apple underpaid tax in Ireland. This argument was made on the basis of the state aid provisions contained in the Treaty of the Functioning of the European Union (TFEU). The TFEU prohibits aid granted by member states to undertakings where such aid distorts competition (by being granted selectively to particular undertakings and providing them with an advantage) and affects trade between member states. State aid rules have been a feature of EU law since its inception in 1957 (Terra & Wattel, 2012). The European Commission is responsible for the enforcement of the TFEU rules relating to state aid. State aid is a powerful mechanism to control the national legislation of member states (Quigley, 2015) but using it to challenge tax rulings given by member states to taxpayers was a new departure by the European Commission (Lovdahl Gormsen, 2016).

The 2016 Commission Decision based the state aid argument on Ireland having selectively treated Apple more favourably than other taxpayers in a similar legal and factual position under Article 107 TFEU. This selective treatment was achieved through the mechanism of the two tax rulings (dating from 1991 and 2007), which reduced the taxable base of ASI and AOE through an endorsement of profit allocation methods by Ireland. These profit allocations, the 2016 Commission Decision found, were not in accordance with transfer pricing rules (Haslehner, 2020) and did not accord with economic reality (Mason, 2017). The 2016 Commission Decision found that Apple had underpaid tax, which was estimated in an accompanying press release as amounting to €13 billion tax foregone by Ireland between 2003 and 2013.[14] The

	Turnover	Profit before tax per statutory accounts	Tax per statutory accounts
ASI	47,281	22,134	9.9
AOE	519	6,299 [a]	3

FIGURE 3 Financial information for ASI and AOE for 2011 (in USD millions). Note: Paragraph 97, 2016 Commission Decision gives details of turnover, profit before tax, and tax per statutory accounts. [a]Paragraph 97, 2016 Commission Decision note that this includes income from group undertakings of USD6,253 million in 2011. [Colour figure can be viewed at wileyonlinelibrary.com]

magnitude of the tax in dispute is illustrated by Figure 3, where, looking at ASI in particular, the Irish branch had a turnover of $47 billion and profit before tax of $22 billion in 2011. In 2011, ASI paid tax of $9.9 million to Ireland. These figures underpin the press statement by the European Commission that ASI paid "an effective tax rate of about 0.05% on its overall annual profits" in 2011.[15]

The 2016 Commission Decision ruled that state aid was unlawfully given by Ireland to Apple. The underpayment of tax was quantified by reference to the correct payment under law, an amount that was based on the interaction between Irish law, EU state aid law, and international law relating to transfer pricing (Lovdahl Gormsen, 2019). The 2016 Commission Decision is silent on questions of fairness or morality: the underpayment was not distinguished from the equitable or moral payment (Christians, 2014; Picciotto, 2007) but from the correct payment under law.[16]

The 2016 Commission Decision was appealed to the General Court of the European Union by Ireland and Apple and, in July 2020, the General Court found that no illegal state aid had been given to Apple by Ireland.[17] The European Commission appealed to the Court of Justice of the European Union and, in September 2024, Ireland was ordered to collect underpaid tax from Apple. This amounts to more than 13 billion to be collected by Ireland, which is paradoxical as Ireland had argued, for 8 years, that no tax was due to it.[18]

4 | QUALITATIVE EMPIRICAL MATERIAL AND METHODOLOGICAL APPROACH

This paper accepts functional differentiation as an empirical reality (Valentinov, 2019) and views systemic communication as bounded by the construction of society by that system, including its blind spots and the limitations of its code. Dealing with a problem within the framework of the legal system results in the tax practices of states, or multinational enterprises, becoming subject to a binary verdict: they are either legal or illegal at any point in time (King, 2000; Luhmann, 1988). The legal/illegal verdict cannot be supplemented with other contingencies: moral/immoral; sufficiently tax generative/insufficiently tax generative; fair/unfair. There can, under Luhmann's system, and as an empirically observable communication of the legal system, be only two possibilities as to the tax relationship between Ireland and Apple *at a particular moment in time*: legal or illegal. The system communicates in its peculiar language, something which is perhaps evident from the verdict of the 2016 Commission Decision:

> The tax rulings issued by Ireland on 29 January 1991 and 23 May 2007 in favour of Apple Sales International, which enable the latter to determine its tax liability in Ireland on a yearly basis, constitute aid within the meaning of Article 107(1) of the Treaty. That aid was unlawfully put into effect by Ireland in breach of Article 108 (3) of the Treaty and is incompatible with the internal market.[19]

The blandness of this language is built upon dense argument based on EU legislation, Irish tax legislation, case law of the European courts, and European Union treaties. These are legal norms, not environmental opinions (Luhmann, 1992a). The discontinuity between legal norms and environmental opinions requires an awareness of "legal closure so as to explore what it is that law 'has no desire to see'" (Nelken, 1998, p. 420).

This paper looks at what is unseen by the law. It does this by generating environmental noise about a tax relationship between a state and a multinational enterprise. To this end, the tax relationship between Ireland and Apple, as attacked on state aid grounds by the European Commission, was used as a case study. The choice of case

study was justified, first, by the size of the monetary penalty imposed on Ireland and, secondly, by the robust calibre of the available information about the tax relationship which at least partially redressed the typical lack of transparency about tax (Freedman, 2018; Oats & Tuck, 2019). Thus, the factual dimension of observed meaning—tax and state aid within the context of a finding of illegality on the part of Ireland—was firmly within the foundational aspects of the research (Andersen, 2011; Luhmann, 1995).

There were three protagonists in this scenario: Ireland, Apple, and the European Commission, each of whose observations on the 2016 Commission Decision was a potentially fruitful source of environmental commentary. The initial plan was to interview personnel from the Irish government, Apple, and the European Commission. The last category proved receptive to an invitation to interview (although there were also refusals from this category). The absence of interviews with Apple employees is an enormous hole in observation, a known unmarked space, a known blind spot (Rasch & Wolfe, 2000). Only two interviews with individuals who identified as institutionally connected with Ireland were carried out. Given that the sampling process proved incomplete, a decision was taken to counterbalance observations from the European Commission officials with interviews of Irish lawyers and former judges who were likely to provide an informed observation on tax and state aid. In total, 16 interviews were carried out with officials or former officials of the European Commission, the Irish government, and several former judges of either EU member states or the EU courts. Five lawyers practising in the private sector in either tax or state aid were also included. All interviewees were either lawyers or EU or state officials who were familiar with the intricacies of state aid and taxation. The interviews were semistructured, in-person, conducted in 2017 and 2018, and classified according to the institutional identity of the interviewee. Each lasted between 30 and 90 min.

Each interview started off with an acknowledgement that the aim was not to dissect the legal reasoning of the 2016 Commission Decision or predict the outcome of the appeal to the EU courts but instead to address the following questions: whether the interviewee had been surprised by the state aid action; what were the views of the interviewee on the behaviour of Ireland and Apple; and whether tax law should be subject to a positivist interpretation consistent with the separation of law and morality. The expert status of the interviewees was crucial: their knowledge of taxation, tax rulings and state aid generated an informed view of the application of state aid rules to a pattern of the tax relationship between Ireland and Apple from 1991 to 2013.

The aim was to construct a view of the social import of the state aid action. In systems theory, this was an attempt to generate environmental noise, using a methodology which observed "the street smarts of the socially experienced participants in social communication who will be answering questions" (Luhmann, 2012, p. 14). Certainly, the interview data must be analysed on the understanding that all interviews are selective, insofar as what is discussed has been chosen, and can be distinguished from what is not discussed. Such an understanding is consistent with Luhmann's constructivist stance: the construction of a reality—labelled environmental noise—is implicit in the very questions that are asked. "The world is not given—as in the traditional representationist frame—but is rather brought forth in the dynamic interaction of observer and observed" (Rasch & Wolfe, 2000, p. 13). The empirical data does not seek to establish itself as the definitive view on tax and state aid, or indeed on any aspect of law. It is simply one contingent and socially constructed reality (Luhmann & Fuchs, 1988).

These interviewees were labelled according to their occupation and date of interview as set out in Figure 4.

The interview data were first subject to a functional analysis, positing the 2016 Commission Decision as a solution to various problems. Luhmann describes this "as a kind of theoretical technique" (Luhmann, 1995, p. 52), and on an epistemological basis, the functional method has an affinity with "complexity, contingency and selection" (Luhmann, 1995, p. 52). The interview data were not reordered in a causal relationship: the 2016 Commission Decision was posited as a solution to variously articulated problems (Knudsen, 2010; Luhmann & Fuchs, 1988). Certain problems were articulated by the interviewees, familiar to all students of international tax law: lack of knowledge and lack of transparency about tax payments to states, lack of international and EU tax harmonisation, tax avoidance activity by multinational enterprises, and the excesses of state sovereignty through tax competition.

These problems were then further analysed. In an oscillating movement from data to analytical strategy (Andersen, 2003), an examination of the results of the functional analysis—the construction of problems—led to a recognition of a pattern of observing these problems in moral language. Interviewees employed value-laden language in describing problems and solutions in the context of a tax relationship between a state and multinational enterprise. This process was both exemplified and suggested by ISAL3:

Identity of interviewee	Date of interview
European Commission employees	
EC1	June 2017
EC2	June 2017
EC3	January 2018
EC4	July 2018
EC5	July 2018
Former Irish officials	
Irish Official 1	September 2017
Irish Official 2	January and July 2018
Former US officials	
US Treasury Official	July 2017
Former judges	
Former EU Judge	June 2017
Former Irish Judge	September 2017
Former Finnish Judge	November 2018
Irish tax lawyers (ITL)	
ITL1	May 2017
ITL2	June 2017
Irish state aid lawyers (ISAL)	
ISAL1	August 2017
ISAL2	January 2018
ISAL3	October 2018

FIGURE 4 List of interviewees and dates interviewed. [Colour figure can be viewed at wileyonlinelibrary.com]

ISAL3: I would use the word fairness. I think morality /decency /propriety/governance, all those sort of words are certainly relevant and you'd almost see it that the Commission is trying to make a point that the state aid, these tax rulings involved an excess of capitalism.

These words—fairness, morality, decency, propriety, governance—can be described as values. Values are "general, individually symbolized perspectives which allow one to prefer certain states or events" (Luhmann, 1995, p. 317). Luhmann cites as "useful and typical" Jurgen Friedrich's definition: "Values are conscious or unconscious ideas of what is wanted that precipitate as preferences in choosing between alternatives for action" (Luhmann, 1995, p. 577). Values are "silent persuaders" and "produce a semantic cover for unresolved conflicts" (Luhmann, 1996, pp. 31, 32). ISAL3 sees the 2016 Commission Decision as an attack, motivated by values, on excessive capitalism. This is a large claim, going beyond anything articulated in the 2016 Commission Decision.

Analysing the interview data enlisted thematic coding and involved pinning down activities in qualitative data analysis "on a practical level" (Flick, 2018, p. 475). It has been described as both flexible (Braun & Clarke, 2006) and vague (Flick, 2018). This possibly gives thematic analysis its useful character as a relatively simple two-stage method for identifying patterns or themes. A theme "captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set" (Braun & Clarke, 2006, p. 82). Finally, the simplicity and flexibility of thematic analysis is helpful where there is a strong theoretical basis that anchors the analytic claims that are made (Braun & Clarke, 2006). This makes it a useful technique where the theoretical perspective is so deeply enmeshed with the methodology.

The methodology of thematic coding involved identifying values through an explicit orientation towards arguments and observations laden with distinctions between the application of a code good/bad or, variously put, approval/disapproval (Rasch, 2000, p. 991); praise/blame (Luhmann, 1995, p. 82); or esteem/contempt (Luhmann, 1995, p. 156). These were values excavated though the moral terms in which they were expressed. The problems identified through the functional analysis were extensively viewed through the prism of values, inchoate, incomplete but nonetheless powerful semantic reservoirs of irreproachable and incontrovertible good. The key point is that subscription to these values is, even among 16 interviewees, not universal but a view of the legal system as having been irritated by political and media noise and influenced by values of fairness and morality, is pervasive.

5 | THE OBSERVATION OF VALUES

The values of fairness, morality, decency, propriety, governance, identified by ISAL3, can be amorphous. It is difficult to ascertain with precision as to what is the exact meaning of moral or immoral, or the content of similar expressions of approval and disapproval. We meet this challenge by not allocating a stable content to these values (Schnebel & Bienert, 2004). The elasticity of these values is exactly what might be expected (Thyssen, 2009; von Groddeck, 2011): the interview data demonstrate that observation of the legal system is, in the current empirical site, saturated with inchoate and wispy values. Labelling a tax relationship as displaying a blameworthy lack of values does not generate a tangible content of those values. For example, fairness is a nebulous value, too abstract to stabilise expectations of the legal system. This is recognised by ITL2:

ITL2: I think it was John McCain and was it Carl Levin? ... the two senior senators involved in the Republican and Democratic party. And they basically went through what I'd call the Apple tax structure, international tax structure in great detail and again basically lambasted Apple for not paying - quotes -'its fair share of tax.' We'll come back to what that means. And who knows what it means.

ITL2 specifically notes the intangibility of fairness. Nonetheless, lack of fairness is a challenge to the system, an expression of a value which "serve[s] in the communication process as a kind of probe in which one can test whether more concrete expectations are also at work" (Luhmann, 1995, p. 318). Fairness or decency is a value that is difficult to define with precision, but it serves as a shorthand description of a tax relationship between a state and a multinational enterprise.

5.1 | Proliferation of moral communication

What is very evident throughout the interviews is the proliferation of moral communication (Valentinov, 2019): Problems are presented in the context of values, with a widespread reference to the value of fairness. The US Treasury Official even observes within a knowingly moral context, and puts it thus:

US Treasury Official: So, then you're asking the question well, what is a

company to do? And what comes back off the civil society is some kind of a morally tinged answer, okay?

This is an interesting position; an observation as to lack of moral clarity within society. It is a denial of any common meaning of morality, and is consistent with Luhmann's identification of the amorality of systems (Valentinov et al., 2016) and Roth's (2014) scepticism as to the publication of values by corporations. While negating the coherence of morality, in the sense of denying a clarity to morality, the US Treasury Official is, nonetheless, observing within the distinction moral/not moral. As is the Former Finnish Judge, who observes that Finland did not engage in this type of tax competition involving tax rulings:

Former Finnish Judge: ... not that we are more moral than anyone else but we know the limitations to our skills.

These are not isolated incidences of moral observation. EC1 says:

EC1: ... there is some morality there, perception there that says it's unfair that some get away with not paying taxes and others do pay.

This connects fairness of tax treatment to some type of universal concept of social fairness. EC1 places this observation at one remove: there is a perception of unfairness, but there is ambiguity as to whether this perception is shared by EC1. This is an echo of Senator's McCain's question to Tim Cook, CEO of Apple, in 2013 (Senate, 2013) where he referred to a perception of unfairness. Indeed, public perception is also evident in EC1's remark:

EC1: And the rumour is that corporates basically don't pay any taxes.

Rumour is an interesting word: carrying with it a connotation of uncertain origin, of inexactitude. It is in the ether, remaining environmental noise until picked up by a functional system.

There is also a deep ambiguity as to what concept of fairness is in play. Murphy and Nagel (2002) argue that the position of fairness within popular debate on the tax system is usually "related to differences over steep economic inequality, individual responsibility, the alleviation of poverty, equality of opportunity, universal guarantees of basic social protection ..." (Murphy & Nagel, 2002, p. 174). These are weighty and complex deconstructions of fairness within tax, to be compared to the shorthand semantic of fairness used by EC1. This shorthand can be viewed as connecting fairness of tax treatment to a universal concept of social fairness, an objection to multinational enterprises being privileged over other taxpayers. There is also a connotation of multinational enterprises conniving to pay less tax in the depiction of them *getting away with* paying less tax.

The Former Irish Judge does not make an overt moral judgment, but Apple's group structure is described as mysterious and chimeric.

Former Irish Judge: So, all the sales are made here but by a process which does seem utterly mysterious, all of, almost all of the activity is deemed not to take place in Ireland at all. It's the activity of something called a head office which is an almost chimeric type of being, whatever it is. That is the bit that, really it does influence the mind, you know.

It is not only the multinational enterprise that is implicated in tax avoidance. EC5 sees Ireland as engaging in tax competition:

EC5: ... this is tax competition, this is tax competition. This is Ireland, taxing the minimum, bringing some, they don't care, they are not losing anything but they are still gaining something.

EC1 also diagnoses tax competition between member states:

EC1: ... then you come to the beggar your neighbour theory that you take away the tax of other member states.

These are shorthand descriptions of a state using fiscal policies to attract multinational enterprises; there is EC5's reference to a small state, which has been implicated in tax competition (Genschel & Schwarz, 2011).

There is also a reference to the rational behaviour of a state in pursuing tax competition (Radaelli, 2000) with the aim of bringing business activity, which would not otherwise have come to the state (Dehejia & Genschel, 1999). All this is viewed as unneighbourly by EC1.

No matter what the point of observation, some observation is in moral terms. From the point of view of the European Commission interviewees, there is an implicit rejection of the "morally tinged answer" noted by the US Treasury Official and a clear expression of moral stance:

EC1: So yeah it was a competition issue, it was a fairness issue.

EC3: I mean in essence - and this is what my Commissioner of course says very clearly - it calls into question some very basic principles of equity, calls into question fairness, fairness of the tax system.

EC5: the new principle is whether or not it corresponds to economic reality. And there we have the debate whether taxation is fair, whether we are using the right, the right allocation formula, whether it is okay.

These three references to fairness are substantively different in ambit. EC1 links fairness with competition (Rixen, 2011), which is generally seen as a requirement that states engage in fair tax competition. EC3's concept of fairness is broader, and more closely allied to a universal concept of fairness, a rejection of privilege for the few (Pogge & Mehta, 2016). EC5, on the other hand, sees fairness as substantively related to whether the allocation mechanism is sufficiently closely related to economic reality, without delving into whether the economic reality was fair.

Similar observations are to be found from other points of observation:

ITL2: I mean my initial reaction was also to a certain degree - Good Lord what are these people at ... I've never been keen on any kind of tax avoidance. I mean I've always paid bloody high taxes and, you know, so I have paid the price.

ISAL2: Like any other taxpayer who pays over 40% of my income in tax, I feel it's outrageous that a company whose products are used should pay so little tax.

ISAL1: I suppose there's a moral issue as well. There's... and this may be the social issue as well... it is, I suppose it is a worry, but this is not a question of state aid, this was a tax. People were going to get very upset. It is a massive issue for society if the Amazons and Googles and Facebooks cannot pay tax on their extraordinary profits.

These observations provide a juxtaposition of state aid, tax avoidance, and fairness, all of which are bound up with the challenge by the legal system to the Ireland—Apple tax relationship, which is observed as follows:

EC3: definitely an element of morality and ethics in this case but it's not the stated case we're running.

This is an interesting formulation: the reference to the stated case draws a distinction between it and the unstated case, the *sotto voce* of the 2016 Commission Decision, the fairness of the tax system. While, as noted in the section entitled "The case—Ireland and Apple," this is unsaid in the 2016 Commission Decision, it was part of the European Commission's press release accompanying the 2016 Commission Decision, where it was noted: "This Commission has pursued a far-reaching strategy towards fair taxation and greater transparency and we have recently seen major progress."[20]

Irish Official 1, while disputing vigorously the quantum of the state aid in the 2016 Commission Decision, observes, without proffering an opinion, the motivation of fairness:

Irish Official 1: there's fairness, there's the point about seeing to make these companies accountable, okay, the sort of the politics of accountability of business and showing the Commission to

be relevant.

Not every observer sees the issues as being related to fairness or any type of morality. ITL1 adopts the traditional stance of a lawyer eschewing normative content and requiring strict adherence to the words of statute (Ostas, 2018; Prebble, 1998):

ITL1: All these words—"tax scheme, tax avoidance, aggressive tax" are just words thrown around, spoken by politicians and by the media. What needs to be done is to analyse what the law says, and then see whether the taxpayer is acting in accordance with the law.

The US Treasury Official also takes this position, saying that it is difficult to find the boundary between acceptable and unacceptable tax avoidance:

US Treasury Official: Imagine I own a house, a million dollar house and I have a new mortgage deduction in the United States, and I tell my friends, "Guess what, if I buy a two million dollar house I get double the mortgage deduction." And I say to people, I cannot find the line between that moral question, you know whether buying a bigger house and doubling my mortgage deduction, how I would analyse that moral question and how I would analyse you know, a Bermuda cost-sharing arrangement, you know?

Even Irish Official 2, who disagrees with the 2016 Commission Decision, saw the Commission's aims as related to fairness:

Irish Official 2: I don't think that people focussed on [state aid's] importance. The evolution of where this is going, the Commission wanted to use all tools in the arsenal to make sure that everybody paid their fair share.

The observation of morality at play is not universal. This is to be expected as universally valid values are hard to come by (Moeller, 2017). EC2 in fact said that the abstraction of moral considerations is necessary to be fair to Apple. Both EC2 and EC4 refused to offer a moral view:

EC2: I've tried to, and I think it's really helping me to separate anything that could pollute my opinions, to separate any judgment from the fact, because it's not only because you want to be fair to everybody including Apple, but also because that's how you make a stronger case because you will not be, I think, driven by emotions or by your personal opinions. You will be driven only by the facts.

EC4 said that he sat listening to a colleague saying that:

EC4: we had to do something about these companies that weren't paying enough tax, which was outrageous to the public and I sat there squirming in my seat saying "This is not what my conception of state aid was."

The Former EU Judge objected to fairness polluting the legal system unless, in a display of positivist circularity, the law is changed:

Former EU Judge: [Mrs Hodge's],[21] as I understand it, her approach yes you may have paid strictly the correct amount as assessed by the Revenue, but you really ought to pay a bit more in order to be fair and reasonable. But fair and reasonable is not the test in any British statute in relation to tax.

6 | DISCUSSION: THE VALUE OF VALUES

Interviewees observed the 2016 Commission Decision as representing certain values: fairness, curbing the excesses

of capitalism, a shot across the bows of competing member states and peripatetic multinational enterprises. Taxation is described as fair, tax practices are described as unfair; with an economy of language, which disguises the deep and murky semantical reservoir that holds the concept of fairness. How can this diffusion of values in a commentary on legal action against the tax practices of states and multinational enterprises be interpreted?

First, the presence of values in assessing a communication of the legal system is, in itself, instructive, although not unique to the legal system as many social issues are hotly contested in moral terms (Laursen et al., 2022). There is certainly a semantic individualisation of moral reference: There is acceptance, often approval, that the 2016 Commission Decision was actuated by fairness. Tax avoidance by multinational enterprises and tax competition by member states are observed as unfair or aggressive, examples of immoral or unethical behaviour, categorised as resulting in unfairness. This link was initially made by the European Commission itself, when it placed its state aid action against Ireland and Apple against a backdrop of curbing unfair tax behaviour.[22] It was made again by the European Commission in September 2024 when it described the ultimate EU court judgment as "a big win for European citizens and for tax justice".[23] The tax system does not itself articulate a moral code other than that contained in law and legislation, an attitude deeply embedded in history, politics, and law (Freedman, 2004, Christians, 2017, cf. Prebble & Prebble, 2017). There have been calls for a move away from viewing tax as based on rules to investing tax rules with an internal morality and an ethical dimension (Barker, 2017; Gribnau, 2015; Ostas, 2018; Payne & Raiborn, 2018; Prebble & Prebble, 2017). As against this, there are historical and cultural, as well as legal, reasons for what Christians (2017) labels "the long tradition of tolerance, and even celebration, of tax avoidance behaviour by taxpayers" (p. 421). This is a doctrine that elevates the rule of law and takes it seriously as a fetter on executive power (Dicey, 2013 [1915]) and, consequently, supports legal certainty as a goal (Likhovski, 2004). The argument about the value of legal certainty (James, 2010) is something which runs in tandem to the need for an equitable distribution of the tax burden (Likhovski, 2004).

Recourse to the shorthand of fairness is "ethically seductive" (Přibáň, 2013, p. 410). This is set, however, against Luhmann's recoil from a normative stance (Valentinov, 2019), which is consistent with the theory of functional differentiation. The emphasis on the observation of moral questions is particularly interesting in the context of tax, which has traditionally been an area of positivist legal reasoning (Ostas, 2018), where interpretation was ostensibly divorced from a normative bias (Christians, 2014). This chimes with Morales' (2022) work on the many contexts of moral communication during COVID19, where moral communication can be relevant to a functional system, although it can be risky and does not offer a privileged access to reality.

The lack of privilege attaching to a single moral viewpoint is sustained where ITL1 specifically rejects any normative description of tax avoidance as aggressive and supports certainty of treatment as the primary aim of the tax system. In short, this heterogeneity of interpretation is consistent with what has been observed about the place of morality in many settings: climate change discourse (Besio & Pronzini, 2014), organisations (von Groddeck, 2011), performative strategising by companies (Roth, 2014), and health in various contexts (Clausen, 2022; Gibson & Boiko, 2012). The effects of morality are multiple: morality is multidimensional.

Secondly, there is no clarity as to the content of the concept of fairness. It is very much a short-hand description of something that is simple to enlist but very difficult to deconstruct. The task of deconstructing the various possible philosophical meanings of fairness in taxation cannot be undertaken on so slender a basis as 16 interviews.[24] It is simply not possible to say what exact meaning of fairness attaches to EC3 and EC5, and in contrast, to the appeal to fair treatment of Apple (EC2) and Ireland (Irish Official 2). Further than this, the "mysterious" (Luhmann, 1992b, p. 1005) and fuzzy (von Groddeck, 2011) recourse to fairness, or morality or governance is exactly the point. It allows the observer to fill in the blanks according to their own perspective, therefore crafting a subjective reality. Commentary on the tax relationship between Ireland and Apple is imbued with the values of fairness, and unfairness, and the actions of the European Commission are subject to an amorphous assessment as to fairness and unfairness. The functionally differentiated society can produce many self-descriptions, apply semantic verdicts as to morality or fairness (Morales, 2022), and implicate different viewpoints from mass media (Nobles & Schiff, 1995, 2004) and politics (Teubner, 1992).

The final point is whether the legal system metabolised the moral dicta relating to the unfairness of tax avoidance and tax competition? Certainly, those interviewed almost all observed the European Commission action against Ireland and Apple as having internalised moral criticism of states and multinational enterprises and taken action. Yet this is not clear from the 2016 Commission Decision itself: such is the rigour with which the legal system is autopoietic that it is difficult to identify, within the 2016 Commission Decision itself, any of the values, ethics, or moral stances observed in the

interviews. The internal logic of the legal system requires a sedulous abstraction of values, which all observers had noted, into the ostensibly valueless language of the legal system. What is unseen by the legal system is any categorisation of the tax relationship between Ireland and Apple as malign tax avoidance. The 2016 Commission Decision does not refer to substantive tax fairness or the righteousness of the European Commission acting against Ireland as a "procurer of profit shifting from other jurisdictions where companies' real economic activity takes place" (Cobham, 2019, p. 137). It does not adjudicate on the categorisation of Ireland as a tax haven (Hines & Rice, 1994), a charge that has been repeated (GAO, 2008; Gravelle, 2010). It does not adjudicate on the merits or demerits of tax competition (Dietsch, 2015). There is, similarly, no mention of the "creative compliance" (Sikka, 2013, p. 22) of the taxpayer, Apple, in achieving the nirvana of tax planning, a stateless company (Kleinbard, 2011), resident in no jurisdiction and therefore insulated from tax liability based on residence. In short, the 2016 Commission Decision in August 2016 illustrates the "systemic isolation of the legal system from such things as politics and culture" (McBarnet and Whelan, 1991, p. 849). The legal system is reserved, even polite: It does not attribute moral judgments to the protagonists in a state aid dispute concerned with tax rulings.

This is in contrast to the environmental noise observed in the interviews, which is not reserved but instead expansive in its depiction of the legal system as having policed the tax relationship of Ireland and Apple, imposing state aid penalties in the morally justified struggle against unfair tax behaviour.

7 | CONCLUSION

There is a strength to these imputations of moral policing, knitting a narrative of fairness and thrusting (unsought) additional tax into Ireland's coffers. This is seductive but can lead to disappointment as the functionally differentiated legal system does not police morality. Otherwise, how can the periods from 1991 to 2013 (when the illegal tax rulings were in force), and from 2020 to 2024 (when the legal system decided no additional tax was due from Apple) be explained. Thus one analysis is that the operatively closed system pursues its isolated, autopoietic course, without co-ordinating itself with environmental noise or allowing itself to be steered in the direction of the moral verdict. The cacophony of environmental moral observation may well be informed and insightful, but it does not necessarily have legal consequences. The legal system is not explicitly influenced—one way or the other—by the self-description of Irish Official 2:

Irish Official 2: we are not bad people.

"Bad people" or, to paraphrase Senator McCain, the perception of being a bad person does not mean that a finding of illegality is the correct, or moral judgment. Being "good people" is similarly no guarantee of a finding of legality. There is no moral superiority inherent in one side of the code: the system is not making a moral judgment that legal is superior to illegal (Luhmann, 1992b). The functional system is not integrated into society by means of morality: the functional systems are autonomous, communicate in their own binary code, and are amoral in the sense that the binary code is available for all operations of the system (Luhmann, 1991). Values are not synonymous with the correctness of an action, something Luhmann says is "often covered up" (Luhmann, 1995, p. 318). This is the autonomy of the legal system, which delves deep within itself for answers which can be the violently arbitrary (Teubner, 2001, p. 31), and not always aligned with moral observation from the environment.

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ENDNOTES

[1] This paper refers to Apple as a generic description of the group of companies headed by Apple Inc, a company listed on Nasdaq. Where necessary, the paper will distinguish two subsidiaries of Apple, namely Apple Sales International (ASI) and Apple Operations Europe (AOE).

[2] Commission Decision (EU) 2017/1283 of 30 August 2016 on State aid SA.38373 (2014/C) (ex 2014/NN) (ex 2014/CP) implemented by Ireland to Apple: [2017] OJ L187/1 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AL%3A2017%3A187%3ATOC, described in this paper as the 2016 Commission Decision.

[3] This estimate of state aid was given by the European Commission in a press release which accompanied the 2016 Commission Decision. See Press Release of the European Commission entitled "State aid: Ireland gave illegal tax benefits to Apple worth up to €13 billion" dated 30 August 2016 https://ec.europa.eu/commission/presscorner/detail/en/IP_16_2923.

[4] Paragraph 115, 2016 Commission Decision. The legal case was resolved in September 2024, 8 years after the European Commission first issued the 2016 Communication. See judgment in Case C-465/20 P of the Court of Justice of the EU in European Commission v Ireland, Apple Sales International and Apple Operations International https://curia.europa.eu/juris/document/document.jsf?text=%26docid=289923%26pageIndex=0%26doclang=en%26mode=req%26dir=%26occ=first%26part=1%26cid=1292780

[5] The dispute between Ireland, Apple and the European Commission as to the (re)payment of €13 billion in illegal state aid was itself subject to disagreement before €14.3 billion was eventually placed by Apple and Ireland in an escrow account. https://ec.europa.eu/commission/presscorner/detail/en/IP_17_3702.

[6] Paragraph 52, 2016 Commission Decision.

[7] Paragraph 110, 2016 Commission Decision notes the number of full time employees of the Irish branches of ASI and AOE between 2004 and 2013. In September 2011, for instance, the two branches employed 2532 full time employees.

[8] Section 25 Taxes Consolidation Act 1997 provides that a branch is chargeable to corporation tax on all its chargeable profits wherever arising. Chargeable profits are defined as "any trading income arising directly or indirectly through or from the branch or agency, and any income from property or rights used by, or held by or for, the branch or agency ...."

[9] Paragraph 248, the 2016 Communication states that: "The wording and purpose of Section 25 TCA 97 thus reveal that provision can only be applied in connection with a method to allocate profit."

[10] Paragraphs 31–34, 2014 Communication and Paragraphs 39, 59–68, 101–102, 2016 Communication. Certain financially sensitive information is redacted from the publicly available documentation.

[11] Paragraph 265, 2016 Commission Decision states that the Irish Revenue proceeded "on the unsubstantiated assumption that the Apple IP licences held by ASI and AOE should be fully allocated outside of Ireland."

[12] Press Release of the European Commission entitled "State aid: Ireland gave illegal tax benefits to Apple worth up to €13 billion" dated 30 August 2016 noted that tax rulings were perfectly legal and gave certainty to the taxpayer.

[13] https://ec.europa.eu/commission/presscorner/detail/en/IP_16_2923

[14] Press Release of the European Commission 'State aid: Ireland gave illegal tax benefits to Apple worth up to €13 billion', 30 August 2016, https://ec.europa.eu/commission/presscorner/detail/en/IP_16_2923.

[15] See https://ec.europa.eu/commission/presscorner/detail/en/IP_16_2923.

[16] The 2016 Commission Decision refers to points made by Ireland and Apple as to the procedural fairness of the state aid proceedings (paragraphs 31, 35 and 36). In paragraph 157 Ireland argued that Apple was not selected for beneficial treatment as Ireland is obliged to exercise any discretion fairly and consistently when granting tax rulings. In paragraph 179 Ireland argued that the European Commission must pursue all member states in relation to tax rulings in a fair and comprehensive manner.

[17] Judgment in Cases T-778/16, Ireland v Commission, and T-892/16, Apple Sales International and Apple Operations Europe v Commission https://curia.europa.eu/juris/document/document.jsf?text=&docid=228621&pageIndex=0&doclang=EN&mode=lst&dir=&occ=first&part=1&cid=9634515.

[18] Opinion of Advocate General, 9 November 2023, Case C-465/20 in European Commission v Ireland, Apple Sales International and Apple Operations International https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:62020CC0465.

[19] Paragraph 452, 2016 Commission Decision.

[20] Press Release of the European Commission entitled "State aid: Ireland gave illegal tax benefits to Apple worth up to €13 billion" dated 30 August 2016 https://ec.europa.eu/commission/presscorner/detail/en/IP_16_2923.

[21] Margaret Hodge MP was the Chair of the Public Accounts Committee (PAC) in the United Kingdom in 2012–13 during which the PAC questioned various multinational enterprises about their tax practices in the UK. See PAC. 2010–15. The work of the Committee of Public Accounts. House of Commons Committee of Public Accounts. https://publications.parliament.uk/pa/cm201415/cmselect/cmpubacc/1141/1141.pdf.

[22] Note 20.[24]

[23] Press Release of the European Commission 'Remarks by Executive Vice-President Vestager following the Court of Justice rulings on the Apple tax State aid and Google Shopping antitrust cases', 10 September 2024, https://ec.europa.eu/commission/presscorner/detail/en/speech_24_4624

[24] There is a vast literature on the interaction between tax and fairness. Fairness is seen as relevant both from the point of view of the design of the tax system, the public perception of the burden of the tax system, and as regards compliance with the tax system. Some conflicting meanings of fairness are discussed in MURPHY, L. B. & NAGEL, T. 2002. *The myth of ownership: taxes and justice*, Oxford, Oxford University Press. For a review of global tax fairness in specific tax areas, see POGGE, T. & MEHTA, K. 2016. *Global Tax Fairness*, Oxford, Oxford University Press. For a broad view of the importance of the public's perception of the tax system as fair and just, see BRAITHWAITE, V. 2017. *Taxing democracy: Understanding tax avoidance and evasion*, Routledge.

[25] Note 23.

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RESEARCH ARTICLE

SYSTEMS and BEHAVIORAL RESEARCH SCIENCE WILEY

The reality of environment reimagined: Niklas Luhmann and the new ecological paradigm

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Abstract

This article delves into the underpinnings of environmental sociology, with a specific focus on the influential contributions of Dunlap and Catton. While acknowledging the increasing societal detachment from the environment, the article questions the projection of this phenomenon onto the structure of social thought. The author contends against dismissing theoretical exemptionalism, advocating for its potential to provide a nuanced understanding of the complex relationship between society and nature. Illustrating this perspective through the lens of Niklas Luhmann's sociological theory, the article demonstrates how theoretical exemptionalism can furnish valuable tools for grappling with environmental issues. Furthermore, it challenges Dunlap and Catton's critique of constructivism, proposing that a moderate form of the latter can shed light on interactions between society and nature. Throughout the discussion, a crucial emphasis is placed on the fundamental distinction between society and its environment, laying the groundwork for a deeper exploration of Luhmann's ontology.

KEYWORDS

constructivism, environmental sociology, Niklas Luhmann, sociological realism, systems theory

1 | INTRODUCTION

Environmental sociology traces its roots back to classical sociology, drawing significant influence from the seminal article by Catton and Dunlap (1978), which played a pivotal role in shaping the recent form of human ecology. In their retrospective clarification in 1994, the authors emphasised that their concept originated from a critical evaluation of 'exemptionalism' within classical sociology. This term, as vaguely indicated by Dunlap and Catton, encompasses two distinct orientations.

The first orientation is theoretical, referring to the scientific explanation that exclusively considers social factors as the causes of phenomena under investigation. Dunlap and Catton attribute the inception of this tradition to Durkheim, holding him responsible for the pervasive exemptionalism in contemporary social thought. They argue that the theoretical tendency arose due to the 'emergence of sociology during an era of unprecedented growth and prosperity, fueled by resource abundance and technological progress', which led to an increasing detachment of human life from the biophysical world (Dunlap and Catton (1994): 6).

Beyond theoretical exemptionalism in formulating scientific arguments, Dunlap and Catton indicate a broader phenomenon that encompasses not only sociologists but also all individuals who perceive themselves as relatively independent from the forces of nature. Unfortunately, the authors do not distinguish between the two meanings of exemptionalism, despite their

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conceptualisation of 'environmental sociology' aiming to address what they perceive as sociology's failure to acknowledge the intricate interdependencies between society and nature.

Dunlap and Catton overlook the fact that the two concepts of exemptionalism do not necessarily imply each other. The distancing of society from nature does not necessarily mean sociologists reject natural explanations. Conversely, exemptionalist theories do not imply the absence of causal links between society and nature. In reality, theoretical exemptionalism appears to be a construct introduced by Dunlap, Catton and their followers (Stevens, 2012; Woodgate, 2016). For instance, contrary to their argument, Durkheim did consider natural causes of social changes, such as population growth. In his critique of *The Division of Labor in Society*, Randall Collins observes, 'The general argument, then is that the physical aspects of structure determine the social aspects of structure. They also determine the mental and moral part of society as well' (Collins, 1994: 188). The social density determined by physical factors contributed to the nature of ideas, ranging from more concrete to abstract concepts. While Durkheim occasionally disagreed with the assumption of natural causes, as exemplified in the case of suicide, it was after detailed falsification rather than dogmatic denial. After all, his emergentism does not imply a rejection of the causal significance of the levels of reality that are more elementary than society. On the contrary, they are presupposed as indispensible prerequisites for any higher functions (Buttel, 1986).[1]

Apart from the questionable projection of exemptionalism onto the history of social thought, Dunlap and Catton endeavoured to link the presumed theoretical tendency to the widely held notion that human society and culture develop largely independently of nature. While there may be sound reasons to argue that contemporary societies are increasingly distanced from natural constraints in both everyday experiences and certain economic models, associating this with the parallel growth of emergentist and functionalist ideas in sociology is dubious. Although such views may have thrived among some modernization theorists of the 1950s, they waned in subsequent decades, making way for more socially critical, interpretive, phenomenological, or even countercultural perspectives. Presently, even the influential holistic theories have shifted towards more deliberation- and network-oriented approaches, with functionalism and system theory critically reassessing their anthropocentric heritage (Luhmann, 1998: 1025–1036).

The distinction between theoretical and social exemptionalism is pivotal for this article. Despite the valid arguments for social exemptionalism, I contend that Dunlap and Catton's critique of theoretical exemptionalism should be rejected. Firstly, such exemptionalism has not been the sole or dominant perspective since at least the 1960s. Secondly, and central to this article's argument, theoretical exemptionalism is not inherently an erroneous approach to the relationship between society and nature. In fact, such a theoretical framework may offer a clearer and more fruitful understanding of environmental problems. I do not assert that every exemptionalist theory brings these advantages, but certain theories within this framework provide sociology with adequate tools to address the interdependence between society and nature. This article will demonstrate this point using the example of Niklas Luhmann's sociological theory, particularly by examining his comprehensive book, *Ökologische Kommunikation*, which is rarely cited in the literature on environmental sociology.[2]

Thirdly, I will challenge Dunlap and Catton's claim that constructivism is generally detrimental to environmental sociology due to its questioning of the reality of nature and the objectivity of scientific findings. According to the view proposed in this article, there are various forms of constructivism, and only a specific combination of epistemological constructivism with ontological realism allows for the preservation of a viable notion of the environment. Contrary to Dunlap and Catton's assertion that 'a staunchly constructivist programme would lead to a very restricted form of environmental sociology, one that analyses knowledge claims about environmental conditions and avoids analyses of societal-environmental interactions' (Dunlap & Catton, 1994: 22); this article will demonstrate, on the basis of Niklas Luhmann's interpretation, that a moderate form of constructivism can elucidate the multiple dimensions of such interactions.

The latter point appears to be crucial because the fundamental distinction between society and nature underlies not only the concept of exemptionalism but also its postulated counterpart, the New Ecological Paradigm. Therefore, I will begin with the elucidation of Luhmann's ontology, specifically emphasising the boundary of the social system.

[1]It should be noted that Durkheim is not an exception in this regard. Other prominent figures in classical sociology also endeavoured to forge connections between society and nature. For instance, Karl Marx envisioned an ultimate reconciliation between humanity and nature, while George Herbert Mead often made analogies between human and animal behaviours and engaged broadly with natural sciences.

[2]As a rare exception, see Papadakis (2001).

2 | TWO FACES OF CONSTRUCTIVISM

In embarking upon a discussion of constructivism, it becomes essential to elucidate that the term encompasses a spectrum of concepts and theories addressing diverse philosophical issues (Hacking, 1998). A pivotal distinction emerges between epistemological and ontological constructivism. The former, predominant in philosophical thought, pertains to our comprehension of the world, emphasising the absence of evidence supporting the notion of correspondence between our cognition and assumed reality. Epistemological constructivists, across various variants of the theory, assert that in determining truth and reality, we are more engaged in 'constructing' the object than reflecting it, particularly in the sense of mirroring representation. Consequently, the primary thrust of constructivism revolves around cognition as a creative and occasionally misleading human and social activity (social constructivism).

Ontological constructivism grapples with a distinct question within a different realm of reflection, seeking to elucidate the status of our reality or specific objects we encounter. Existence is not uniform, and some social objects—such as money, markets, or institutions—exist differently than tangible entities like banknotes, horses or anthills. The former are shaped by shared beliefs, practices or accepted legal decisions, while the latter seemingly exist independently of subjects (Searle, 1994). Hence, ontological constructivism delves into the nature of the object of cognition rather than cognition itself, arguing that the existence of certain objects hinges on the activities of social actors. Although the processes by which beliefs, practices and rules produce social objects may vary widely, as indicated by the extensive literature in social ontology (Epstein, 2018), the crucial point is to differentiate the inquiries of epistemological constructivism from those of ontological constructivism.

One reason for the persistent ambiguity between these two types of constructivism is the perceived implication of ontological conclusions by epistemological constructivism. The term 'construct' carries ambivalent connotations, suggesting that the act of 'constructi' is performed by individual subjects, yielding nothing more than a construct. Additionally, it posits that social objects endure only as long as they are continually produced, thereby constantly relying on subjects. Within constructivism, this seemingly benign strategy leads to questionable inferences evident in the strong programme endorsed by the Edinburgh school or Bruno Latour's critique of the nature-society distinction (Latour, 2018) and the traditional concept of scientific facts (Latour, 2015: 93). Those exploring these ideas recognise that constructivism extends beyond delineating social facts, boldly intruding into the natural sciences, eliciting a fervent response from new realists (Ferraris, 2014; Gabriel, 2014). These realists emphasise that even biassed and creative cognition requires some form of ontological consensus and a set of assumptions that allow for a 'reality test.' While the extension of epistemological constructivism to ontological issues may seem uncontroversial for its simplification of social reality and reduction to human activities, there is no logical necessity to draw ontological conclusions based on epistemological considerations. This observation paves the way for balanced perspectives that underscore the complementarity of realism and constructivism, particularly within the environmental context (Lidskog, 2001).

3 | SYSTEM AND REALITY

One of the most intriguing challenges faced by Luhmann's interpreters lies precisely in his approach to 'constructivism." While he is frequently cited as a proponent of its radical version, Luhmann underscores that social systems construct themselves, not relying on human subjects. Interestingly, he also characterises radical constructivism as the 'newest fashion'[3] (2017: 9), distancing himself from it by addressing it 'in a constructive way' (1992: 521). Despite this, he identifies as an 'objectivist', advocates 'realistic' perspectives and initiates his major work, *Social Systems*, with a sentence evoking a sense of realism: 'The following considerations assume that there are systems' (Luhmann, 1995: 12).

But perhaps Luhmann was not interested in dwelling on ontological problems at all? While Luhmann resisted foundational epistemologies, and his theory can be interpreted as an alternative to the grand metanarratives of the past, particularly rejecting metaphysical and hierarchical visions of society, this does not imply a complete alignment with postmodern hesitations towards engaging with epistemological and ontological questions. On the contrary, Luhmann viewed his undertaking as a response to the challenges posed by postmodernism, aiming to seriously address both epistemological and ontological concerns and formulate a universal theory with clear philosophical contours. However, the interpretations of his ontological and epistemological considerations have sparked debate (Harste, 2021; Krawietz & Welker, 1992),

[3]It is possible that Luhmann, in this instance, is specifically referencing the work of Ernst von Glasersfeld, who was also influenced by Humberto Maturana; however, there is no explicit indication to confirm that except the fact that Luhmann represented himself a variant of „radical constructivism".

primarily due to Luhmann's intricate and at times ambiguous exploration of these aspects across various works.

Furthermore, the approach of formulating a general theory as a theory of second-order observation might suggest that Luhmann consistently dismissed any ontological significance of his intellectual framework. While this may hold true concerning the question of 'ultimate reality', essential ontological issues such as the nature, composition and causality of social reality cannot be easily overlooked in a comprehensive theory of the social. It can be assumed that, like any other matter, Luhmann aimed for consistency in his epistemological and ontological views, striving to 'determine them in reference to one another' rather than aligning them with other sociological schools or contemporary philosophical debates.

The ambiguities surrounding critical epistemological and ontological aspects of the theory of social systems raise questions about the status of Luhmann's key categories: system, environment, society, communication and meaning. In what sense do these entities exist? Moreover, within the context of environmental social research, one may inquire about the ontological status of the environment of human society. These questions are intriguing not only in the framework of Luhmann's theory but also in the broader context of ongoing epistemological and ontological debates.

The proposed interpretation of the work of the author of *Social Systems* posits that Luhmann presented a novel and balanced perspective, serving as an alternative to both 'radical constructivism' and the emerging trend of 'new realism'. Furthermore, it contends that Luhmann viewed his intricate idea as a productive tool for sociological analyses. According to this interpretation, Luhmann's theory rests on a unique concept that restrains constructivist tendencies by melding epistemological constructivism with ontological realism. The latter term has been viewed with scepticism in sociology since Durkheim safeguarded his 'realistic' stance beneath a methodological assumption, prompted by objections that accused him of metaphysical emergentism (Durkheim, 2013: 7). As one delves into Luhmann's *Social Systems*, a similar impression may surface—the declaration that systems exist seems a simplistic assumption, either to anchor the theory in common sense or to furnish a heuristic tool for navigating the theoretical intricacies. Both notions find support in subsequent readings, reinforcing the notion that Luhmann, in line with postmetaphysical thinking, hesitates to delve into ontological matters. However, these insight fail to capture the essence of his innovative idea.

According to my interpretation, Luhmann's theory is distinguished by three original features: (1) complexity—where epistemological and ontological considerations are intricately intertwined; (2) balance—epistemological constructivism casts ontological claims in a relative light, and vice versa; (3) dynamics—both epistemological and ontological perspectives on social systems can be interpreted as independent starting points for various theoretical analyses.

The passage in which Luhmann delves into the ontology of the system and environment, located in Chapter Five of his *Social Systems*, underscores the crucial examination of their mutual relationship, defined as a difference. The initial two chapters of the book lay out Luhmann's theoretical assumptions and apply them abstractly to systems of meaning. Subsequent chapters elucidate the emergence of interactional systems and the concept of communication as an empirically defined element of social systems. Chapter 5 integrates this defined communication back into the concept of the system, revealing the substantial disparity between action (communication) and system. The question emerges: How can an empirical phenomenon in time and space becomes an element of a theoretical construct that only ostensibly exists?

Luhmann clarifies that the distinction between the system and the environment, and not the system itself, constitutes the paradigm of his theory. He concedes that the difference is 'not an ontological one' (1995: 178). In simpler terms, reality itself is not inherently divided into the system and environment. The system/environment distinction is introduced with communication as an epistemically subjective construct. However, once the distinction has been observed and reproduced by another communication, it creates an ontologically objective link between communications (operations of the system). Therefore, Luhmann, after defining the system/environment distinction as ontologically subjective, adds: 'it pertains only in relation to the system, though objectively' (1995: 178). In this context, ontological objectivity implies that the object, rather than the subject, constructs social reality.

The primary evidence of the ontological objectivity of systems lies in their nonarbitrary operation and their resistance to observation with arbitrary distinctions by sociologists seeking empirically adequate knowledge. Luhmann suggests that scientific theory should align its observation schema with that of a system itself, identifying the system congruently with its inherent approach (Durkheim, 2013). This aligns with his realist stance, emphasising the correspondence between the system/environment distinction and its scientific observation.

To fortify his realism further, Luhmann contends that the distinction presupposes an 'underlying, continuous reality'. While a communicative social system asserts its leading distinction as universally valid, it presupposes the

existence of other, undifferentiated levels of reality that ignore the distinction. Simultaneously, the system identifies in reality its own emergent elements as indissoluble units, treating the presupposed complexity as its environment (1995: 179).

As a consequence, social systems exhibit emergent properties that render them independent of actors' intentions and even capable of influencing individual motivations. In contrast, the environments of these systems lack such defining characteristics and defy essentialist descriptions. There is no singular environment nor are there multiple environments that can exist independently of the systems with which they are associated. This assertion notably challenges the notion of nature and raises questions about the symmetrical conceptualization of nature and society. First, the existence of numerous environments would be impossible without the presence of multiple systems. Second, concerning the environment of the overarching social system, it encompasses everything that falls outside the system, including human consciousness and all that remains beyond the purview of science and human cognition. While critics of Luhmann may lament the relativity inherent in his concept due to its correlative nature, it is crucial to recognise its receptiveness to the domain of the unknown and the intransparent, particularly the blind spots that arise from our own observations.

The positive concept of nature, involved in the New Ecological Paradigm, has, admittedly, the advantage of being nonrelative but suffers from being overly determined by socio-cultural beliefs, putting nature into ready-made categories and classifications within the realm of the known. Ironically, modern science appears to be much more relativistic and probabilistic than the old categories, dealing more with specific problems and hypotheses than with nature as an absolute. In this context, Luhmann's definition of the environment is congruent with the scientific worldview, maintaining a balance between the objectification of nature and its complete solution in the vein of Latour.

4 | THE WAY TO CONSTRUCTIVISM AND BACK

Luhmann introduces his epistemological ideas towards the conclusion of his magnum opus. This placement is not accidental; rather, it underscores the vital role of epistemological reflection in an era marked by the diminishing authority of traditional institutions in addressing cognitive questions (1995: 476). Simultaneously, he defines epistemology as a self-referential and, in its purest form, a tautological science, asserting that 'the real is what knowledge indicates as real" (1995: 479). While the circle is unbreakable, it has been successfully interrupted and developed for numerous reasons, aiming to approximate reality. Luhmann attributes the tremendous productivity of the basic circularity of epistemological reflection to the 'environmentally sensitive structure' that could not be developed without self-referentiality. Consequently, Luhmann concludes that epistemology is itself a system fulfilling its cognitive function due to *autopoietic* closure. Therefore, the considerations concerning systems may be applied to epistemology as well. In other words, epistemology becomes another object of functional analysis, a point Luhmann emphasises through appreciative references to 'naturalised epistemologies' advocated by Willard van Orman Quine.

However, it would be a partial truth to assert that Luhmann entirely objectifies epistemology, treating it like any other system. It is the sociological perspective elaborated in *Social Systems* that derives radically constructivist conclusions from the objectivist approach. Firstly, the self-referentiality of cognition questions any point-to-point correspondence between epistemic content and reality. The cognitive system asymmetrically exercises its programme of self-referential reproduction without being forced or oriented towards empirical correspondence. As Luhmann phrases it later, 'it makes no difference for the cognition whether it produces truth or errors' (2017: 16). 'We do not have separate brains or parts of brains for errors and separate for truths' (2017: 16). For the system, it is crucial to continue reproducing itself through its operations and has no direct need to adapt to its environment unless such adaptation contributes to its boundary maintenance.

Secondly, with the introduction of the sociological perspective, the frame of reference for the cognitive system expands more significantly than with biological, neuronal or psychological constructivist notions. Reflective epistemology, in the case of the latter, merely concedes limitations imposed by the same biological, neuronal or psychological constraints it studies. With the sociological perspective, the theory undergoes a complete transformation because there is only one society, and the sociologist cannot transcend it. She is a 'rat in the labyrinth', aware only of her own place determining her perspective and, in particular, the communicating system.

Thirdly, cognition is self-referential because it draws a distinction to observe other operations of its own. However, it is unable to apply the leading cognitive distinction of truth/false to the very same distinction. This means that the operational circuit constituting the system is epistemically blocked, immensely limiting the scope of cognition. Moreover, as an observation and description of systems observing their observations, epistemology is

stimulated to make further distinctions necessary to grasp the complexity of cognition: (1) between the operation and its observation, (2) between references to the system and its environment, (3) between self-observation and observation of the other, (4) between the observation of that which is the object of the observer's observation and the observation of something the observer cannot observe and finally, (5) between the true/false code and other codes of self-observation and observation of the other.

The scope and maturity of epistemology are measured by the number of distinctions it differentiates. If it applies all the above-mentioned distinctions to cognition, it may be called, according to Luhmann, constructivist in the full sense of the word (2017: 17–18). That being said, it would be a huge mistake to conclude that Luhmann was merely a radical constructivist. Although *Social Systems* suggests that he developed his thought as a path to radical epistemological constructivism leaving no possibility to reclaim a realistic position, it is precisely the nature of his radical epistemology that allows for a much more extended realism than what the so-called new realists allow.

If we were to identify the most significant feature of Luhmann's epistemology providing a foundation for a realistic ontology, it is his thesis of the unity of mind and nature, promoted by Gregory Bateson, who believed that the achievements of human cognition could not be possible without the two parallel 'stochastic processes': evolution and learning (Bateson, 2002 [1979]: 139f.). This unity makes Luhmann critical towards both subject- and object-oriented epistemologies (Luhmann, 2017: 11) and guides him on the path towards a relational theory of knowledge, drawing on 'natural epistemologies' and, at the same time, respecting constructivist insights. His definition of 'reality' as the unity of cognition and object is especially telling in this context (2017: 20) and, as we will see, has far-reaching consequences for sociology.

Since Luhmann defines constructivism as an empirical theory (2017: 18), his return to realism starts with an analysis of the nature of the environment of cognition. He does not engage in the complex debates on the biochemical or neuronal prerequisites of cognition but tries to identify objective features of the environment based on cognitive operations. Although it is hardly possible to assert anything specific regarding the environment, some general presumptions are legitimate. Firstly, drawing on Kant, Luhmann recognises a relative stability of the environment compared with cognitive operations. On the other hand, he remarks that the cognitive system manages to operate parallel to its environment by applying constant concepts, irrespective of the changeability of phenomena. The generality of our notions is a source of numerous errors, but it allows the system to run parallel to its environment at the price of exact point-to-point synchronism.

The second argument for the objectivity of the underlying reality of cognition is the fact that cognition is only possible under certain conditions. Luhmann takes advantage of Fritz Heider's idea that there would be no perception without the difference between loose and tight coupling of elements in the external world (2017: 22). Thus, seeing would not be possible without the difference between light and objects, while hearing requires the contrast between air and sounds. Similarly, according to Luhmann, language serves as a medium to express sentences and money as a medium to determine prices (2017: 22). Following this line of thought, it may be argued that cognitive operations would not be possible without the existence of certain features of the environment that are normally, at least in part, invisible to the operating system. In other words, cognition is possible only in a specific, not any environment.

The concessions to realism do not deny the idea that cognition projects onto reality distinctions that are neither known nor present in this reality. On the contrary, the cognitive system must ignore the richness of environmental discontinuities and variations to accomplish its own operational closure. Due to such closure, the system creates its own internal freedom to observe things in terms of alternatives and possibilities, or, to put it in Luhmann's vocabulary, it operates with meaning. The internal complexity of the system grows at the price of synchronicity but achieves a much more important goal—increased cognitive freedom and selectivity/sensitivity.

Although the operations of cognition are, to a large extent, indifferent to the world and negate it by projecting their own distinctions onto it, they are real as operations of the system; they are operations 'in the world' (2017: 27). This reminds us of the initial explanation of the ontology of the system in *Social Systems*—operations are epistemologically subjective but, at the same time, ontologically objective in that they produce and reproduce the system. The cognitive systems are in the world and are observed as such. In a sense, each operation of observation is performative—it communicates something and communicates that it communicates, thus reproducing a system.

The final step Luhmann takes on his journey from epistemological constructivism to realism is perhaps the most original one because it deanthropologises the idea of cognition. Namely, Luhmann claims that 'the operations of cognition are quite different depending on the kind of system that exercises them" (2017: 27). In other words, there is no need to limit the notion of cognition to

human cognition. Social systems are equally able to build their internal complexity with the help of language as a medium shared with psychic systems. There are reasons to claim that psychic and social systems are coupled, but they operate under completely different structural and operative conditions.

To complete the realistic interpretation of Luhmann's theory, it seems necessary to indicate some practical advantages of his version of realism. His approach is quite different and, in fact, broader than the classical realism promoted by the wave of 'new realists." For Luhmann, realism does not mean a mere correspondence of cognition and reality but rather the ability of science to identify the areas of ignorance that arise because of blind spots, desynchronization, and selectivity of systems. Unlike classical realism, Luhmann focuses on the system/environment distinction instead of the environment exclusively. Moreover, he is able to see the multitude of system references and, thus, the multitude of environments defined by the perspectives of various systems.

In the perspective of Luhmann's theory, realism recommends, in the first place, taking into account one's observational distinction and the ensuing ignorance. The realism of the theory of social systems allows for the insight that the interdependencies, as well as desynchronization of systems, are consequences of a specific structure of ignorance and its distribution among systems. As far as lacking awareness and deficient mobilisation for ecological action are concerned, the lack of knowledge is a consequence of different resonance of ecological problematics in different systems and their inability to process all irritations coming from the environment.

5 | IS ENVIRONMENT REAL?

The nuanced exploration of the epistemological and ontological significance of the system/environment framework triggers inquiries into the reality of the natural environment. Although Luhmann's conceptualization of environments in the systemic sense does not align with concrete objects or their aggregations, an intuitive connection emerges between society's environmental communication and the ecological notion of the natural environment. Luhmann acknowledges this link in his work *Ökologische Kommunikation*, explicitly addressing ecological challenges. Nevertheless, Luhmann's concept of 'environment" extends beyond the natural, incorporating not just Earth, plants, and animals but also humans with their inner, intellectual, and spiritual dimensions. While the human aspect holds equal importance for Luhmann, it warrants separate analysis (1986: 64–65).

One of the primary advantages of Luhmann's approach is his clear demarcation between society, consciousness, and their respective (different!) environments. The New Ecological Paradigm proposed by Dunlap, Catton and their followers fails to provide any consistent distinction between these objects and opens the way to falling into reductionist traps. For example, there might be a well-reasoned temptation to reduce human reality to nature or, conversely, to reduce nature to human constructs. Curiously, these reductionist viewpoints are frequently veiled by claims of multidimensionality. For instance, Pierre L. van den Berghe proposed a seemingly balanced biosocial approach, asserting that 'much behaviour can only be understood as the product of interplay between biological predispositions and social learning' (van den Berghe, 1975: 31). Nevertheless, a closer examination of his subsequent remarks reveals a more reductionist orientation: „Our sociability is rooted, not only in our culture, but also in our biology. Indeed, it is absurd to try to separate these two aspects of our behaviour, because our culture so obviously grows out of our biology" (van den Berghe, 1975: 34).

Moreover, both nature and society might be reduced to purely conscious phenomena. For instance, one of the fathers of counterculture, Theodore Roszak, wrote: ' ... our appraisal of any course of personal or social action would not be determined simply by the degree to which the proposal before us squares with objectively demonstrable knowledge but by the degree to which it enlarges our capacity to experience: to know ourselves and others more deeply, to feel more fully the awesomeness of our environment. This, in turn, means that we must be prepared to trust that the expanded personality becomes more beautiful, more creative, more humane than the search for objective correctness can make it'. (Roszak, 1969). Drawing on the foundational contributions of Dunlap and Catton, Stevens (2012) appears to tread a similar path. He aptly identifies three crucial points in alignment with Luhmann's theory: (1) recognising the significance of extending traditional environmental concepts without complete abandonment (Stevens, 2012: 585), (2) emphasising the role of systems theory in comprehending the complexity of nature beyond societal complexity (Stevens, 2012: 583) and (3) highlighting the inherent anthropocentrism in environmental sociology, where assumptions tie the 'human' intrinsically to the definition of the 'social' (Stevens, 2012: 586).

However, it is noteworthy that Stevens refrains from citing Luhmann in his work. This divergence becomes apparent when examining Stevens' response to the insights mentioned above. Rather than reevaluating the very boundary between society and nature, he opts to

broaden the environmental perspective by incorporating only ecopsychological observations. Consequently, his approach seems to converge towards ecopsychology 'with sociological understanding' (Stevens, 2012: 590). Unfortunately, the valuable insights derived from systems theory have not spurred Stevens to reconsider the fundamental demarcation between society and nature.

Depending on a perspective preferred by a theorist, the concepts of consciousness, society or nature tend to expand and dominate the others. Such one-sided approaches are likely to produce deterministic ideas of reality, which Dunlap and Catton admit but only with respect to sociocultural determinism produced by constructivist theories (1978: 20–23). What they fail to see, however, is the danger of other reductionistic simplifications. Contrary to Luhmann, they also fail to see the asymmetry of society and nature. Although nature reacts to the impact of society by adapting to it in different ways, it is not communicating on its own unity in different specialised subsystems.

Luhmann's broad concept of environment understood as a systemic construct allows us to see the relativity and multiplicity of environments depending on the position of observers. This approach does not imply that environments are unreal but rather that they constitute a much more complex area than can be imagined from any specific position. The awareness of the limits of our observation of the environment and the will to extend the observed environments constitute challenges that are hardly conceivable for the New Ecological Paradigm.

Luhmann's perspective is sometimes construed as a pessimistic analysis of society, suggesting an increasing decentralisation that results in the loss of both a central agency and a holistic viewpoint. Neither politics nor science, according to Luhmann, can ensure the restoration of these elements. Critics, highlighting the pessimism associated with multiple agencies and perspectives, propose remedies such as dialogical practices, synchronised mechanisms, blurred system boundaries and nonsystemic social institutions (Papadakis, 2001). However, they may overlook the flip side of the coin: the expanding capacities of a functionally differentiated society, the growing mutual adaptability and synergy of social systems (Luhmann, 1986: 208, 2010).

While Luhmann expressed scepticism regarding the ability of individuals or social movements to effectively address environmental issues, he argued that the autonomy of functional systems engenders significant emergent powers within society. Faced with these developments, it may prove more advantageous for politicians or activists to permit systems to operate autonomously or to broaden the environments of specific systems, rather than imposing a singular environmental framework.

Instead of discussing the negatively defined environment in general, a theory of social systems involves considering specific systems within the environment, such as the psychic systems of humans, psychic systems of animals or even social systems of animals. While such lists may be multiple and include various ontologically objective elements, they diverge from Luhmann's theoretical concept of the environment just because it is a purely negative and relative concept produced by the system's epistemic perspective. Admittedly, concerning the environment, Luhmann adheres to constructivism. However, this assertion is only partially accurate. He indeed aligns with radical constructivism when considering the entirety of the environment but does not prohibit discussions about real objects and does not reject the credibility of scientific research and its objects. Contrarily, the functional differentiation of the social system of science motivates Luhmann to advocate for the autonomy of scientific organisations and the privileged status of science in addressing cognitive challenges.

Luhmann explicitly acknowledges the relativity of the environment and the 'natural environment" (excluding psychic systems) by asserting, 'Much of what was previously experienced as nature turns out to be a decision and comes under the pressure of justification' (1986: 211). The progression of functional differentiation alters the balance between firm nature and the realm of freedom and choice created by systems. The more complex and numerous the functional systems, the stronger the social presupposition of freedom that extends to the systems in the environment. Nature no longer implies power and determinism but invokes feelings of care and fear regarding human decisions that threaten the natural foundations of social life. What was once an uncontrolled natural environment becomes an intransparent field of interdependencies between multiple social systems and their respective environments. Contrary to Bruno Latour, Luhmann does not assert that the nature/culture distinction is a misleading historical construct. Instead, he claims that there are more fruitful distinctions including multiple environments of different systems, while the environment of society is not graspable for any functional system. This implies that Latour's idea of creating a parliament of things (Latour, 1993: 144–145) to reflect the network of humans and objects is too simplistic from the perspective of the theory of social systems. According to Luhmann, each object has different meanings for different systems depending on its significance in the environment of a system.

While reclaiming the epistemological or ontological objectivity of the environment is challenging, asserting such objectivity for specific objects (including systems), the underlying reality of the system/environment

distinction and specific claims to truth made by the scientific system specialised in acquiring new knowledge is feasible. Although absolute truth may be elusive, statements fulfilling scientific criteria of truth and satisfying the social system of science are attainable. The challenge, as highlighted by Luhmann, lies in the insufficient resonance of scientific findings in other functional systems like politics, law or the economy, each with different codes and environments. The root of this issue may not only lie in the difference between environments but also in the inadequate impact of science on its environment, particularly in the deficient and unequal inclusion of the public of the system into its operations.[4] The public of science is relatively small and less motivated to engage in scientific projects, partly due to the hermetic nature of scientific research and knowledge. Moreover, phenomena and risks indicated by science are often invisible, which, though inherent to the specific task of science, makes alarming scientific reports, such as those on climate change, seem irrelevant to the general public and other systems unless they process scientific findings with own codes. In addition, Luhmann indirectly suggests that a competition exists between systems for the engagement and interest of their publics (1998: 844–846).

Inclusion remains a hurdle for science, possibly because, unlike other systems, the cognitive openness of science is limited by its operational closure. On the one hand, as Luhmann posits, science is inherently inclusive because everyone has the opportunity to contribute to the pursuit of truths, and each assertion warrants thorough examination. Consequently, the ideal 'scientific community' avoids typical asymmetrical roles, such as producers/consumers or officials/petitioners. On the other hand, unlike economics or politics, science maintains scepticism towards all observations, including its own, investing significant effort in selecting credible research proposals and preemptively eliminating non-scientific factors and influences. The demand for methodical verification of data and assertions renders scientists highly selective, cautious and socially exclusive in their professional practices. Even in the pursuit of new phenomena and evidence, these explorations are highly selective and theory-driven.

While science does unveil crucial discoveries to the wider public, it tends to be less concerned with their practical consequences and less inclined to involve the public in strictly scientific activities. Despite the formal inclusivity of scientific communication, where, for example, anyone can submit research papers to journals, the practical reality reveals the high exclusivity of science and the passivity of its engagement with the public: „This deficit in inclusion is initially compensated for by technical successes and the resulting prestige of science. Anyone can feel included as long as they participate in these successes, consume medicines with healing effects, use electricity, fly or rely on synthetic materials. However, such participation remains passive and can quickly turn into an aversion to science—also a form of inclusion if one continues to believe in the truth of the results!—when trust in the blessings of technology erodes."(Luhmann, 1992: 349). In essence, the role of science in environmental debates is ambiguous. On the one hand, science offers crucial insights and tools to mitigate risks; however, on the other hand, it is susceptible to criticism for its potential to inadvertently promote the same technologies: „Partly, such criticism adheres to metascientific criteria—such as those of rational consensus. Partly, it points to future consequences that cannot be justified, even though they may be achieved with truth. Partly, it reserves a moral judgement following the old rule, already valid in paradise, that one should not be allowed to do everything one can. In this way, attempts can be made to organise resistance against science and, ultimately, even to give terrorist activities, including the detonation of scientific research facilities, the appearance of perceiving a legitimate interest. Such phenomena are a result of heightened risk awareness, but they are not forms of dealing with risk." (Luhmann, 1992: 345).

Moreover, as far as science remains blind to the multitude of environmental perspectives, the ecological economics, taking advantage mostly from scientific recommendations, seems to privilege only one observational mode. As Roth and Valentinov (2020) argue, „The unfortunate consequence of this privileging is the underestimation of a broad range of multidimensional sustainability risks which are foregrounded by the numerous alternative observational perspectives which are just as legitimate." (Roth & Valentinov, 2020: 2). Therefore, contrary to the critics of exemptionalism, Luhmann generalises and radicalises the sustainability concerns, rebalancing the responsibility of natural and social sciences. Roth and Valentinov summarise this point in the following way: „A truly social science that accounts for this multienvironmental condition would therefore need to refrain from overidentifying the extra-social environment with the environmental concepts and terminologies of the natural sciences. This is true because, first, it is hard to impossible to prove scientifically that one of the above-mentioned subsystems is essentially more important than the other(s). Second, even if a scientific bias to

[4]For the complex discussion on Luhmann's idea of inclusion/exclusion that replaces the old concept of integration, see Jönhill (2011), who emphasises the variety of inclusion/exclusion forms and Stichweh (2005), who focuses on the unprecedented scope of systemic inclusion in the modern societies.

science seems logical or at least comprehensible, it would still remain unclear why social sciences should favour an environmental concept of the natural sciences over a social-scientific one“ (Roth & Valentinov, 2020: 4).

While Luhmann's theory aligns with the criteria of exemptionalism by establishing clear boundaries between emergent systems and highlighting society's substantial selectivity in engaging with its environment, the theory is far from indifferent to environmental issues. In contrast to the New Ecological Paradigm, it is not solely confined to the intricate explanation of nature-society interdependencies; instead, it delves into the fundamental aspects of observing the environment across various sectors of society. It could be contended that responsiveness to ecological concerns and the synchronisation both among social systems and between society and its environment (including biological systems) are issues that elude consideration within the New Ecological Paradigm, as it overlooks the inherent mechanisms through which social systems process environment-related information. Luhmann emphasises that we are not even able to receive information from the environment: „Information is therefore a purely internal quality of the system. There is no transfer of information from the environment into the system. The environment is what it is. It contains at most data. Only for systems does it become possible to perceive the environment, as this requires the ability to see other possibilities, the specification of a difference schema and the localization of items in this difference schema as ‘this and not that.’ In the environment, there is no ‘and not that,’ and therefore no ‘this’ as a selection from other possibilities, so neither a difference schema nor information. To emphasise once again: a system boundary must be drawn for the world to have the possibility of observing itself. Otherwise, there would only be pure facticity.“ (Luhmann, 1986: 45). The pressing issue lies in the absence of a singular overarching processing of environment-related data, and, in fact, there is no single environment that is observable and comprehensible for the entire society. Instead, multiple environments are constructed through the operations of various functional systems. This multiplicity, rendering epistemological objectivity unattainable in modern society, is not entirely undesirable. On the contrary, it enhances the sensitivity of society as a whole to different aspects of the environment, making it more multidimensional and specialised in addressing the risks generated by the collective.

Another advantage of the Luhmannian approach is its emphasis on the costs associated with the increasing complexity of systems. As these systems develop more selective internal structures, their growing insensitivity to their environments leads to a proliferation of problems being deferred to the future. This process overlooks vast areas of natural and social phenomena and attempts to offload self-generated costs onto other systems. Valentinov (2012) highlights that Luhmann's theory provides a distinctive structural explanation for the ‘trade-off between complexity and sustainability.” This concept suggests that as systems become aware of their reliance on previously disregarded environmental conditions, it may become rational for them to reduce their internal complexity to enhance their sustainability within a specific environment. By doing so, these systems can better align their operational processes with the ecological constraints and resources available, thereby mitigating the risk of unsustainable practices. This approach underscores the necessity for systems to balance their structural complexity with the imperative of maintaining a sustainable relationship with their environment, illustrating a strategic withdrawal of complexity as a means to achieve long-term viability and ecological harmony.

6 | CONCLUSION

In this paper, we have revisited the foundational underpinnings of environmental sociology, tracing its lineage to classical sociology while critically evaluating the seminal contributions of Dunlap and Catton. Their work, pivotal in the evolution of human ecology, introduced a critical assessment of ‘exemptionalism’ within the sociological discourse. This critique, aimed at disentangling sociology from an entrenched bias towards social determinants at the expense of environmental factors, highlighted a dichotomy between theoretical and social exemptionalism. However, our analysis suggests that Dunlap and Catton's approach to exemptionalism, particularly their failure to distinguish clearly between its theoretical and social dimensions, overlooks the nuanced engagements with nature evident in classical sociology, notably in the works of Durkheim.

Central to our argument is the exploration of theoretical exemptionalism within the framework of Niklas Luhmann's sociological theory, particularly his work *Ökologische Kommunikation*. Contrary to Dunlap and Catton's critique, we argue that theoretical exemptionalism, rather than detracting from environmental issues, can offer profound insights into the interdependencies between society and nature. Luhmann's theory, with its differentiation between system and environment, serves as a prime example of how theoretical exemptionalism can be employed to advance our understanding of environments. This approach not only provides a robust framework for analysing social–environmental interactions but also challenges the binary opposition between constructivism and realism, advocating for a moderate

form of constructivism that embraces the complexity of these interactions.

In conclusion, the paper argues for a reevaluation of the conceptual boundaries that have historically separated sociological and environmental discourses. By engaging with Luhmann's comprehensive ontological framework, we demonstrate the potential for sociological theory to contribute meaningfully to the environmental sociology landscape. This reconceptualization moves beyond the critiques of Dunlap and Catton, offering a perspective that acknowledges the multilayered interplay between society and its environment. To assert that science or politics present a complete picture would overlook their inherent blind spots and the narrow observation schemes that define these systems and nothing more. The reality of nature does not imply that we, as humans and a society, can control or fully understand it. Nevertheless, every functional system is able to generate increasingly comprehensive and intricate depictions of society and its environments (Luhmann, 1986: 204–205). Despite their expanding cognitive openness, each of these representations remains incomplete and exhibits inevitable one-sidedness. An effort to synchronise our knowledge regarding the sources of our ignorance would represent notable progress in realistic thinking.

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RESEARCH ARTICLE

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The paradox of standards and innovation: Reconceptualising standards and standardisation with the help of Niklas Luhmann

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Abstract

This research explores the intricate relationship between standards and innovation through the lens of Niklas Luhmann's theoretical framework. Standardisation transforms uncertainty into certainty, providing a stable foundation for modern social systems and shaping reality. Historically, standardisation has facilitated social homogenisation and bureaucratic efficiency, as observed by Max Weber. However, defining standards and standardisation remains ambiguous due to their diverse applications across various domains. This study reconceptualises standards and standardisation as dynamic constructs that integrate specific forms and general principles, aligning with Luhmann's notion of unity. It addresses the paradox of standards and innovation, which arises from the duality and simultaneity of complexity reduction (uniformity) and complexity increase (diversity), as well as the tension between compatibility (standards) and novelty (innovation). The research introduces the concept of stylisation to the works of technological standardisation, enabling the comparability of technological systems with art systems. By embracing dynamic stability and stylisation, systems can navigate the paradox effectively, ensuring sustainable growth and adaptation.

KEYWORDS

innovation, Niklas Luhmann, paradox, standardisation, standards

1 | INTRODUCTION

Standardisation enables the anticipation of the future by transforming uncertainty into certainty. As shown in the etymology of *standard*—i.e., 'a certain and conspicuous rallying-point', notably after the Battle of the Standard (Busch, 2011, p. 17)—the function of standardisation is to bring certainty into modern social systems. By imprinting predetermined identities onto ongoing conversations in the present moment, it shapes the reproduction of reality, influencing the oscillation of what lies ahead. The history of standardisation provides evidence of how standards have been used to construct the image of a uniform society over a long period of time. For instance, it is widely known that the Qin Dynasty (i.e., the initial dynasty of Imperial China) emphasised the standardisation of measures, language and currency with the aim of unifying the state.

Standardisation is intricately intertwined with modern organisations and social homogenisation. Max Weber keenly observed that bureaucratic organisations are

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predicated on the 'levelling of social differences and the abstract regularity of the execution of authority', which results in social homogenisation (Weber, 1949, p. 224, cited in Timmermans & Epstein, 2010). Additionally, bureaucracy facilitated the rise of the collective mass over individual distinctions and advanced the formal rationalisation of an efficient modern system. According to Weber (1921/1968), formal rationality relates to the way established standards influence people to seek the optimal methods to achieve a specific objective. In a system governed by formal rationality, individual choices are highly restricted because nearly everyone is pressured to make the same optimal decision according to preset standards, often in predetermined sequences (Ritzer, 2008). Following standards shape people's behaviour in a similar manner, leading to uniformity across different times and places (Brunsson, 2000).

Paradoxically, in this formally standardised modern academic society, there are no standard definitions of *standards* and *standardisation*. As noted by Brunsson et al. (2012), there has been ambiguity surrounding the concept of *standards* due to its application across diverse domains, ranging from paper sizes (e.g., A4) to interface technologies within telecommunications networks (e.g., 5G). This concept is at times used interchangeably with other terms like *platforms* or *dominant designs* (Narayanan & Chen, 2012), amplifying confusion.

Without delving deeper into the concept, some literature merely ends its discussion of the concept at 'a set of specifications' (e.g., David & Greenstein, 1990; de Vries, 1999; Spivak & Brenner, 2001) or attempts to fixate it to tangible elements, such as written artefacts (e.g., ISO/IEC, 2004; Yoo et al., 2005). This lack of comprehensive explanation regarding standards limits the expansion of theoretical insights into intriguing and current phenomena related to standardisation (e.g., platformisation, as discussed in Helmond, 2015).

Several pieces of literature avoid directly addressing the meaning of 'a set of specifications'. They adeptly transition towards describing various types of standards, such as quality, information, compatibility and variety reduction (Tassey, 2000) or design, terminological, performance and procedural standards (Timmermans & Epstein, 2010). However, this approach of categorising the concept presents an incomplete portrayal, as it leaves room for the existence of additional types. Departing from this method, a different approach is intentionally adopted by employing the two sides of distinction (A/¬A) to explore the concepts of standards and standardisation, drawing upon Niklas Luhmann's theoretical works.

In the context of standardisation, literature emphasises the negotiation process, which often leads to agreements. This implies that achieving consensus among actors is a crucial condition for closure in standardisation. Yet, the question arises whether consensus is an indispensable attribute of standards, given that it is not obligatory in the development of market-mediated standards (e.g., dominant designs and platforms). To address this gap, this research aims to provide conceptual explanations on standards and standardisation by responding to these questions: *How can standards and standardisation be reconceptualised from Niklas Luhmann's perspective? What is the important attribute of standardisation?*

In addition, some studies (e.g., Hawkins et al., 2017) note the paradox of standards and innovation has not yet been sufficiently elaborated, particularly lacking theoretical explanations for the emergence of the paradox concerning standards and innovation. To address this theoretical gap, the following research questions will be further explored: (1) *How does the paradox of standards and innovation arise?* (2) *How can a system manage or address this paradox?* Employing Luhmann's difference-oriented approach, which highlights the simultaneity of system and environment, this research aims to tackle the conundrum.

The research is structured as follows: each section will begin with a review of previous studies to highlight the shortcomings of existing theoretical explanations. Subsequently, a thorough exploration of Luhmann's works will follow to address these gaps. The subsequent section will focus on fleshing out the concepts of standards and standardisation. Following this, a theoretical inquiry will delve into the paradox of standards and innovation, guided by Luhmann's framework. Through these efforts, I aim to not only add to the discourse on standards and innovation but also expand the theoretical scope of Luhmann's contributions.[1]

2 | RECONCEPTUALISING STANDARDS AND STANDARDISATION

2.1 | Previous studies on standards and standardisation

David and Greenstein (1990) offer valuable insights into the realm of standards, particularly from an economics perspective. They define a standard as 'a set of technical specifications adhered to by a producer, either tacitly or as a result of a formal agreement' (ibid., p. 4). Their work distinguishes between various types of standards, such as reference, quality and compatibility (or interface),

[1]I would like to sincerely thank the anonymous reviewers for their valuable comments and insightful feedback, which have significantly enhanced the quality of this paper.

following the taxonomy established by David (1987). Reference and quality standards function as indicators that an object complies with specific defined characteristics, aimed at reducing transaction costs. Compatibility (or interface) standards ensure the seamless integration of components into a larger system consisting of closely specified inputs and outputs. This categorisation is rooted in the economic impacts of standards, a framework adopted by numerous scholars to analyse the driving forces behind standardisation and their effects (e.g., Blind, 2004). In a similar vein, Tassey (2000) defines a standard as 'a set of specifications to which all elements of products, processes, formats, or procedures under its jurisdiction must conform' (p. 588). Tassey categorises the functions of standards into quality, information, compatibility (or interoperability) and variety reduction. Among these functions, a fundamental one is variety reduction through the establishment of a uniform standard, leading to decreased transaction costs (David, 1987). The unity of these different functions is grounded on the definition of standards as a set of specifications. Yet these seminar papers do not provide an explicit explanation of the term 'a set of specifications'.

Scholars trained in economics tend to view standardisation as a rational game and, in turn, rely on the game theory approach. This approach assumes certain equilibrium conditions to elucidate the coordination process. For instance, Farrell and Saloner (1988) use a modified payoff-matrix derived from a two-player coordination game known as the 'battle of sexes' to draw several conclusions. They find that, concerning achieving coordination, committees outperform market mechanisms, and a hybrid approach combining both committee and market mechanisms demonstrates superiority over sole reliance on committees. Here, the differentiation between committee and market coordination is established by assessing whether explicit communication and negotiation precede irreversible decisions. While this economic model centres on actors' rational choices using a presumed payoff matrix, it tends to disregard the learning process and collective problem-solving inherent within the standardisation process, occurring within the black box of standardisation (Schmidt & Werle, 1998).

Scholars in sociology emphasise the standards-making process as involving social negotiation and sense-making (Fomin & Keil, 2000). Schmidt and Werle's book, 'Coordinating Technology' (1998), serves as a valuable guide to the social-shaping perspective of standardisation. They see technical standards as 'a medium of coordination' and 'rules that specify relational properties of artefacts' (ibid., p. 26). According to their viewpoint, the inception of standardisation assumes that technical standards are 'socially constructed' within institutional contexts. Institutions provide a framework and context for modes and rules of interaction (negotiation), thereby influencing the collective understanding of the situation and the identification of problems (ibid., p. 17).

Some utilise the social constructivist approach as a means to construct a conceptual framework for analysing the standardisation process from various viewpoints (e.g., institutional, political and socio-cognitive perspectives (Egyedi, 1996)). Within these studies, the shaping process is described as involving the attribution of meaning and the negotiation of problem definitions. From cognitive perspectives, the standardisation process has been delineated into three stages of closure: design, negotiation and sense-making (Lyytinen et al., 2008). This line of literature accentuates the process of negotiation, often leading to some form of agreements. This suggests that achieving consensus among actors stands as a crucial condition for closure in standardisation. However, a question remains regarding whether consensus is an indispensable attribute of standards.

2.2 | Standardisation as the unity of specification and generalisation

By defining standards as 'a set of specifications', previous literature has been predicated upon two underlying assumptions: (1) They represent the entirety of those outcomes (part/whole paradigm); (2) standards result from specification processes (input/output paradigm). The term 'set' implies that standards are not individual elements but rather general or universal rules (Metcalfe & Miles, 1994; Timmermans & Berg, 1997). In essence, standardisation revolves around generalisation, as highlighted in Timmermans and Epstein's (2010, p. 71) definition: 'process of constructing uniformities across time and space, through the generation of agreed-upon rules'.

The input/output model of standardisation encounters challenges when incorporating generalisation into its procedural stages. Botzem and Dobusch's (2012) input/output model epitomises previous scholars' view on the recursive process of standardisation across four stages: formation, diffusion, adoption and reproduction. Their distinction between 'formation or reproduction' (from output to input) and 'diffusion or adoption' (from input to output) seemingly assumes that standards are established as fixed entities through specification and disseminated through generalisation. However, this conceptual framework paradoxically excludes generalisation from the initial formation of standardisation. Moreover, this sequential arrangement of specification and generalisation creates a flawed notion that developers and users of technical standards should be treated differently. It overlooks the valuable insight that specification and generalisation may occur *concurrently*.

To unravel the paradoxical interplay between specification and generalisation, I draw upon Luhmann's concept of 'unity' (*Einheit*): 'all unity is the unity of self-reference and other-reference and thus is constituted paradoxically' (Luhmann & Bednarz, 1995, p. 363). The notion of reference is invoked concerning the 'operative handling of a distinction' (ibid., p. 440). Luhmann further clarifies this paradoxical formation by explaining: 'the different is the same, that the distinction of marked and unmarked is one distinction among others, that any distinction is a unity, a frame that separates two sides and can be used to connect operations only at one side (at the positive side, at the inner side of the form) and not at the other side. The other side remains included, but as excluded' (Luhmann, 1995, p. 46). Applying this operational unity of distinction and indication implies that technical standards are not considered as physical objects but rather as a form of meaning—the distinction between actuality and potentiality (Luhmann & Barrett, 2012a, p. 21)—constituted by systems for processing connective information.

Standardisation is an operation of distinction by which a standard is actualised into the fixity of specific forms and simultaneously generalised as a potential for connective conditions. Specification establishes limiting conditions of possibility, while generalisation, characterised by indeterminacy, is reconstructed within the system (Luhmann & Bednarz, 1995, p. 327). For instance, when standardisation organisations specify certain frequency bands as candidates for mobile communication standards (e.g., below and above 6 GHz in 3GPP 5G NR standards), they leave other conditions undetermined (e.g., the general context in which these specific frequency bands will be used). In essence, the fixation of technical forms coexists with interpretive flexibility.

Technical standards encapsulate the operational requirements of technology, such as programming for control (Luhmann & Barrett, 2012a, p. 316). Technisation (*technisierungen*) 'combines generalisations and specifications in a specific way, namely, for use in widely differing situations and in often very different purposive contexts with a high measure of precision in specifying functional conditions' (ibid, p. 319). The configurations of technical objects and social expectations can be standardised over time, forming a script where the interdependence of meanings within the object, its temporal aspect and social dimensions regulates the sequence of actions (Luhmann & Cross, 2000, pp. 109–110). For example, the standardised size of paper significantly influences how people write, draw and the content itself by dictating the structure, layout, detail and presentation of the work. Different sizes cater to specific needs and contexts, shaping the way information is conveyed and perceived. For instance, the paper size standards affect pacing and storytelling techniques in comic books. Larger standardised page sizes can accommodate more action or intricate scenes, while smaller ones might focus on character interactions and dialogue.

2.3 | Standards as the unity of thematic identities and expectational structures

A body of prior academic literature has utilised a broad interpretation of standards by categorising standardisation modes using the schema of de facto/de jure or informal/formal (e.g., David & Greenstein, 1990; Farrell, 1989). De facto (or informal) standards signify outcomes arising from market-mediated processes, while standards established through administrative ('committee') procedures are loosely termed as de jure (or formal). Certain researchers attempt to further distinguish the other side of de facto (market, competition) schema into committee (cooperation) and government (hierarchy) (e.g., Wiegmann et al., 2017).

Research focused on practical application often relies on a more narrowly defined concept of standards. Among practitioners, one of the most frequently cited definitions originates from ISO/IEC (2004): 'A standard is a document, established by consensus and approved by a recognised body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.' This definition concentrates on documents established by consensus and approved by a recognised body, thereby excluding other market-mediated standards (e.g., dominant designs or platforms).[2] This limitation arises from the association of standards exclusively with *documents* and *consensus*. Despite the steadfast emphasis on consensus (or agreed-upon rules) by certain sociologists and practitioners (e.g., Cargill, 1989; Timmermans & Epstein, 2010), the notion of consensus as an indispensable criterion for defining standards raises concerns about excluding other types of market-mediated standards.

If not consensus, what essential conditions ensure stability (or reproductive capacity) embedded within standards? In cases involving technical objects, they might bypass the need for consensus by demonstrating their value (Luhmann & Barrett, 2012a, p. 313). For instance, as long as a mobile phone, which incorporates specific standards, consistently proves its value, it won't matter

[2]As for examples of dominant designs and platforms, see Abernathy and Utterback's (1978) Model T and Eisenmann, Parker and Alstyne's (2006) Windows PC operating systems.

whether those standards were established through consensus or via market processes. Of course, some standards can still be made based on consensus, particularly among certain experts (e.g., drug testing standards). Yet the attainment of consensus always comes with the possibility of dissent, which may cause instability in standards. The apparent stability (or reproducibility) of technical standards does not necessarily rely on consensus as its fundamental basis, but rather on *ongoing assessments of consistency based on the proof of their worth*. This cognitive shift from a consensus-based view to a consistency and usefulness-based view allows dominant designs and platforms, which may not necessarily emerge from consensus or documented agreements, to be included within the conceptual scope of standards.

A series of standardisation events convert material objects into communicative themes. These themes establish the parameters for assessing the value of technical objects and facilitate the sequential ordering of actions. The thresholds of thematisation determine the framework for contributions, regulating who can contribute what and even the possibility of negating the content (Luhmann & Bednarz, 1995, p. 155). Themes operate as generalisations and control the correctness of communicative behaviours, determining what is considered appropriate or not. They function as structures shaping expectations and action programs within language (ibid, p. 157).

Applying Luhmannian hermeneutics, standards are reconceptualised as thematic identities and structures of expectation. Guided by its own trajectory of standards, a standardisation system reduces its complexity by determining who contributes what and rejecting what may not align with established criteria. Each contribution selection (e.g., Huawei submitting a technical document to 3GPP) acts as an event that disentangles and consolidates thematic identities, coagulating around a specific standard (e.g., 5G). Standards, functioning as a repertoire of potential themes, shape the expected boundaries of feasibility and acceptability within communicative processes. For instance, it is observable how 5G standards are reproduced as thematic identities and structures of expectation, influencing emerging business opportunities and challenges.

3 | PARADOX OF STANDARDS AND INNOVATION

3.1 | Previous studies on innovation and standards

Numerous studies on innovation have been conducted across three fields: economics, technology management and organisational sociology (Gopalakrishnan & Damanpour, 1997). The common theme that revolves around these innovation studies is 'novelty'; fundamentally, innovation entails 'something new'. Economists tend to see innovation as a phenomenon that results in significant changes in productivity at both the industry and firm levels, while also accounting for differences in growth, productivity and overall performance across industries (e.g., Griliches, 1988; Schmookler, 1966). They focus on aspects of firms or the environment (such as firm size or market structure) that encourage innovation, often conceptualised as technological progress (e.g., Mansfield, 1963).

Researchers in technology management concentrate primarily on the processes of creating new technology and enhancing existing technology. Some conceptualise this process of technological change as evolutionary and cyclical, where progress is punctuated by technological discontinuities that initiate a period of ferment, eventually culminating in the establishment of a dominant design or standard (e.g., Anderson & Tushman, 1990). Sahal characterises the origin of innovation as '*learning* to overcome the constraints that arise from the process of *scaling* the technology under consideration'—in essence, technological progress is seen as a process of learning through scaling (Sahal, 1985, p. 63). He also emphasises the role of dominant designs or standards as technological guideposts that chart the course of subsequent innovative activities.

Organisational sociologists mainly focus on the organisational characteristics that facilitate the adoption of innovations within organisations. Some studies examine how individual, organisational and contextual factors affect the adoption of technological and administrative innovations, highlighting the need for tailored approaches in innovation management (e.g., the case of hospitals in Kimberly & Evanisko, 1981). For instance, Rogers (2003) identifies five key factors that potential adopters consider when determining whether to embrace an innovation: relative advantage (e.g., better than alternatives), compatibility (e.g., fit with existing values), complexity or simplicity (e.g., ease of use), trialability (e.g., capacity to be experimented with) and observability (e.g., visible results). However, the adoption of innovation within organisations involves more complex situations compared to individual adoption. For example, implementing a new information system is a complex organisational change process that requires careful attention to political factors, including the power dynamics within the organisation and the strategic management of stakeholder interests (Markus, 1983).

Similar to innovation studies, standardisation literature highlights how standards are adopted and

diffused, influencing organisational structure and practices (Brunsson et al., 2012). One of the institutional explanations for organisations to adopt standards is isomorphic pressures: coercive (e.g., EU directives), normative (e.g., professionalisation) and mimetic (e.g., to achieve legitimacy) (DiMaggio & Powell, 1983). Functionalist explanations also exist, such as improving efficiency. For example, the adoption of standards is associated with positive network externalities (e.g., consumer benefits related to a standardised product network) (Katz & Shapiro, 1986). Botzem and Dobusch (2012) stress the recursive cycles and mutual dependence between standard formation and diffusion processes, as well as the importance of input legitimacy for initial acceptance and output legitimacy for wider acceptance.

Some studies focusing on the interplay of standards and innovation (e.g., Fomin & Lyytinen, 2000) view these constructs as abstract representations of technical knowledge and perceive the standardisation and innovation process as part of knowledge creation and diffusion. They further emphasise an asymmetric temporal arrangement between creation and diffusion, framing it within the realms of technology and the market (i.e., transitioning first from technology to market and then from market to technology). Similarly, Rogers (2003) distinguishes between the creation of innovation (i.e., new ideas, practices, or objects) and the subsequent diffusion process, where 'an innovation is communicated through certain channels over time among the members of a social system' (p. 5). This body of literature within technology management and innovation regards standards and innovation as forms of knowledge or technology and, consequently, does not distinctly separate standards from innovation, assuming their integration as essential elements of knowledge or technology.

Scholars in the field of standardisation research have endeavoured to differentiate between standards and innovation. For instance, Blind (2004) delineates the innovation process, comprising stages like research, development and diffusion, and elucidates how standards and standardisation intersect within each stage. Hanseth et al. (1996) characterise this ambivalent relationship between standards and innovation as a tension between standardisation and flexibility. Aligning with a similar line of thought, the majority of standardisation literature highlights the dualistic impacts of standards on innovation, primarily focusing on the positive aspects (e.g., Blind & Gauch, 2009; Egyedi, 2001; Ho & O'Sullivan, 2018; Zoo et al., 2017). Nonetheless, this line of research still lacks sufficient theoretical explanations for the emergence of the paradox concerning standards and innovation.

3.2 | Sources of the standards–innovation paradox

Within Luhmann's theory, complexity stands out as a crucial element in unravelling the intricate relationship between standards and innovation. Regarded as the unity of a manifold, complexity assumes a paradoxical nature and is frequently utilised by an observer to characterise a system as a blend of redundancy and variety (Luhmann & Barrett, 2012a, p. 78). Using the concepts of element and relation, complexity can be decomposed into an abundance of potential connections, compelling a system to selectively minimise (or exclude) other potential connections (Luhmann & Bednarz, 1995, p. 39). Through conditioning the reduction of complexity for further operations, a system moulds structures and, consequently, augments its own complexity (i.e., the potential for recombination) (ibid, p. 171). Increasing complexity enables systems to embrace more innovation and change. Complex systems can respond to more external stimuli, allowing their internal complexity to grow more quickly. This rise in complexity occurs not only within a system but also influences the environment of other systems simultaneously (ibid, p. 177). As environmental complexity increases, it puts pressure on other systems to manage complexity both internally and externally. Accordingly, systems address this challenge by reducing complexity and focusing on relevant information through selective standards.

Standards have functioned as the coupling mechanism between systems and environments. Operating as highly selective structures, standards reduce complexity on one side while consequently expanding complexity in the form of extensive possibilities for recombination on the other (Luhmann & Gilgen, 2013, p. 87). For instance, a few standardised acoustic signs in language and a few standardised letters in writing significantly enhance the potential for combining these elements to generate numerous sentences. Furthermore, a standardised interface (e.g., universal serial bus type-C, USB-C) facilitates connectivity with other devices, resulting in a multitude of connective possibilities. This increases adaptability to change, enabling rapid response to changing needs. *The duality and simultaneity of reducing complexity within a system (leading to uniformity) and increasing complexity in its environment (resulting in diversity)* constitute one of the sources of the standards–innovation paradox.

The tension between compatibility and novelty serves as the second source of the standards–innovation paradox. The concept of innovation establishes an asymmetry between old and new, presuming the superiority of new over old (Luhmann & Barrett, 2012b, pp. 254–255). This asymmetrical structure guides the generation of new forms

(or designs, themes) while simultaneously dismissing what has become overly familiar (Luhmann & Knodt, 2000, p. 122). On the other hand, standards prioritise compatibility with existing systems, often termed backward compatibility. Compatibility facilitates the integration of heterogeneous systems, fostering market expansion and economies of scale. For instance, 5G phones maintain functionality across 2G, 3G and 4G networks. The inherent asymmetry between old and new creates a paradoxical instability between standards and innovation.

3.3 | Ways of dealing with the paradox: Dynamic stability and stylisation

Many previous studies have not sufficiently explained that standards and innovation can be equivalent as structures in the present moment. The distinction between standards and innovation can be discerned when considering the time schema (before/after). A structural change within a system is typically identified as innovation, whereas the absence of such change characterises the continuation of standards (Luhmann & Barrett, 2018, p. 274). Structural change involves a certain reversibility of relationships at the level of expectations (Luhmann & Bednarz, 1995, p. 345).[3] It presupposes self-maintenance and dynamic stability, implying different choices between the structure level (conformity/deviance schema) and the element level (continuation/cessation schema) (ibid, pp. 347–348).

Structural change, such as a change in the standard driven by innovation, is accompanied by exnovation with unintended side effects. Exnovation is the process of phasing out old standards that have been replaced by new innovations. When innovation leads to a change in the standard, the older standards-based systems do not simply disappear; they remain but become legacy systems that are incompatible or less effective within the new standard. For instance, legacy software or hardware systems designed to work with floppy disks or compact disc read-only memories (CD-ROMs) may struggle to adapt to new USB-based systems, leading to a need for updates, replacements, or adaptations. Stabilising the conditions for extending historical structures into the present is crucial for the system's adaptability to change.

[3]See Luhmann's example of structural change: *After thirty-one years of marriage a husband, on his fifty-seventh birthday, tells his amazed wife, 'I don't like plum tarts. And I never have liked them.' Then question of what to cook him on his birthday must be decided anew. If both birthdays and desserts, married life and candour, do not lose their meaning, the structure can be meaningfully changed* (Luhmann and Bednarz Jr., 1995, p. 347).

Institutionalising stabilised conditions for structural change, a standardisation system navigates its way to address the standards–innovation paradox. Standardising enables something by excluding something else. Using second-order observations, systems can observe what has been excluded by existing standards or new innovations and readjust a balance between standards and innovation (Luhmann & Knodt, 2000, p. 83). While new innovations are being adopted, systems can reevaluate and modify existing standards as needed.

In particular, reflexivity (processual self-reference) helps define system boundary conditions for structural change by standardising the standardisation process (Luhmann & Bednarz, 1995, p. 443). This recursive process enables the examination of system processes within the standardisation procedure and allows the system to manage its own non-occurrence (such as discussing why a specific specification was rejected) (see ibid, p. 446; p. 451). This improves the system's predictability. By retaining rejected options as latent alternatives for subsequent decision-making rounds, a standardisation system internalises the conditions of changeability, allowing for the integration of cognitive learning possibilities into the existing standards' framework. Self-referential works of standardisation can challenge the boundary of existing standards by integrating rejected alternatives into future standards. This fosters dynamic stability.

Dynamic stability allows the system to maintain its core identity while adapting to environmental changes and integrating new elements. This involves a delicate balance between change and continuity, providing a foundation for sustainable system evolution. Systems adapt to changes in their environment through ongoing internal adjustments and recalibrations. For instance, healthcare systems adapt to new medical knowledge, technologies and public health challenges through continuous adjustments of standards, ensuring the system's stability and effectiveness in providing care. This adaptation is key to their dynamic stability. For a system to be adaptable, its standards must be flexible enough to evolve in response to external changes. It means that standards must contain the necessary emptiness that allows systems to imbue them with meaning during the process of application in different contexts (Rasche & Seidl, 2020).

Periodisation involves the segmentation of history into periods that are characterised by specific attributes, such as dominant designs or thematic styles. Utilising distinctions of periods or generations, it temporalises long-known forms and styles (Luhmann & Knodt, 2000, p. 208). This allows for a deeper appreciation of historical contexts which canonise a particular style (i.e. stylisation) and catalyse a transition to another style. An illustrative example of periodisation is mobile telecom

standardisation work using generational styles (e.g., 2G, 3G, 4G and 5G standards).

Stylisation refers to the process by which works of standardisation follow certain styles that are formed through repetitive patterns. This affects how standards are created and evaluated within a particular style or historical context, thereby maintaining the consistency of standardisation works. Classifying a work within a specific style indicates that it belongs to a particular system (ibid, p. 208). Stylisation helps manage the paradox of standards and innovation by allowing standards to remain grounded in recognisable forms while continually pushing the boundaries of these forms. It involves selectively referencing established forms and ensuring that new innovations are incorporated in ways that are familiar enough for users to adapt without significant friction. For example, when USB standards evolve, the basic 'plug and play' style remains recognisable, ensuring users can easily adapt to new versions.

Dynamic stability and stylisation are interrelated but distinct concepts that jointly help manage the paradox of standards and innovation. Dynamic stability is a broader concept at the system level, encompassing structural and functional aspects. It deals with how the system as a whole maintains its identity and functionality amidst change. Stylisation is more specific to the works and operations of standardisation, focusing on the methods and techniques that balance recognised forms with creative deviations. It provides specific creative strategies to reinterpret historical repertories and transform these elements within new contexts, ensuring that new stylistic works are both novel and compatible. For instance, the evolution from 4G to 5G standards involves the reuse of certain architectural styles (or constraints) to maintain backward compatibility while introducing new capabilities like ultra-reliable low-latency communication.

4 | DISCUSSION AND IMPLICATIONS

The reconceptualisation of standardisation as the unity of specification and generalisation offers a nuanced understanding of the duality and simultaneity of the operation of standards. In this context, standards are not merely fixed sets of specifications but are dynamic constructs that integrate both specific forms and general principles. This perspective aligns with Luhmann's notion of unity, where standards embody both self-reference (specificity) and other-reference (generality). This duality enables standards to remain relevant across various contexts and applications, facilitating both stability and adaptability. Furthermore, the reconceptualisation of standards as the unity of thematic identities and expectational structures helps us make a cognitive and communicative turn from the consensus-based standard definition to the consistency-based standard definition, whose scope is comprehensive enough to include the concepts of dominant designs and platforms.

The exploration of standards and innovation through Luhmann's theoretical lens reveals significant insights into the paradoxical relationship between these constructs. The findings suggest that standards, while inherently promoting stability and uniformity, simultaneously set the stage for innovation by providing a stable framework that can be selectively altered. The paradox of standards and innovation arises from the duality and simultaneity of complexity reduction (uniformity) and complexity increase (diversity). This duality underpins the dynamic interplay between maintaining consistency and fostering change within and between systems. Another source of the paradox is the tension between the need for compatibility (standards) and the drive for novelty (innovation). This paradoxical tension can be managed through the concepts of dynamic stability and stylisation.

One of the key original contributions of this research is bringing the concept of stylisation to the works of technological standardisation. Previous research tends to concentrate on the functionality of technological standardisation, whose performance is legitimised by economic efficiency. That is to say, the standardisation operations of technological systems are highly intertwined with the functions of economic systems. By contrast, in this research, the concept of stylisation is employed to explain the dynamic relationship between standards and innovation, enabling the comparability of technological systems with art systems in terms of functional equivalents. This epistemic comparison may enrich the social function of technological systems and inspire new ways of thinking to redefine what is considered technological standards.

For practitioners, these insights underscore the importance of maintaining flexibility within standards to allow for ongoing innovation. Organisations should focus on creating standards that are not overly prescriptive but provide a framework that can accommodate future changes. This approach can help organisations remain adaptable and resilient in the face of evolving technologies and market conditions.

5 | CONCLUSION

To standardise is society—rephrasing Bowker and Star's (1999) audacious statement, 'to classify is human'. Drawing from Luhmann's theory, standards and standardisation are reconceptualised as the unity of thematic identities and expectational structures and the unity of specification and generalisation. This endeavour seeks to

offer a fresh perspective on the current interpretations of standards and standardisation. Furthermore, it delves into the sources of the standards paradox (the duality and simultaneity of complexity reduction and increase and the tension between novelty and compatibility) and outlines an approach to address this paradox (dynamic stability and stylisation). Through these explorations, the intricate relationship between standards and innovation is clarified.

Future research should further explore the mechanisms through which standards and innovation co-evolve within different contexts. The application of Luhmann's theoretical framework to other domains, such as digital platforms and emerging technologies, can provide deeper insights into the interplay between stability and change. In addition, subsequent investigations might unveil the in-depth comparability between technological systems and art systems within the context of standards and innovation. This has the potential to enrich the literature on standards and innovation while simultaneously expanding the application and relevance of Luhmann's theory.

Luhmann's works, much like night-vision goggles, have illuminated the path toward a thorough exploration of modern society—a sort of 'reconnaissance'.[4] Particularly, it has led to the following observation: the reciprocal process of modernity where society and technology mutually standardise each other. Understanding the complex relationship between technological standards and innovation through the lens of Luhmann's theory provides a comprehensive framework for managing the paradox of stability and change. By embracing both dynamic stability and stylisation, systems can navigate this paradox effectively, ensuring sustainable growth and adaptation in an ever-changing environment.

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[4]See Chapter 12 of Luhmann and Bednarz Jr. (1995).

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RESEARCH ARTICLE

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The decree of inclusive education and its potential for irritation for the educational system—A system-theoretical conceptualization of the relationship between education and politics

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Abstract

The starting point of the argument is the assumption that the decree of inclusive education in Germany has received considerable impetus from national and international political developments, especially through the adoption of the Salamanca Statement and Framework for Action on Special Needs Education in 1994 and the ratification of the United Nations' Convention on the Rights of Persons with Disabilities in 2009. The immense pressure for reform, which is triggered by education policy's expectations, essentially means that the decree of inclusive education can be interpreted as an irritation for the specific constitution of the educational system. Against the background of the potential for irritation in the decree of inclusive education, it is shown to what extent the educational system recognizes differences in the sense of irritation and to what extent these are relevant when it observes its relationship to politics. The theoretical work of the article provides important information on how the relationship between education and politics can be conceptualized based on a concrete semantic context such as the decree of inclusive education.

KEYWORDS

educational system, inclusive education, irritation, politics, system/environment difference

1 | INTRODUCTION

In the following article, the decree of inclusive education forms the starting point for a conceptualization of the relationship between education and politics as subsystems of a functionally differentiated society. The theoretical framework of the conceptual approach is based on the system-theoretical conceptual tools sensu Luhmann, in particular on his comments on the functional system of education (cf. Luhmann, 1995a). In the meantime, a lot is already known about the relationship of the educational system to other functional systems of society such as economy, family, politics, and science, especially about the ways in which it is structurally linked to them (cf. Luhmann, 1996, 2018b). However, using *specific system references*, the question of how the irritation of a system and, subsequently,

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the observation of the respective system environment can be conceptualized based on a *concrete semantic context* has hardly been addressed so far.

This question is relevant because it cannot be assumed that subject-specific discourses that are primarily—but not exclusively—relevant for a single functional system are communicatively processed in a comparable manner in different social system contexts. A research gap opens up in that the question of the importance of specific semantic contexts for the potential for irritation of a system—shown here using the example of inclusive education and the educational system—and for the observation of its environment has been neglected since then. This research gap is even more surprising because the importance of system-relational refractions of discourses and system-specific operational modifications, which result in recontextualization efforts of the respective system, has now been sufficiently emphasized, at least for the educational system (cf. Fend, 2006, p. 175; Urban, 2019, p. 42). In the author's opinion, the added value of a system-theoretical framework sensu Luhmann for an analysis of the irritation and observation of a selected functional system lies in relieving expectations of the success of interactional negotiation processes—which does not mean that these do not take place—and instead taking the respective internal system constitution as the starting point for a reflection on connectivity.

Before the research objective can be translated into concrete questions, the key 'adjustment screws' of the argument structure will be explained:

a. Which understanding of inclusive education is assumed?
b. Which system references are chosen? How can these be justified?

Regarding a, inclusive education is a complex discourse in international inclusion research. It is a global paradigm that focuses on participation and processes of inclusion and exclusion in educational contexts and is designed to eliminate barriers and disadvantages in educational systems (cf. Richardson & Powell, 2011). Beyond formal educational processes, non-formal and informal educational processes are also addressed across the entire lifespan of an individual. In this line of development, political-normative statements, such as those formulated primarily by the United Nations' *Convention on the Rights of Persons with Disabilities* in 2006 (cf. United Nations, 2006), play a particularly important role, as they are taken up nationally, locally and regionally in terms of educational policy and transformed into forms of educational governance. Due to different framework conditions at national, local and regional levels, which are determined, among other things, by the historical-cultural and legal characteristics of the respective educational systems, inclusive education appears to be a 'fuzzy concept' (Artiles & Dyson, 2005, p. 43), the transformation of which into practice is handled differently. In a broader context, inclusive education is considered an important step on the way to an inclusive society (cf. Magnússon et al., 2019, p. 71). In this article, inclusive education is viewed from the perspective of its decree as a supranational norm and programme that is accompanied by changes in society's self-description (cf. Luhmann, 1995b, p. 90). Against the background of the overall societal orientation of inclusion, the assumption is made that functional systems are called upon to refer to it and to process it communicatively.

Regarding b, the research objective formulated at the beginning involves decisions about the choice of system references. As soon as subsystems are differentiated, the question arises as to how the subsystems—which are similar in their inequality—should be thought of in relation to one another. In any case, no specifications of an order, for example, in the sense of a hierarchy, can be expected from the overall system, this means society as the environment of the subsystems (cf. Luhmann & Barrett, 2013, p. 89). The question therefore comes to the fore as to which system references are possible when taking inclusive education into account as a semantic context. In principle, the decree of inclusive education can be processed communicatively in different ways by different functional systems—each taking into account their system-specific codes and programmes. In the course of a functionally differentiated society, social events can be transformed into the operational logic of other functional systems since environmental relationships within society must be assumed. This leads, among other things, to the fact that '[...] one and the same social event may simultaneously be economized, politicized and mediatized' (Roth & Schütz, 2015, p. 16)—and also educationalized, one would have to add with regard to the topic of this article. For example, inclusive education could be reflected in the functional system of religion in the discussion about a denominationally shaped image of man, it could be negotiated in the functional system of economics under the auspices of the pecuniary follow-up costs of widespread implementation, it could be dealt with in the functional system of mass media with regard to its media distribution or it could be elaborated on in the functional system of art, by addressing the perspectives of impaired people, which may lead to an expansion of previously known forms of representation and work. These and other potential possibilities must be taken into consideration when it comes to locating semantic contexts in functional systems. Analytically, however, these options must be treated separately from one another.

In all of this, it is important to remember that there is no direct influence from one functional system to another, but 'merely' irritations are generated and perceived (and possibly processed) by a system: 'Although there is no longer any possibility of intervening in structural developments from without, the irritations that a system has repeatedly to deal with—and what indifference it can afford—play an important role' (Luhmann & Barrett, 2012, p. 110). Irritation describes 'a purely internal system state that [...] can be attributed both internally (to its own structures) and externally' (Luhmann, 1995b, p. 61 + 62). It follows that irritation *cannot* be transferred from the environment *into* a system but is rather produced *by* a system in the course of comparing its own possibilities with external events. If a system shows signs of irritation, these are system-related. It does not mean that the environment of the system is also irritated (cf. Luhmann & Barrett, 2013, p. 118).

In this article, the decree of inclusive education is unfolded in its potential for irritation for the educational system, with particular attention to politics.[1] The choice of this system reference is supported by current educational discourses (cf. Ainscow, 2021; Qvortrup & Qvortrup, 2018) and is due to the author's research interest. For the sake of completeness, it should be noted that the educational system—like all other functional systems—is continuously exposed to *countless* irritations from its environment, which it processes or ignores. As outlined above, the choice of a different system reference would also be possible—but this would justify a different research project. With regard to the educational system, it is argued at this point that inclusive education as a supranational norm has the potential to irritate it. Whether and how the educational system further processes this internally would be the subject of subsequent—preferably empirically oriented—analyses.

In order to better understand the article, it seems important to add that the inclusion discourse did not genuinely develop from the educational system itself but is based as one of its sources on a political process, which culminated in the formulation of a norm claiming global validity (cf. Urban, 2019, p. 42). So the article is based on the idea that the decree of inclusive education has received considerable impetus from national and international political developments, especially through the adoption of the *Salamanca Declaration* in 1994 (cf. UNESCO, 1994) and the ratification of the United Nations' *Convention on the Rights of Persons with Disabilities* (cf. United Nations, 2006) by Germany in 2009. The political system becomes particularly relevant for the educational system from the point of view of providing guidelines for inclusive education. Therefore, the system-to-system relationship between education and politics is subject to specific characteristics that cannot simply be transferred to other functional systems (cf. Luhmann, 2002, p. 130). The demand for inclusive education goes to the core of the educational system's current agenda, for example, regarding the question of curriculum orientation (cf. Roth & Schütz, 2015, p. 24). As a result, the educational system is called upon to look for ways of dealing with a high degree of heterogeneity within the student body (cf. Luhmann, 1990, p. 91). The immense pressure for reform, which is triggered by education policy's expectations and its power, essentially means that the educational system will most likely observe its relationship with the political system.

Based on the aim of this article to provide a system-theoretically informed conceptualization of the relationship between education and politics based on the decree of inclusive education as a concrete semantic context, the following consecutive questions can be identified against the background of the premises developed above:

1. To what extent is the decree of inclusive education by politics thematically relevant for the educational system?
2. To what extent does the educational system, on the basis of its structural constitution, recognize the decree of inclusive education as a difference in the sense of an irritation?
3. Resulting from the irritation potential of the decree of inclusive education, what can be part of the educational system's observations of politics?

In order to address the research objective—a system-theoretic conceptualization of the relationship between education and politics against the background of the decree of inclusive education—it is first necessary to show to what extent the decree of inclusive education becomes particularly relevant for the educational system from the point of view of providing guidelines for inclusive education (Section 2). In the next step, the potential

[1]The term educational system means that the function of education is differentiated in an own system, although education—and this is crucial in order to understand the following explanations—*actually* takes place in the *interaction system of teaching* and, moreover, institutionalized teaching is tied to an *organization* with corresponding structures. The educational system of a functionally differentiated society is hardly conceivable without schools, teaching and teachers, because the 'differentiation of an educational system requires the establishment and operation of schools' (Luhmann, 2002, p. 118). Schools as organizational systems are thus parts of the functional system of education; they enable the multiplication of educational communication via the interaction system of teaching (cf. Luhmann, 2002, p. 43). On an analytical level, interaction, organizational and social systems are comparable insofar as they are all social systems.

for irritation of the decree of inclusive education for the educational system is unfolded with particular consideration of its system-specific constitution (Section 3). The perceived differences associated with the irritation of the educational system form the basis for an observation-theoretically informed relationship between education and politics (Section 4). Some final remarks on the argumentation and the insights gained from the article will conclude it (Section 5).

2 | THE DECREE OF INCLUSIVE EDUCATION AS AN ISSUE FOR THE EDUCATIONAL SYSTEM

The first internationally significant statements on the framework planning for special needs education were initiated by the political system (cf. Rapp & Corral-Granados, 2021); hence, inclusive education is seen as a vision of international policy, which aims at developing both a whole personality and an inclusive society. Reference is made to a number of internationally significant documents from which schools derive their mandate for inclusive school development: the *Universal Declaration of Human Rights* (United Nations, 1948), the *World Conference on Education for All* (UNESCO, 1990), the *United Nations Standard Rules on the Equalization of Opportunities for Persons with Disabilities* (United Nations, 1993), the *Salamanca Statement and Framework for Action on Special Needs Education* (UNESCO, 1994) and the United Nations' *Convention on the Rights of Persons with Disabilities* (United Nations, 2006)—just to name the most prominent ones (cf. Magnússon et al., 2019, p. 71).

In these documents, inclusive education appears as 'a set of political ideals—even decrees—for educational practice, ranging from specific definitions and foci on pupils with special needs or disabilities, to broader ideals of "*creating communities*" [italics in the original, author's note] for all pupils' (Magnússon et al., 2019, p. 71). From the political side, a rough framework is defined within which the educational system is called upon to design inclusive education. That includes, for example, the following questions, which become an issue for the educational system:

- Who is addressed when speaking about inclusive education? The term 'persons with disabilities' includes those 'who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others' (United Nations, 2006, Article 1)
- What is expected of the educational system? It shall ensure 'an inclusive education system at all levels and lifelong learning directed to (a) the full development of human potential and sense of dignity and self-worth, and the strengthening of respect for human rights, fundamental freedoms and human diversity; (b) the development by persons with disabilities of their personality, talents and creativity, as well as their mental and physical abilities, to their fullest potential; (c) enabling persons with disabilities to participate effectively in a free society' (United Nations, 2006, Article 24)
- How can inclusive education be realized? By ensuring that pupils with disabilities are not excluded from the general education system and that they receive 'effective individualized support measures [...] in environments that maximize academic and social development, consistent with the goal of full inclusion' (United Nations, 2006, Article 24)

With the ratification of the United Nations' *Convention on the Rights of Persons with Disabilities* (United Nations, 2006) in Germany in 2009, the mandate to implement inclusive education became an internationally binding norm, although forms of inclusive education for pupils with and without special educational needs have been discussed again and again as a federal requirement for around five decades. They have also been reflected in relevant resolutions, recommendations or state agreements. In this context, the relevance of collaboration between teachers from different professional backgrounds is particularly emphasized. Furthermore, it was considered early on that inclusive education no longer had to take place primarily in an institution-related context (cf. Conference of Ministers of Education and Cultural Affairs, 1994).

At the level of all 16 German federal states, the school law regulations regarding the establishment of inclusive education have been adjusted in such a way that the implementation of inclusive education is now a binding component. So inclusive education has been regarded as a central component of the programme of the federal German educational system (cf. Authors' Group for Educational Reporting in Germany, 2022, p. 128) since 2009 at the latest. Inclusive education is also located in educational programmes on international level (cf. Buli-Holmberg et al., 2023; Hedegaard-Sørensen et al., 2017; Michailakis & Reich, 2009; Palikara et al., 2019). However, no conclusions can be drawn about the actual existence of inclusive education from the regulations in the respective school laws per se (cf. Dyson et al., 2005; Göransson & Nilholm, 2014; Lindacher, 2020).

It can therefore be stated that the decree of inclusive education in Germany does not primarily arise from an educational discourse or even practical school needs but is closely linked to national and international political developments. If one assumes with Luhmann that 'the societal

function of the [political] system [is] to make collectively binding decisions' (Luhmann & Barrett, 2013, p. 96) based on an ideology as a programme, whatever the programme may be designed (cf. Roth & Schütz, 2015, p. 24), it can be argued that (at the latest) with the ratification of the United Nations' *Convention on the Rights of Persons with Disabilities* (United Nations, 2006), there is a subsequent obligation to implement inclusive education. This is because the political system acts through the legislative *power* by changing the legal basis. This process affects the smallest branches of the legal system, for example, at the level of the federal state school laws, with politics acting as the driving force behind this development (cf. Byrne, 2013). As a result of this form of environmental relationship, the educational system is called upon to move away from a relative homogenization of its pupils (cf. Luhmann, 1990, p. 91)—for example, in the course of establishing grades and the orientation towards educational standards for different levels of competence to be distinguished—and, instead, to move towards the processing of a high degree of heterogeneity.

This chapter has addressed the decree of inclusive education from the perspective of the external relationship between politics and the educational system. In order to better understand why the decree of inclusive education has the potential to irritate the educational system, it is also necessary to have a look at the system-specific constitution of the educational system and to identify aspects which might be challenging for the agenda of inclusive education.

3 | THE DECREE OF INCLUSIVE EDUCATION AS AN IRRITATION FOR THE SPECIFIC CONSTITUTION OF THE EDUCATIONAL SYSTEM

Being a functionally differentiated system, the educational system occupies a special position within society because the educational process is accompanied by interdependencies across society (cf. Luhmann & Schorr, 1988, p. 28). It is able to distinguish events in its environment as belonging to the system or not belonging to the system in order to recognize in which cases follow-up communication has to be initiated. When it comes to politics, we have learned that the decree of inclusive education as a collectively binding norm is likely to lead to irritation of the educational system in the sense of a 'resistance of communication against communication' (Luhmann, 1995b, p. 63). But why is that so? Or to put it another way: how can the educational system recognize the decree of inclusive education as something that makes a difference to it?

The educational system has a certain idea of itself and does not equate itself with another subsystem. Education does not assume that its environment is competent with regard to the function it fulfils itself but conversely assumes the competence of the other subsystems with regard to the functions it does not fulfil. The specific function, which is only provided by the educational system and not by another subsystem in a functionally differentiated society, is oriented towards solving a problem relevant to society (cf. Baraldi & Corsi, 2017, p. 28; Luhmann & Schorr, 1988, p. 233). Luhmann and Schorr (1988, p. 28) attribute to education a 'universal special function', which is not simply limited to the production of people's knowledge and skills but is to be found 'in the enabling of rather unlikely premises for social contacts, namely for contacts that normally lie outside the educational system. At the same time, it becomes clear that through the differentiation of this special function, the interdependencies of the educational process as a whole *do not decrease, but increase* [italics in the original, author's note]' (Luhmann & Schorr, 1988, p. 28). Society is involved in the educational process in two ways. Specifically, the function of education is about preparing for social contacts in society—thus extending beyond the educational system—or about equipping an individual for this, so that expectations of individuals can be legitimized and, ideally, not disappointed. For a functionally differentiated society, it follows that every individual is educated in the educational system, and, at the same time, each individual can assume in social interactions with others that they have also been educated.

In this context, it seems important to distinguish between 'human beings' and the analytical concept of 'persons'. Education has to do with persons. While 'people' are born, 'persons' are primarily the result of education (and socialization) in that they incorporate the expectations of their environment. It is characteristic of the educational system that its function relates to the personalization of individuals (cf. Luhmann, 2002, p. 38), to a 'change in structures of consciousness' (Luhmann, 2018a, p. 407) and, ultimately, to a 'formation' (Roth & Schütz, 2015, p. 24). That is, the problem to be referred to lies in the environment of the educational system and not in its communication itself. Education ultimately works towards changing psychic systems through educational communication (cf. Luhmann, 1994, p. 177). In other words, education initiates a transformation of human beings into persons—'psychic systems with a personal behavior' (Baraldi & Corsi, 2017, p. 50)—but the latter operate under the operational mode of consciousness and are in this sense disconnected from education.

The function of education excludes that education can be observed based on, for example, content or materials,

because every decision to select them would require a justification for the selection, which in turn would entail new justifications (cf. Baraldi & Corsi, 2017, p. 51 f.). Instead, education is made possible through an orientation towards the conveyance of knowledge and skills. This goes along with some advantages: education is neither tied to the achievement of a predetermined quality dimension nor to a justification of the appropriateness of what is to be taught. The concept of conveyance just indicates that an operation *is going on*—it is not restricted to a specific educational situation (cf. Baraldi & Corsi, 2017, p. 51).

This leads to the question of the unity of the educational system, which requires putting past and future operations into context. According to Luhmann (1992, p. 112), its unity lies in the 'intention to educate' and is assumed from a social perspective, regardless of whether teachers are interested in it or not. Such an educational intention as a cognitive symbol makes it possible to classify educational communication as belonging or not belonging to the system. For the sake of completeness, it should be noted that the other side of the form of the educational intention is marked by what occurs unintentionally, which means through socialization (cf. Baraldi & Corsi, 2017, p. 52). By referring to persons as '*individually attributed restrictions on behavioural possibilities* [italics in the original, author's note]' (Luhmann, 1992, p. 122), which means, as expectations that are only tied to one individual, it becomes clear that an educational intention oscillates between self-reference and external reference. An educational intention marks self-reference. Persons are necessary as external references to the educational system insofar as their resistance, their learning difficulties, et cetera mark any intention as an educational intention (cf. Luhmann, 1992, p. 124). Therefore, it is important to note that persons constitute a form of system reference and not an autopoietic system (cf. Luhmann, 1992, p. 122).

The educational intention cannot be observed in the educational system (otherwise, the functional system would be something else in addition to its unity), nor is it constructed by an external observer. What is referred to as the unity of the educational system is itself part of a distinction, thus addressing one side of a form, the inside, which is used as a starting point for further operations (cf. Spencer Brown, 1994). In order to differentiate the educational intention from others, moral and technological distinctions come into consideration. In the course of moral distinctions, it is assumed that the educational intention per se is a good one that it benefits the pupils and that it is fundamentally compatible with the meaning of their life (cf. Luhmann, 1992, p. 117). If a technological differentiation style is used to represent educational intentions, the focus is on the intended effects as the inner side of the form, although unintended effects in educational planning cannot be ruled out or at least those that are subsequently described as 'postdecisional regrets' (Luhmann, 1992, p. 119) can just about be accepted. A combination of both forms of differentiation can result in a paradox in that even good intentions can have unintended effects (Luhmann, 1992).

In order to be able to guarantee the intention to educate as a plausible claim, specific structures are required in the educational system. A central prerequisite is the aspect of asymmetrical relationships in terms of time and roles. There must be a difference between before and after, which structures the educational intention in temporal terms. Knowledge and skills are imparted 'to pupils who do not yet have them' (Baraldi & Corsi, 2017, p. 61), but who are in the process of acquiring these. It is therefore a paradox resolved along a time dimension. More abstractly, it ensures the continuity of the system in the course of reproducing this difference through a discontinuity. Equally important is the social asymmetry between educator and pupil or between teacher and pupil. The intention to educate is usually attributed to the educator. The pupil is expected to expose himself/herself to this intention and, if necessary, to support it more or less through some actions (cf. Luhmann, 1992, p. 113). The decree of inclusive education may irritate the existing asymmetrical time and role relationships insofar as it is no longer assumed that there is only one teacher in the classroom, but possibly that there is teacher collaboration, which has an impact on the respective shares of the individual teachers in educational communication and on the question of who assumes responsibility for teaching (cf. Vangrieken et al., 2015).

The intention to educate further presupposes that the educator is not indifferent to the efforts of the pupils but rather takes a stand. This is done through the use of various system internal selection duals such as the distribution of praise or blame with regard to behaviour, graduation or non-graduation and passing or failing in an examination. However, the educator cannot know whether any action will ultimately be successful or not. The educational system therefore operates under conditions of uncertainty, which is reflected, among other things, in 'the distinction between conveyable and non-conveyable' (Baraldi & Corsi, 2017, p. 61), where the positive value (designation value) acts as an identification of positive connectivity and the negative value (reflection value) serves to reflect reasons for negative connectivity. With regard to the double dimension of placement—on the one hand of learning content and on the other hand of learners in social positions—the code 'placeable/unplaceable' is used (cf. Roth & Schütz, 2015, p. 26). Regardless of whether more emphasis is placed on the

operation of mediation or on placement, it is clear that the distinction between education and selection for careers inside and outside the educational system is therefore constitutive of the system—even if the system should try to circumvent selection (cf. Krause, 2005, p. 233)—because the intention to educate cannot be communicated without having to resort to discrimination in the sense of distinctions. If the intention to educate was accompanied by the refusal to assess, for example, for pupils with severe disabilities, this would amount to a 'performative self-contradiction' (Luhmann, 2017, p. 253) or paradoxical communication, as it would give the impression that the educator did not know what constituted the educational intention of his or her endeavours. With the use of any form of selection, a determination is made about the achievement or non-achievement of educational goals, as a result of which the educational system is necessarily subject to binary coding (cf. Luhmann, 2017).

However, the binary code, which merely marks a difference, does not yet provide any clues for deciding to what extent an operation leads to greater connectivity in terms of content. In addition to binary coding, a kind of programming is therefore required that provides a basis for decision-making. This is the case, for example, with curricular standards. What is primarily important for the programme is that it is suitable for assigning the system's events to the code values. Its task is to 'fix the clues for a correct assignment of the code values' (Luhmann, 1987, p. 182). Accordingly, the programme of the educational system contains statements about the 'conditions of the persons to be educated that one wants to achieve and [the] means that are used to achieve this' (Luhmann, 1987, p. 186). That means, for example, the levels of competence or specialist content to be achieved. Only at the level of programmes, educational goals may be formulated, and operations linked to the function of the system (cf. Luhmann & Schorr, 1988, p. 466).

The differentiation of the educational system by a two-valued code—here 'conveyable/non-conveyable'—is in principle accompanied by the problem of an excluded third possibility (this applies analogously to all functional subsystems). Just to give an example for this: if inclusive education is considered as a compulsory educational programme that goes beyond simply bringing together children with and without special educational needs under the same school roof or in one classroom (cf. Göransson & Nilholm, 2014), one has to seriously reflect upon the question of how social participation and well-being of *all* pupils can be realized—also of those pupils who have not been able so far to follow a standardized educational programme in any form whatsoever. Social participation, social justice, well-being, et cetera do not automatically result from actions aimed at imparting knowledge along the code 'conveyable/non-conveyable'. That is why it is likely that the decree of inclusive education will lead to needs that are not represented by the established code of the educational system. However, in the form of 'support programs', 'special programs for compensatory education' or 'compensation programs' (Luhmann, 1987, p. 200 f.), the excluded third component may be reintroduced in the dual value of the system—under its given conditions and structural requirements. One possibility would be to consider forms of teaching with different learning objectives. The extent to which the educational system is able to perceive environmental events under these circumstances depends on the 'system's own structures' (Luhmann, 1987, p. 183) or on the autonomy of the system.

To sum up, against the background of the international standards explained in Section 2, which express extensive expectations of the educational system in terms of inclusive education, as well as the structure of education outlined in this chapter, there is some evidence to suggest that the educational system does not view the decree of inclusive education as an event that will disappear on its own but rather recognizes it as a significant difference within the system, which initially encourages the continuation of system-specific operations but also raises the question for the system as to whether changes to its system structures are necessary or whether the system should initiate learning processes (cf. Luhmann & Barrett, 2013, p. 116 + 117).

A key reason for the confirmation of the potential for irritation for the educational system is likely to lie primarily in the massively expanded target group of educational communication as a result of the decree of inclusive education. While the educational system was previously able to rely on attempts to homogenize the beginning of educational communication, for example, in the form of basic expectations regarding the physical and cognitive maturity of its pupils (cf. Luhmann, 1990, p. 91), such expectations are now being undermined by the targeted addressing of pupils with physical, mental, intellectual, and sensory impairments. This means that educational communication, which has so far been characterized by a high degree of uncertainty about reaching psychic systems in class, is now required to meet the requirement of addressing *everyone*—regardless of the greater complexity that this entails. This also affects questions of the application of previous selection duals, such as the distribution of praise and criticism, which may no longer be adequate in an inclusive context, for example, when special features in the social–emotional development of pupils have to be taken into account.

As already shown above, the educational system occupies a special position among all functional systems, as it prepares individuals for their place in society, in particular, for social contacts primarily outside the educational system. The decree of inclusive education seems to have caused a massive irritation in that the focus is now on the realization of individual potential while at the same time achieving the greatest possible social participation, strengthening self-esteem and appreciating human diversity. Although the United Nations' *Convention on the Rights of Persons with Disabilities* also calls on other functional subsystems to develop inclusive structures (cf. United Nations, 2006), the problem is particularly challenging for the educational system in view of the overall social interdependencies of the education process (cf. Luhmann & Schorr, 1988). A central task, for example, is to consider ways of increasing the chances of placing people with disabilities in the labour market. This means that previous forms of structural coupling between the educational system and the economic system (here under the aspect of the employment system), such as certificates and diplomas (cf. Luhmann & Barrett, 2013, p. 114), need to be put to the test, as they are unlikely to meet the changed requirements anymore.

The educational intention that is constitutive for educational operations is likely to be confused in the course of implementing inclusive education, particularly with regard to its unintended effects. In order to meet the requirements of the United Nations' *Convention on the Rights of Persons with Disabilities* with regard to the joint instruction of impaired and non-impaired pupils (cf. United Nations, 2006), all pupils must be offered an individualized educational programme, with attention being given to the highest possible level of social participation. Depending on the individual case, this can lead to forms of classroom-based learning in which social participation is the main focus, but the effects of self-esteem-weakening performance comparisons among the pupils must also be taken into account. However, if the aim is to foster content independently of the rest of the class community, the teacher's intention may lead to the establishment of (temporarily) segregated learning groups and social segregation will have to be accepted in return. Whatever the teacher may decide, 'the difference that (dis)ability makes' (Naraian & Schlessinger, 2018, p. 187) could become a (new) calculation of his or her educational intention. In this context, it should be noted that, in the course of the irritability of the educational system, it cannot be ruled out that expectations of inclusive education recognized by the system as differences, for example, the right to individualized learning opportunities, are processed with structural changes like forms of grouping, tracking and selecting, which only express social differences within the system (cf. Emmerich, 2021).

With a view to expectations of inclusive education for the educational system, the aim of this chapter has been to identify aspects that address the irritability of the system against the background of its system-specific constitution. The final question now focuses on how these aspects of irritation can be translated into observations of the educational system with regard to politics.

4 | THE OBSERVATION OF DIFFERENCES BY THE EDUCATIONAL SYSTEM IN THE CONTEXT OF THE POTENTIAL FOR IRRITATION OF THE DECREE OF INCLUSIVE EDUCATION

After having pointed out at the beginning that one and the same social event can be perceived and processed differently in and by several functional systems, the article first directed the reader's attention to the decree of inclusive education as an 'environmental effect[s]' (Luhmann & Barrett, 2012, p. 679), which is thematically relevant for the functional system of education. Politics and education were viewed from an external perspective using the semantics of inclusive education and the chosen system reference was justified (Section 2). In order to clarify the extent to which the decree of inclusive education is associated with a potential for irritation for the educational system, education was analysed in structural terms and related to the expectations of inclusive education (Section 3). In the final step, it is obvious to assume that the educational system will take the irritation it has constructed internally as an opportunity to attribute it to its environment, preferably the political system, and to assign increased attention to it. Regardless of whether it will try to eliminate the source of irritation or to steer it in a certain direction in the interest of its own structures—which would require empirical analyses to clarify—it will subject its system-to-system relationship with politics to observation. But which aspects can in principle come within its observation horizon?

Every observation is based on difference-theoretical thinking, which has developed to be paradigmatic for an understanding of social processes. It quintessentially unfolds the idea that an 'inside' cannot be grasped without an 'outside'. This understanding of society manifests itself in the difference between system and environment (cf. Luhmann, 1995a, p. 176). What is constitutive for the environment is that it does not exist per se but is 'a system-relative situation' (Luhmann, 1995a, p. 181). That is, the concept of environment is only meaningful as far

as it functions as a point of reference (cf. Luhmann, 1996, p. 14). It is a prerequisite for the identity of a system. Hence, identity of a system results from the difference between system and environment (cf. Luhmann, 1995a, p. 177). This also applies to the above-mentioned context. Irritation of the educational system by the decree of inclusive education cannot be properly understood without taking into consideration that it is a construct of education itself, albeit launched by the environment of the educational system, here by politics.

The difference between the educational system and its environment is conceptualized as a form of observation and naming (cf. Luhmann, 2018a, p. 64). Social systems such as education, which are based on communication, are closed from an operational point of view, so they cannot communicate *with* their environment but can communicate *about* it within the framework of an observation (cf. Kneer & Nassehi, 2000, p. 98 f.). Just as the system/environment difference marks a form, observation by the educational system is, analytically, a two-sided form. Observation as an 'operation processed by communication systems' (Emmerich, 2021, p. 759) marks both a distinction and an indication at the same time, because nothing can be indicated without having been distinguished before, and, vice versa, a distinction only makes sense when one of the two sides (not both) is indicated (cf. Luhmann, 2018a, p. 69). So each observation is tied to a chosen distinction, without which it could not observe anything (cf. Willke, 2000, p. 158). But no observation can observe itself at the moment of observation, because in such a case the chosen distinction would have to be applied during the observation and, at the same time, differentiated from something else. The chosen distinction thus represents a so-called blind spot for the observing system; it can only be observed through a second observation (cf. Kneer & Nassehi, 2000, p. 100). Analytically, one has to distinguish a first-order observation from a second-order observation.

If, as in the present example, the irritation of the educational system about the decree of inclusive education is used as an opportunity to generate statements (by science) about a relationship between education and politics that is supported by an observation theory, there is a second-order observation. From a systems theory perspective, it is known so far that the relationship between the educational system and the political system is characterized by a paradox, which, from education's perspective, lies in the contradiction between autonomy and heteronomy. On the one hand, the educational system insists on its independence from politics, not least to underline the independence of its efforts to prepare individuals for social contacts in society, which is not the result of politics. On the other hand, it depends on political decisions, for example, regarding the provision of organization and personnel for education (cf. Luhmann, 1996, p. 28; Smyth et al., 2014, p. 433). Even when designing an administrative framework for its programmes, for example, when determining teaching subjects and an available time quota (cf. Luhmann, 2002, p. 130), the educational system is not authorized to make binding decisions. It does know that the enforcement of its autonomy becomes more difficult or less likely when it is tied to political decisions. Furthermore, it can hardly estimate the extent to which differences in political decisions affect the 'differences in educational success' (Luhmann, 2002, p. 131), which it would only like to attribute to itself as a functional subsystem.

The relationship between autonomy and heteronomy can be observed under the auspices of the decree of inclusive education along the lines of 'performance dependency and motivation' (Luhmann & Barrett, 2013, p. 97). Specifically, in the context of the decree of inclusive education, education as a functional system may, for example, observe the allocation of teachers trained in special education to mainstream schools based on the distinction 'fulfilment of the required teaching loads/non-fulfilment of the required teaching loads'.

Beyond collaborative teaching, in which the expertise of teachers from previously separate types of schools is bundled in regular school classrooms (cf. Hadfield & Ainscow, 2018; Palikara et al., 2019), inclusive education also requires the acquisition of additional staff in classroom (in Germany, e.g., called inclusion or integration assistants) who supports pupils with special needs in their everyday school life to the extent that they can actually take advantage of an inclusive educational programme, for example, by helping physically disabled pupils to go to the rest room or by providing visual aids for visually impaired pupils. This means that the educational system would have to monitor the political system with regard to the 'provision or non-provision of assistant staff'.

This also requires clarification of the respective authority to give instructions. While headmasters usually have the authority to give instructions to the teachers at the respective school, this does not automatically apply to additional assistant staff, which must be requested by the parents through a separate provider or association. If several groups of persons come together to provide an inclusive educational programme—professionally trained teachers for mainstream schools, professionally trained teachers for special schools, non-professionally trained assistant staff—not only their respective responsibilities for the teaching content but also their obligation to follow instructions in the sense of the distinction between 'being subject to instructions/not being subject

to instructions' has to be reflected. In this regard, there is a gap in school laws that needs to be filled by politics, and the question is whether politics will give schools more scope or restrict their authority to issue instructions.

Going beyond the aspect of teacher supply, the question of the binding nature of school catchment areas would also be relevant for education, in order to be able to manage parents' wishes for inclusive education for their children in a capacity-oriented manner. If parents have a legally binding right to inclusive education for their child in the school district where they live or if the educational system has to implement such a right, it will certainly push for the necessary resources to be provided. It is then guided by the distinction between 'maintaining school catchment areas' and 'not maintaining school catchment areas'.

Regardless of this, beyond the above-mentioned and other possible manifestations of recognizing differences that the educational system considers relevant enough to observe in the course of its orientation towards its functional primacy, it should not be forgotten that the decree of inclusive education is itself embedded in contexts of education policy that aim to address 'the challenge of improving outcomes for disadvantaged learners' (Hadfield & Ainscow, 2018, p. 441). One possible way to do this could be to develop locally and regionally generated solutions to systemic issues 'such as student underachievement' (Hadfield & Ainscow, 2018, p. 442) by strengthening the autonomy of schools, which the educational system must first turn productively for itself, and ultimately through more competition and collaboration.

5 | CONCLUDING REMARKS

The aim of the article was to conceptualize the relationship between education and politics in terms of systems theory against the background of the decree of inclusive education, which is understood as a potential source of irritation for the educational system. It was emphasized that inclusive education as a semantic context can fundamentally be viewed from the perspective of different functional systems and that a justification for the chosen system reference is therefore required.

It was shown that the decree of inclusive education is highly thematically relevant for the educational system because it sets out requirements for the pupils to be educated, the objectives of the programme geared towards inclusion and the possibilities for implementation in schools and teaching. These requirements affect the work and function of the educational system at its core.

Particularly with regard to the educational system, the function of which is located in its environment—the personalization of individuals—which subjects educational communication to considerable uncertainty, it is assumed that the decree of inclusive education challenges the irritability of the system. If one conceptualizes irritation as a comparison between the system's own expectations and those of the environment, it becomes apparent, among other things, that the differentiation of the educational system by the binary code 'conveyable/non-conveyable' as the basis for the system-specific assessment of connectivity neglects the dimensions of social participation, social justice and well-being, just to name the most prominent ones of inclusive education. It has to be supplemented by, for example, support programmes such as lessons with differentiated learning objectives. Furthermore, it was explained that the environmental expectation of offering all pupils an individualized educational programme that is tailored to their needs and learning requirements can lead to unintended effects such as temporary segregation.

Based on these considerations, a number of aspects were finally worked out that play a role in observations of the educational system, based on the important distinction from the perspective of the educational system between dependence on the performance of other systems, in this case the political system, and the provision of services. In this context, the educational system's orientation towards the allocation or non-allocation of teachers trained in special education to mainstream schools is primarily to be mentioned. However, since an expanded target group of educational communication also requires support services to enable participation in lessons in the first place, the distinction between the provision and non-provision of assistant staff comes into focus. In the course of communication of the staff involved in inclusive education, their location in school organization and school law will also have to be reflected on the basis of the distinction between subordination and non-subordination. Another distinction that guides observation is related to the question of the organization of school catchment areas in the provision of inclusive education, where the educational system hopes for regulations that it can handle as autonomously as possible in terms of capacity.

The suggestions outlined in this article are not exhaustive in terms of content. Rather, they are intended to show, using the example of the semantic context chosen, what is within the observation horizon of the educational system. For pragmatic research reasons, it had to be disregarded that both the political system and the educational system are simultaneously exposed to countless irritations from other systems in their respective environments, which may also be relevant to the perception of

irritation on the part of the educational system (and also on the part of the political system, which was ignored in this article), for example, the question of the presence of inclusive education in the mass media.

This article is intended as theoretical and conceptual groundwork for a subsequent empirically oriented research programme that, for example, addresses the question of how the educational system deals with its relationship between performance dependence on politics and willingness to perform in the context of inclusive education under the auspices of an operationally independent school while being accountable to politics and society. In order to implement this empirical programme, methodological decisions would have to be made, among other things, about how educational communication can be operationalized and how any connectivity of communication can be recognized. The previous statements should sensitize the reader to the fact that decisions in this regard are always tied to an observer's point of view, that system references are contingent and that it is necessary to clarify 'what position an observer must take in order to see what is described' (Luhmann, 1995a, p. 465).

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RESEARCH ARTICLE

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Unilateral consensus: Legitimation as a societal phenomenon in Luhmannian systems theory

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Abstract

For Niklas Luhmann, the political system's primary function is the establishment of decision premises for future decisions, with these decisions being applied across different societal subsystems. However, Luhmann recognized that this resulted in the political system running the risk of de-differentiating itself when producing collectively binding decisions. Luhmann solved this problem by restricting the political system's role, relegating it to society's sidelines. But there are many examples of where we would want the benefits of collectively binding decisions in society, such as planning systems. This raises the question *how can we have decisions that serve as premises for future decisions across societal subsystems while maintaining each system's differentiation and legitimacy?* To answer this question, we will redouble our focus on meaning in considering each system's legitimation process. Through the lens of meaning, we will show how legitimation can bring independent systems to make shared decisions, thus producing unilateral consensus.

KEYWORDS

coordination, differentiation, legitimation, meaning, Niklas Luhmann, political system, systems theory

1 | INTRODUCTION

Niklas Luhmann's systems theory begins with systems differentiating themselves from their environment by making reference to themselves (Luhmann, 1995, p. 13). Social systems then establish their identity through their meaning, so that each societal subsystem is oriented around the formulation of a problem and provides functional value to society (Luhmann, 1995, p. 15). These subsystems exist independently and formulate themselves through their internally located processes (Luhmann, 1995, p. 34). Using these processes, systems legitimate themselves through consistently and recursively maintaining the boundary between themselves and their environments via their autopoietic process (Luhmann, 1995, p. 347). These internally located processes in subsystems are also what provide these subsystems with their autonomy, rationality and, as a result, legitimacy as functionally differentiated systems (Luhmann, 1983, 1995). Luhmann says that many different societal subsystems exist, like the economic system (Luhmann, 1998), the scientific system (Luhmann, 1992b), and the education system (Luhmann, 1987).

One of these subsystems is the political system (Luhmann, 2000). The primary function of the political system is the "establishment of decision premises for

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future decisions" (Luhmann, 1966, p. 272) with these decisions being "applied across different systems of society" (Thornhill, 2006, p. 45) so that they become "collectively binding decision premises" (Luhmann, 1981, p. 48). Collectively binding decisions are valuable to society in that they reduce the risk of societal instability (Luhmann, 1981), resolve conflict between subsystems (Luhmann, 1995, pp. 393–394), and coordinate activity among independent societal subsystems to facilitate collaboration and cooperation (Luhmann, 1995, p. 383).

But there is a fly in the ointment: for the political system to produce a collectively binding decision, it must produce a decision that is applicable to another system, and to do this, it must draw on the processes located in other societal subsystems rather than itself (Thornhill, 2006). Thus, the political system runs the risk of de-differentiating itself while also undermining its legitimacy (Luhmann, 2000).

This problem is not new (King & Thornhill, 2003; Luhmann, 1981, 1997; Thornhill, 2006), and Luhmann's solution to the problem was to restrict the role of the political system in society (Luhmann, 1981, p. 48). But there are many examples of where we would want the benefits of collectively binding decisions in society, such as in planning systems (Van Assche, 2007; Van Assche et al., 2014). Planning systems engage with multiple societal subsystems at a time (Van Assche, 2007, p. 112), functioning by coordinating them so that their success "hinges on the dissemination of its articulations in society: that is, the distribution and acceptance of concepts, strategies, forms, and materialities" (Van Assche et al., 2014, p. 2393). This raises the question; how can we have decisions that serve as premises for future decisions across subsystems while maintaining each system's differentiation and legitimacy?

This paper is about meaning and legitimacy in Luhmannian societal subsystems. As a result, we will answer this question by redoubling our focus on meaning. We will explore how a system's meaning produces structure, and how the combination of meaning and structure produces a system's legitimacy. We will also consider how systems engage with one another through their structure and meaning in seeking solutions to problems so that systems can cooperate with one another via structural coupling. We will consider how each system's meaning and structure produce the system's legitimacy, and how the legitimation process creates expectations both within and across systems, which in turn impels decisions within systems. Finally, we will consider how it is possible for each solution-seeking subsystem's independent legitimation process to drive decision making that can converge on a single selection that is subsequently built on.

By applying the lens of meaning, we will see that the legitimation process within each societal subsystem can bring each independent system to make a single unilateral decision, thus producing unilateral consensus.

2 | SELF-REFERENCE, SOCIETY, AND THE POLITICAL SYSTEM

2.1 | Luhmann's theory of self-referential social systems

In his seminal work, *Social Systems* (1995), Niklas Luhmann begins by asserting that "there are systems" (Luhmann, 1995, p. 13) that exist in the real world and that a theory of systems must take its form as an epistemic endeavour that analyses real systems in the real world (Kaczmarczyk, 2024). Additionally, because the starting point is that there are systems that exist in the real world, Luhmann says that a theory of systems must make reference to systems in the real world so as to be able to be tested for validity (Luhmann, 1995, pp. 12–13). If a theory of systems is to be valid for *all* systems, it must also be applicable to systems of analytic and epistemic behaviour. As a result, as an epistemic endeavour analysing real-world systems, systems theory must count itself among the systems to be analyzed and referred to as existing in the real world. Thus, a theory of systems must be a theory that refers to itself — it must be a theory of self-referential systems.

Luhmann contends that for systems to be self-referential is for them to be able "to establish relations with themselves and to differentiate these relations from relations with their environment" (Luhmann, 1995, p. 13), and it is here that we find the beginning of systems theory — as the differentiation of a system from its environment through self-reference. Systems "constitute and maintain themselves by creating and maintaining a difference from their environment" (Luhmann, 1995, p. 17), and they do this through the ongoing process of autopoiesis that is found within the system itself (Luhmann, 1995, p. 20). This claim is at the core of Luhmann's theory of systems.

Luhmann said that the objects, or elements, that a system selects as being part of itself need to be sufficiently similar, so that the elements found in a system and its environment are the same type of thing (Luhmann, 1995, p. 39). Luhmann saw the elements that make up society as being communication events — existing at a point fixed in time (Luhmann, 1995, p. 67) — and it is from these communication events that a societal system autopoietically selects while forming itself (Luhmann, 1995, p. 137). Naturally, as these events are

fixed at a point in time, they come and go, resulting in the necessity for systems to continually form themselves via their internally located process of self-reference (Luhmann, 1995, p. 42).

All this led Luhmann to see the central form of relationship in the social world not as being between individuals and society, but rather as being between a social system and its environment. From this perspective, a system is everything its environment is not, and so cannot itself be a self-referential system (Luhmann, 1995, p. 17). But the environment can be everything a system as self-referential is not. In the case of society, this takes the form of other self-referential systems and their respective environments (Luhmann, 1995, p. 18). To illustrate this, Luhmann breaks modern society into an array of self-referential subsystems and their environment, such as.

> "... the political subsystem and its environment, the economic subsystem and its environment, the scientific system and its environment, the education system and its environment and so on" (Luhmann, 1982, p. 132).

Each of these subsystems finds its identity in the unity of its self-recognition and its environment, providing the system with its identity both as a "difference from something else" and as a "difference from itself" (Luhmann, 1995, p. 18). As a result, each subsystem is unique, differentiating itself from its environment and the other systems within its environment, and understanding itself as the unity of difference between itself and its environment.

Furthermore, Luhmann views each of society's subsystems as functional, orienting themselves around the formulation of a problem that they try to provide solutions to (Luhmann, 1995, p. 15). For a system to be functional means that through their ongoing internal process of self-identification, they create meaning by selecting and relating communication events, juxtaposing the selected events against unselected ones in their environment (Luhmann, 1995, pp. 60–61). Meaning establishes the border between a system and its environment by uniting the two and providing the system with its identity as a functional, self-referential system. Each differentiated subsystem functions to

> "... organize communications and disseminate them in ways that they and other communicative systems may make use of them... they give meaning to events which otherwise would be meaningless for society" (King & Thornhill, 2003, p. 9).

On this view, self-referential systems in society are uniquely functional, organizing communication through their own process of self-identification and establishing meaning that differentiates them from their environment and the other systems within their environment (Luhmann, 1995, pp. 61–62). The system's ordering of communication events happens in accordance with the system's meaning attribution process (Luhmann, 1995, pp. 37–38), and is determined contingently rather than necessarily (Luhmann, 1995, pp. 44–45). That is to say, systems order communication based on an internal logic, and whatever is selected and related by a system could have remained unselected or related differently.

This turns out to be very important. Because a system's meaning bridges the gap between what was selected and what remains unselected in its environment, each subsystem engages with other subsystems in its environment through its meaning. The environment around each system changes, not least because subsystems form themselves and react to one another in each other's environments. And so, system boundaries cannot be static – they must change to maintain the difference between themselves and their environments as their environment changes (Luhmann, 1995, p. 18). Thus, a system's meaning must be continually employed in re-establishing the system's self-reference through the difference between what it is and what it could have been, so that "meaning is the continual actualization of potentialities" (Luhmann, 1995, p. 65).

To illustrate what a functionally differentiated society looks like, Luhmann provides examples of systems and their function in action: the economic system responds to and regulates scarcity of resources (Luhmann, 1998); the scientific system distinguishes between what is true or false (Luhmann, 1992b); the education system is concerned with the intentional transformation of humans into persons that can participate in communication (Luhmann, 1970, 1987); and so on. Each of these systems possess their own meaning, and relate to one another through their meaning. They interact with one another, react to one another, and fulfil their respective functions in society through their meaning as contingent, self-referential systems.

2.2 | Society and politics

The political system's primary function is "the production of binding decisions" (Luhmann, 1966, p. 271). This means that the political system establishes "decision premises for future decisions" (Luhmann, 1966, p. 272), with these decisions being "applied across different systems of

society" (Thornhill, 2006, p. 45) so that they are "collectively binding decisions" (Luhmann, 1981, p. 48). By producing collectively binding decisions across different subsystems of society, the political system fulfils its role of seeking to reduce the risk of societal instability (Luhmann, 1981). We can imagine an example of this as when a collectively binding decision is established by the political system to resolve a conflict between two subsystems that perceive an issue in opposing ways (King & Thornhill, 2003, p. 71). Collectively binding decisions also serve to coordinate actions among independent societal subsystems (Luhmann, 1995, p. 383), facilitating collaboration and cooperation that in turn allows these systems to fulfil their function in society (King & Thornhill, 2003, p. 9).

In making collectively binding decisions that form the foundation for future selection within other societal subsystems, the political system's autopoietic process intends to produce an output with implications that "extend beyond the boundaries of one or another system" (King & Thornhill, 2003, p. 70). For this to occur, though, a decision made by the political system must be accepted by the subsystems in its environment — and this is not a foregone conclusion in a functionally differentiated society. In Luhmann's theory of social systems, subsystems are operationally closed and function independently of one another, meaning that the political system cannot determine what is or is not accepted by other subsystems in society (Luhmann, 1997, p. 119). As Luhmann says, "[a]greement can be given, but it can also be denied" (Luhmann, 1995, p. 200). Thus, to achieve acceptance of a collectively binding decision, the political system must seek to provide justification for its decision (Thornhill, 2016, p. 4), something that can be achieved through establishing its legitimacy (Luhmann, 1992a, p. 11).

2.3 | Visiting legitimacy

For Luhmann, all systems possess legitimacy (Luhmann, 1983). This does not mean that a system "conforms to standards or categorical definitions of what legitimacy might be; it merely means that the system proposes itself in its contingency as a meaningful reality" (King & Thornhill, 2003, p. 74). That is to say, a system produces its legitimacy internally by consistently establishing itself through its autopoietic process (Luhmann, 1983, p. 167). To do this, a system must continuously employ its meaning to maintain the boundary between itself and its environment, differentiating itself from its environment and the other systems within its environment in a manner that is internally consistent and coheres with its past and future meaning (Luhmann, 1995, p. 347).

2.4 | Legitimacy and the political system

Speaking specifically of the political system, Luhmann says that it can only understand its communications "under the condition of legitimacy" (Luhmann, 2000, p. 126). This means that the political system must employ its meaning to "generate within itself justifications for its collectively binding decisions, and explain its operations in forms which are likely to be accepted [by other societal subsystems]" (King & Thornhill, 2003, pp. 72–73). In this way, the political system's legitimacy comes from the enactment of its own autopoietic process of self-reference, through which its contingent operations create a coherent and consistent pattern of selections based on its meaning. By generating internal justification for its own operations through its meaning, the political system develops an expectation of its activity as "furthering the public interests" (Luhmann, 2000, p. 125), and presents this perspective of itself to the subsystems within its environment.

This is imperative, as the political system must produce decisions that are likely to be accepted by independent subsystems in its environment to fulfil its role in society. According to Luhmann, this can be achieved by the political system coordinating its autopoietic process with those of the subsystems it is seeking to influence (Luhmann, 1995, pp. 200–201), allowing for a tight correlation between each so that the political system can produce a decision that is more likely to be accepted by its coordinating subsystem (Luhmann, 1981).

We can think about it this way: for it to be accepted by another subsystem, the political system must generate a decision that corresponds with what *could* have been selected by that subsystem. Each system's internal autopoietic process establishes that which is selected and that which remains unselected in the system's environment through its meaning. It is the ongoing autopoietic process within a system that provides the system with its meaning as the means to relate that which is selected and that which remains unselected. But this happens contingently, so that each selection a system makes could have been different in so far as it corresponds with that system's meaning, thereby preserving its legitimacy. The political system can understand its own selections through its meaning, but to understand what would or would not be accepted in another system, the political system must access that system's meaning — something Luhmann says is achieved through coordination of its autopoietic process (Luhmann, 1981, p. 23). In doing so,

the political system uses its autopoietic process to function similarly to the system it is coordinating with, and generate a selection as a decision that aligns with the coordinating subsystem's meaning, making that decision more likely to be accepted as collectively binding.

2.5 | A political problem

It is at this point that we may begin to see a fatal flaw in the way the political system operates. For the political system to make a decision that is likely to be accepted, it must base that decision on another system's autopoietic process and meaning. If the political system produces a decision based on the meaning of another system, it will lose the capacity to generate justification for its collectively binding decisions based on its own meaning, thereby undermining its legitimacy (Luhmann, 2000). This is because it will be producing a decision as a selection that corresponds with another system's meaning instead of its own, and it will not be able to repeat this selection as a decision in the future — it will jar with the rest of its past and future meaning.

Furthermore, if the political system coordinates its own autopoietic process with another system's to achieve a collectively binding decision, it will lose the thing that differentiates it from its environment, and other systems in its environment — it will de-differentiate itself (Luhmann, 1981, p. 23). This is because the political system's autopoietic process would be mimicking the function of another societal subsystem in its environment, and so the two would lack differentiation from one another. And because systems theory begins with differentiation, de-differentiation represents a death knell for autopoietic subsystems, resulting in "the dissolving of subsystem identity and the disappearance of the borders between system and environment" (King & Thornhill, 2003, pp. 84–85).

All this puts the political system in a difficult position. When it seeks to generate a decision that will be accepted and serve as a binding decision, it runs the risk of de-differentiating itself in relation to other systems (Skoblik, 2024), undermining its autonomy and its legitimacy as a self-referencing system (King & Thornhill, 2003, p. 107). The political system

"... must therefore walk a fine line between an admission of its contingency (through which it would abandon its legitimacy) and the tendency to make its legitimacy reliant upon obligations which it cannot carry out, or principles of validity which distort its functions" (King & Thornhill, 2003, p. 94).

Luhmann recognized these shortcomings (Luhmann, 1981, 1997) and thought the solution was to say that the political system's influence was quite limited. He argued that its operations should be reduced "to its exact function – the satisfaction of the need for collectively binding decisions" (Luhmann, 1981, p. 48). He also said that the political system could not "set itself up as the universal medium of dominating society" (Luhmann, 1997, p. 358), and relegated its operations to the fringes of society, thereby disagreeing with earlier German scholars like Max Weber (1978, 1992) who had seen politics as a dominant component of society that shapes human life.

Thornhill (King & Thornhill, 2003; Thornhill, 2006, 2016) also highlighted these characteristics of the political system but presents a solution that trends in the opposite direction, towards that of Weber's. Rather than reducing the importance of the political system, Thornhill suggests positioning the political system more prominently in society, recasting it so that it operates as "a repository for a generalized social rationality, that it applies this rationality for the benefit of all society, and that it must lastly describe and legitimize itself in accordance with this rationality" (Thornhill, 2006, p. 48). Thornhill suggests that it is necessary for the political system to operate in this way for it to be able to resolve conflicts between systems, thereby providing all of society's subsystems with a generalized precondition of legitimacy. In doing so, Thornhill argues that all societal subsystems draw on the political system's legitimacy and that it is "indirectly invoked in the many local communications and conflicts" (Thornhill, 2006, p. 47) that arise between subsystems. And by presenting "a selective preference for a distinct model of legitimacy" (Thornhill, 2006, p. 48) that subsystems are subservient to, Thornhill ultimately argues that the political system operates in a normative rather than a descriptive manner (Thornhill, 2016, pp. 7–8).

But suppose we wanted to stay true to Luhmann's theory as far as possible, seeing the political system's influence in modern society as limited. Could we still have decisions that serve as premises for future decisions shared across subsystems without those systems de-differentiating and de-legitimating themselves? Could we still have decision premises shared across subsystems? And if so, how?

Motivation for answering this question might be found in the work of Van Assche (2007; Van Assche et al., 2014), who argues for seeing planning systems as interactive societal subsystems that simultaneously communicate with a multitude of other societal subsystems in their environment while attempting to affect an outcome. Van Assche describes planning systems, saying that.

> "... the overt function of planning is coordination, the success of planning hinges on the dissemination of its articulations in society: that is, the distribution and acceptance of concepts, strategies, forms, and materialities" (Van Assche et al., 2014, p. 2393).

Van Assche highlights that a planning system "can deal with economic, legal and esthetic issues, therefore participates in the reproduction of the economic, legal and artistic function systems" (Van Assche, 2007, p. 112). He goes on to highlight that these subsystems are all operationally closed, and as a result, they operate independently from one another. Nevertheless, the planning system is seeking to affect an outcome, and this cannot be achieved without these systems being coordinated.

Thus, Van Assche argues that the planning process must be democratic and involve input from all of the subsystems the planning system is engaged with, rather than simply issuing a decree that will likely be assessed and rejected by some stakeholders as it is considered unfair (Van Assche, 2007, p. 114). We can see how coordination among these independent subsystems might be necessary for the planning system to achieve its aim. We may wish to know, then, how planning systems might achieve coordination by having decision premises shared across subsystems without any of the systems de-differentiating or de-legitimating themselves.

To answer our question, we need to delve deeper into how systems form themselves and relate to one another through their meaning. In doing so, we will be able to understand how through each system's individual process of legitimation, structurally coupled subsystems can come to establish a shared decision premise, thereby achieving unilateral consensus.

3 | THE PAST THROUGH A FUNCTIONAL LENS

3.1 | Selection, meaning, and structure

Social systems form themselves through self-reference, selecting communication events from their environment and relating them to one another. It is through this internal, ongoing process that a system (re)produces itself and its meaning (Luhmann, 1995, p. 60). At the same time, meaning is the means by which system elements are selected and related to one another. As Luhmann says,

> "meaning reformulates the compulsion to select implied in all complexity, and every specific meaning qualifies itself by suggesting specific possibilities of connection and making others improbable, difficult, remote or (temporarily) excluded" (Luhmann, 1995, p. 61).

As noted previously, communication events are temporally located. A system's autopoietic process, however, is ongoing. Guided by meaning, the autopoietic process generates a system's structure by selecting and relating elements to one another, existing in time by defining "more precisely how elements relate across temporal distances" (Luhmann, 1995, p. 282). Thus, a system's structure provides a snapshot of how a system relates selected system elements to one another, thereby expressing the system's meaning (Luhmann, 1995, p. 286). At the same time, the system's structure reflects the recursive nature of the system's autopoetic operations, so that selections and relations are consistently reflected in the system's structure. As Luhmann says,

> "Structures would then be the general representation of the continuous activation of recursive orientations in a system. That is to say, structures themselves would be something that is fluid from moment to moment and which serves merely to furnish the continuation, processing, and continued operation of the system with information and directions" (Luhmann, 2002, p. 244).

But there is more; a system's meaning bridges the gap between that which is selected and unselected. For a system's structure to contribute to its meaning, it must also contribute to the system's contingency, including relational information between both elements selected by the system, as well as how elements could be related. To reflect this, Luhmann says "structure, whatever else it may be, consists in how permissible relations are constrained within the system" (Luhmann, 1995, p. 283).

As a result of this, system's structure and its process of selection are tightly intertwined — they "presuppose each other, because under increasingly demanding conditions, structuring is a process, and processes have structure. They differ through their relation to time" (Luhmann, 1995, p. 44). The process of selection is ongoing and cannot be undone. The structure this process builds, however, exists as a snapshot of a system that can be amended (Luhmann, 1995, p. 293). Luhmann elucidates this by saying that.

> "[s]tructures capture the reversibility of time because they hold open a limited repertoire of possibilities for choice. One can negate

> structures, or change them, or with their aid gain security for change in other respects. Process, by contrast, marks the irreversibility of time" (Luhmann, 1995, p. 44).

This is instructively perceived through the lens of contingency: where selection collapses possibility to actuality in expressing a system's identity, a system's structure manifests past selection but holds the door open to other ways a system could have been by reflecting unselected — and unrelated — options. Both selection and structure form and are formed by the system's meaning, with the selection process immutably manifesting the system's meaning, and meaning moulding the system's structure to refine its identity through selection (Luhmann, 2020). On this view, system structures represent selections that have been made, and the process of selection and relation is the means by which the system differentiates itself in society while forming itself. System structures, however, can change based on the system's autopoietic process that enacts its meaning in an ongoing manner. This results in a system's structure being changed across time based on the system's meaning reacting to its environment or adding new selections to its structure.

3.2 | Recursive selection, expectation, and legitimacy

With selection and structure feeding into one another, the system's future selections are informed and restricted by the system's structure while still allowing that structure to change — but only as far as it remains coherent with the system's meaning (Luhmann, 1995, p. 291, 2020). Actualized selections are temporally located and build on one another — they, too, can be connected. Structures, on the other hand, present the system with both past selections and possible selections, thereby directing the system's future selection by limiting what the system can do next (Luhmann, 1995, pp. 283–284). The system can change its structure, but these selections and relations must still be guided by its meaning — something already reflected in the contingency of its structure (Luhmann, 1995, p. 348). To this end, Luhmann describes structures as "the representation of the recursive interconnectedness of operations that is used in the system" (Luhmann, 2002, p. 244). But as Luhmann goes on to point out, meaning, selection and structure all flow both ways (Luhmann, 2002, pp. 244–245). That is to say, a system can presently change its structure via its meaning and selection process so that it produces a new past (Luhmann, 1995, p. 41). But, its past also flows forwards into the future by influencing future selection through interdependencies and expectations.

A system's structure connects actualized selections that are built on one another and thus represent interdependence between selections. These interdependencies "serve as perspectives for and constraints on the structural selections that connect onto them" (Luhmann, 1995, p. 284) so that past selections can constrain future selections. When one selection builds from a previous selection, a relation is established between these selections that must recursively persist into the future. These interdependencies represent constraints on system selection and produce recursive selections where a system is required to consistently establish relations between selected elements that come as part of the system's meaning as manifested in its structure.

In addition, as its structure constrains a system's range of possibilities going forward, expectations are established — thereby becoming constraints for future selection in and of themselves (Luhmann, 2002, p. 246; Spencer Brown, 1969, p. 5). Luhmann stipulates this in his theory of societal subsystems, saying that "social structures are expectational structures" (Luhmann, 1995, p. 292). On this view, expectations affect contingency within systems and so exist as a form of meaning, guiding a system's process of selection and subsequent formation of structure by compelling the system to make selections in the future based on the possibilities for selection and relation presented in the system's structure (Kjaer, 2017).

Thus, through interdependencies and expectation of how the system will behave in the future, recursive selection is established within the system. The system then continually produces a structure that selects and relates the same elements, consolidating its structure and further cementing the way in which it will select and relate going forwards (Luhmann, 1995, p. 284). Luhmann describes this when he says.

> "Viewed from the perspective of autopoietic reproduction and processed with the help of autopoietic difference, the problem of structural change possesses its own conditions of possibility and its own degrees of freedom relatively independent of the structure that has been problematized (but naturally not independent of all structures that enable the discovery and appointment of connective actions)" (Luhmann, 1995, p. 348).

All of this is governed by the system's meaning so that a system forms itself by differentiating itself from its environment, and in doing so it produces its structure. The system's meaning bridges the gap between the elements

it has left unselected, and those elements selected and related. These selections exist at a moment in time as the system's structure. However, both the system's environment and structure can change. As the system's environment changes, it needs to reestablish itself through differentiation, and this can result in the system needing to change its structure by changing the way it relates elements it has already selected — as well adding new selections to its structure. This, of course, must be done via its meaning, so that the system's structure changes across time in as far as that change corresponds with its meaning.

3.3 | Decisions, decisions …

From the establishment of expectation, we move to the obligation of decision. Luhmann says "one can speak of a decision: if and insofar as the slant of meaning an action has is in reaction to an expectation directed to that action" (Luhmann, 1995, p. 294). That is to say, expectation impels a selection event where either the selection conforms with expectation, or it deviates from expectation — and the system must decide. This decision takes its form as the manifestation meaning, as all selection does. In doing so, the decision represents "a structure of meaning" (Luhmann, 1995, p. 296) so that it becomes incorporated into a system's structure to be referred to in future as a decision from which further expectation can follow (Grothe-Hammer, 2020; Kjaer, 2017).

Therefore, we can see that the internal processes within a subsystem can create the conditions that produce expectations and ultimately create decision events for systems while the system establishes its legitimacy. A system's decision can go on to serve as a decision premise, informing future selections by creating new expectations that constrain and compel the system to decide anew. Thus, we take it to be the case that decision premises can be formed within societal subsystems without the intervention of the political system, and that this becomes more likely as a system engages in legitimation. But what about decisions being shared by systems? To consider this, we must consider how systems interact with one another.

3.4 | Legitimacy revisited

All of this plays into a system's legitimacy. A societal system's legitimacy is established when the system acts in compliance with its own meaning as a mechanism for making sense of communication (Luhmann, 1983, p. 167). This takes its form in consistently and coherently selecting and relating elements to create a structure that reflects the system's operations (King & Thornhill, 2003, p. 142). Structure then establishes interdependencies and expectations that in turn restricts and guides future selection for a system. All of this is the instantiation of a system's meaning - ordering selection and relation of a system's elements so that its function in society is fulfilled. Thus, as a system differentiates itself in society through its meaning, it establishes a structure that in turn informs future structuring of the system through selection. This repetition of selection, at the behest of the system's structure creating expectation and interdependency, consolidates the system's structure and legitimates the system as a self-referential, functionally differentiated societal subsystem.

A system's legitimation process, then, consolidates the system's structure, thereby producing more expectations and as a result increases the likelihood that a system will need to make a decision that can then become a decision premise. This process is important to the question of establishing shared decision premises across systems as it allows us to see this as something an independent system can do within itself without intervention from other systems. With this in mind, we can see how systems producing their own legitimacy can independently produce decision premises for themselves without invoking the political system. But what about decision premises in other systems?

4 | INTERSYSTEM INTERACTION

4.1 | Structural coupling, irritation, and external expectation

The central form of relationship in society is between a subsystem and its environment, with a system's environment made up of other subsystems and their environments. Naturally, systems relate to their environments through their meaning. But each system's environment is made up of other subsystems and their environment as established through their meaning. As a result, in relating to their environments, systems relate to other systems via those system's meaning. Thus, a system relates through its meaning to the meaning of other subsystems in its environment (Baecker, 1996; Palmieri, 2024).

Luhmann points out that "a system exists through its elements, thus via events" (Luhmann, 1995, p. 48), and it is through selection and relation of elements that a system's meaning is manifested as structure. A system's structure contains the elements selected by the system, as well as the relations between those elements and

elements unselected in the system's environment, thereby representing contingency and the system's meaning.

A system's structure exists between itself and its environments — with their environments made up of other systems as their structures. Systems engage with their environment through their meaning, and so for a system to engage with another system's structure in its environment is for that system to make use of its meaning in relating to another system's meaning via its structure. A system's meaning is also the means by which a system differentiates itself from its environment, contingently shifting its differentiation as its environment changes. This means that as the environment around a system changes, change is caused in the system's structure so as to maintain the system's differentiation via its self-reference.

Systems engage with their environments, and their environments can cause the system to change when the environment changes, resulting in the system adjusting its structure to maintain its differentiation. But systems can also engage other systems. Systems are not forced to engage with one another. But when they choose to, we say that they are structurally coupled (Luhmann, 2002, pp. 84–85). In this way, a change in a focal system's environment, or in a structurally coupled system within that system's environment, causes a change in the focal system. This led Luhmann to point out that "[t]he causalities that occur between system and environment are located exclusively in the domain of structural coupling" (Luhmann, 2002, p. 85).

Functionally differentiated systems are independent, though. And so, a causal relationship between structurally coupled subsystems does not mean one system is able to change something in another system at will. Rather, the causal relationship means that these systems have the capacity to irritate one another. As Luhmann says, "[s]tructural couplings do not determine the state of the system. One might say that they only supply irritations for the system" (Luhmann, 2002, p. 88).

We can think of irritation in this way: systems have structures that provide those systems with a range of possibilities for how they could manifest themselves. This is further restricted by their own autopoietic process of meaning through which a system interprets its environment and structure to actualize itself in an ongoing manner. Luhmann describes this when he says that a system has.

> "... certain structures and thus also a certain range of possibilities for its own operations. This range is very limited, since the definition of what qualifies as poiesis at all is severely restricted. In addition, this range is limited by the constraints concerning what can be processed within a pre-existing structural pattern and thus without any far-reaching and incalculable structural changes. In this way of thinking, disturbances are always measured against the structures, or in the domain of meaningful occurrences against possible operations, or also expectations that have proven their worth in the system and thus provide information from that angle" (Luhmann, 2002, p. 89).

When structurally coupled subsystems make selections, their partner subsystems that they causally interact with are presented with "a relevant choice from a range of possibilities" (Luhmann, 2002, p. 89). The subsystems in question must now select a response from their options as constricted by their structures and meaning.

Structurally coupled systems engage with each other's meaning through each other's structures. Because these structures include contingent relations and provide options for how the system might relate selections in future, these systems can hold expectations of one another, just as they develop expectations of themselves from within their own operations (Luhmann, 2002, pp. 90–91). Luhmann links contingency and expectation when he says "[t]he system must be capable of creating expectations in order to see possibilities" (Luhmann, 2002, p. 91). Thus, we can say that systems that are structurally coupled can hold expectations of both themselves and one another (Bakker et al., 2010; Spencer Brown, 1969).

In conjunction with expectations of coupled subsystems, a social system making a selection presents their structurally coupled subsystems with an irritation that comes with an expectation (Luhmann, 1995, p. 293) — and it is up to the other subsystem to comply or deviate from that expectation through selection as decision. As a result, we can expect that systems that are structurally coupled and hold expectations of one another can present the systems in their environment with irritations that impel a decision.

In response, this selection as decision now becomes a part of the irritated system's structure and can itself generate interdependencies and expectation within that system, thereby potentially going on to become a decision premise. The decision by the irritated system then prompts a reaction from the initial system that might also come with an expectation, and so the communication cycle continues between structurally coupled subsystems.

4.2 | Legitimacy revisited, again

Even if the decision does not become a decision premise immediately, as a selection it will become a part of the system's process of legitimacy so that the system is compelled to make future decisions that cohere with the decision in question. We can expect that this legitimacy process will require the system to be prepared to repeat the selection based on its structure, thereby consolidating the system's structure, and increasing the likelihood of the decision becoming a decision premise as selection is repeated.

Thus, we can see how decision premises are established within systems through internal expectation, and through external expectation between structurally coupled subsystems we can see how decision premises are established within system, too. The legitimation process of each system only serves to further consolidate each system's structure, and in turn, the expectation that each system has of one another, thereby increasing the likelihood of decisions becoming decision premises within each individual system.

What we need, then, for a decision premise to be akin to what the political system generates is for each individual system to make use of the same decision as a decision premise. We could imagine that this might happen if two structurally coupled subsystems irritate one another regarding a decision and ultimately come to decide on the same thing, independently – that is, decide based on their own autopoietic processes. Over time, these structurally coupled subsystems could then legitimate themselves and recursively reinforce this decision through their structure, potentially going on to make future decisions based off a decision that they share consensus on. We can see that this could happen, but how?

5 | SOCIETAL SUBSYSTEMS, LEGITIMACY, AND UNILATERAL CONSENSUS

5.1 | The problem of other systems

Societal subsystems form themselves through self-reference, thereby differentiating themselves from their environment. In doing so they establish their meaning as the means by which they order and disseminate communication, thereby enacting a functional role in society. In this role, systems engage with problems that are pertinent to their operations and view those problems through their meaning (Luhmann, 1995, p. 15).

Luhmann describes problems as being "problems only if they cannot be isolated, worked on and solved one piece at a time," and links problems to solutions through "a connecting thread to questions about other possibilities" (Luhmann, 1995, p. 53). Thus, problems relate to contingency — and therefore meaning, selection and structure — with systems attempting to engage with them via their functional differentiation.

Solutions to problems, however, vary based on perspective. With multiple systems viewing the same problem, we can imagine that "there can be different, functionally equivalent solutions for specific problems" (Luhmann, 1995, p. 15). To address these problems, then, they must be considered from a multiplicity of perspectives so that the best solution to a problem can be found (Luhmann, 1995, pp. 55–57). This provides us with a way to think of structural coupling — namely, as subsystems within society providing different possible solutions to the same problem as they enact their own unique functional differentiation. Luhmann describes this when he says.

> "This never means, however, a detachment or separation from the original complex, but merely the establishment of functionally specific differences within the system, to whose problems the functional mechanisms relate. The differentiation of functional subsystems means, for example, the establishment of new system/environment differences within the original system. The functional orientation thereby retains the 'holistic' aspect of older systems theories but combines it with the capacity to specify problems more precisely" (Luhmann, 1995, p. 53).

Subsystems are formulating problems pertinent to their operations, and in doing so they engage with other subsystems in their environment that are formulating related problems. As such, even if we would not expect subsystems to be able to fully integrate their communication with one another, we can expect them to be able to engage with one another surrounding the formulation of problems that pertain to their operations. These systems engage with one another via their meaning, and through structurally coupling they produce expectations and irritations, impelling one another to respond with a decision as a selection. As decisions are made and incorporated into systems' structures, these systems continue to engage with and respond to one another around the formulation of a problem pertinent to their operations, producing decision premises as they legitimate themselves.

In this form, a decision premise is established when an expectation encounters and already existing decision, that in turn came from an initial expectation impelling a

structurally coupled system to make a decision. All of this requires multiple irritations between structurally coupled subsystems across time. Why should we think that subsystems will be consistently drawn to the formulation of a particular problem, though? Why not think that they will simply move from one problem to another?

Let us consider a focal subsystem that refers to itself in functionally differentiating itself from its environment, formulating a problem pertinent to its operations and seeking possible solutions to that problem. In doing so, this focal subsystem connects with other subsystems in their environment that are concerned with related problems. Thus, for as long as the problem exists, the focal subsystem can structurally couple with these other subsystems and produce irritations, expectations, and eventually impel decisions among these subsystems. This in turn leads to decisions within the focal subsystem, that then impels decision premises among structurally coupled subsystems for as long as each subsystem legitimates itself. And all of this will occur for as long as the problem exists, because this is what the focal subsystem is engaging with.

While it is true that this process does not require systems to agree, it does impel them to decide. In addressing systems holding expectations and responding to decisions, Luhmann says.

> "One is almost forced to react to disappointment. One can do so by adapting the expectation to the disappointment (learning) or, conversely, by retaining the expectation despite the disappointment and insisting on behavior conforming to the expectation. The mode of reaction chosen can be structured into the system, and on this depends how far in and what way one must concern oneself with the causes of deviation" (Luhmann, 1995, p. 293).

So, we can expect structurally coupled subsystems to engage with one another around expectations and decisions, and particularly so when an expectation is met with disappointment. Each system's capacity to accept a decision by a structurally coupled subsystem will be determined by the same mechanism that determines the system's ability to change based on shifts in its environment — that is, the combination of the constraints provided by its structure, and the outward working of its meaning through selection and relation that ultimately produces the system's legitimacy. This legitimation process is what guides the system as it relentlessly explores solutions to the problems pertinent to its operations, driving structurally coupled subsystems to irritate one another in accepting or adapting to decisions as selections.

Thus, we can see how structurally coupled subsystems can irritate one another and individually come to accept a selection as a decision. This might typically involve back and forth between structurally coupled subsystems, but it also seems likely that they would occasionally easily reach a consensus on a decision — even if only by chance. If this were to be the case, each structurally coupled subsystem would independently establish the same decision, either through selection impelled by irritation, or acceptance of selection, before going on to build future decisions on that decision through the establishment of their legitimacy.

In all of this, we can see how legitimation can exist as an intra-systemic process where each structurally coupled subsystem individually legitimates themselves and in doing so eventually comes to a consensus regarding a selection as a decision. The legitimation process would then recursively produce this selection as a decision, establishing expectations that in turn lead to future decision based on this decision. Thus, their independent processes of legitimation would lead to unilateral consensus regarding a decision as a decision premise. That is to say, unilateral consensus obtains when multiple autopoietic systems that are establishing themselves through their legitimation processes independently come to the same selection as a decision, thereby producing a selection as a binding decision for the systems in question.

5.2 | Reference to the real world

Luhmann's theory of systems makes reference to systems in the real world, and this is claimed to be the case so that we can test the theory for validity. In the real world, we find systems that seem to structurally couple to multiple social subsystems at the same time. One example of this could be a Van Assche planning system (Van Assche, 2007; Van Assche et al., 2014).

Drawing on Luhmann's systems theory, Van Assche describes how planning systems form themselves around the conceptualization of a problem, and structurally couple with systems in the environment that are also conceptualizing this problem as far as it pertains to their own operations. In this setting, a planning system irritates and is irritated by these systems, establishing expectations of itself and these systems through interacting with these systems' structures via its meaning. Van Assche describes this in saying that planning systems "participate in the reproduction of several function systems, each of them with a specific autopoiesis ... it can deal with economic, legal and esthetic issues" (Van Assche, 2007, p. 112).

Van Assche comes to this view of planning systems by arguing that they are created through the emergence of planning discourse between interacting entities, thereby existing as a social system made up of communication. The entities that are involved in shaping planning operations are "marked by their own discourses, their own rationalities, their own framing of the landscape" (Van Assche, 2007, p. 111). These entities may be actors that are steeped in multiple social systems — as described by Luhmann (1995) — or organizations that participate in multiple different societal subsystems — as described by Kneer (2001), S. Roth et al. (2020), and Sales et al. (2022). By engaging with these different entities as a part of the planning system's environment, the planning system as a social system "frames its own space, and borrows from/interprets certain scientific, moral, esthetic, legal, organizational, conversational, environments in order to interpret/construct a certain place and its futures" (Van Assche, 2007, p. 113).

Assuming this view of planning systems, we can see how as these systems engage with one another, irritations are responded to, expectations are drawn on, and can be either met or rejected. From these expectations, selections are impelled, and decisions are established. The planning system cannot coerce any of the systems it is structurally coupled with to make any given selection, but it can respond to decisions as selections. Through the ongoing process of selection via meaning and structure, all the autopoietic systems involved in this process legitimate themselves and respond to one another, accepting the decisions of other systems or reacting so as to further irritate one another.

The key here is whether the systems can accept the decisions that others make — and this is determined by the combination of a system's meaning and its structure that together restrict the selections and relations the system can make. If a proposed decision as selection jars with a system's meaning or structure, it will not be able to accept it as it will undermine its legitimacy. In this way, the system's legitimacy as the combination of its meaning and structure determines whether the decision can be accepted or rejected. This will result in further irritation of the structurally coupled system if the decision is unaccepted. If, however, the system can find a way to reimagine itself with this new decision as a part of its meaning, it will be able to accept the decision and produce new selections in response to this decision. Here we can see how the system's process of legitimacy flows both ways just as its structure does.

At this point, a real-world example may be instructive. Consider the case of innovative photovoltaic cells described by Dewald and Truffer (2011). Between 2000 and 2008, organizations like SunEdison, Hanwah Qcell, and Saferay enjoyed significant success operating in the German photovoltaic market, constructing, financially planning and operating centralized photovoltaic power plants ranging from several 100 kWp to several MWp (Lenardic et al., 2009). During this time, these organizations innovated to produce more efficient photovoltaic cells, allowing them to solicit further investment from stakeholders looking to benefit from this improved efficiency, as well as favourable governmental subsidies. However, in 2008, their growth was severely limited due to local residents offering resistance to further installations being developed, citing an array of objections including that it would detract from the region's natural beauty (Dewald & Truffer, 2011). In this setting, economic, technological, and environmental considerations seemed to encourage further photovoltaic farm development, and indeed developers did expand their offerings for some time, until those developers and regulators alike were stopped in their tracks by considerations emerging from systems residents participated in like the aesthetic system.

Once the legitimation process has run its course, a shared decision is accepted between participating system and becomes a part of what each system responds to in making future decisions. It is important to note that this does not mean that these systems agree with one another on how the decision is made — only that they agree that a decision has been made. In the same way that a logical limitation can force a decision to be made from a suboptimal set of options, it is still accepted that a decision must now be made and usually an option will be selected that is the least bad. In future, it can be acknowledged that "something had to be done" without recasting the decision as a good one.

From this position, it is likely that eventually this legitimation process results in these decisions becoming decision premises, further perpetuating the entire process once again. Thus, we come to find unilateral consensus among the planning system's structurally coupled subsystems as facilitated by the planning system's constant irritations surrounding its problem.

In this way, we could see how legitimation within structurally coupled subsystems can lead to unilateral consensus regarding shared decision premises. With the irritation provided by the planning system, a set of structurally coupled subsystems can achieve unilateral consensus regarding a decision without any of the systems in question compromising their legitimacy — and without any system running the risk of de-differentiation. In fact, this happens because of each system's successfully engaging in the legitimation process, enhancing their autonomy and differentiation as they clearly define their rationality through the outworking of their meaning.

Indeed, we may expect this to be happening in the real world in a wide array of settings on a regular basis, simply because without systems achieving unilateral consensus through their legitimation processes, we should expect to see significantly more de-differentiation of systems within society. That is not to say that this is the only way for systems to coordinate without risking de-differentiation, just that achieving unilateral consensus through legitimation is a strong candidate for realizing coordination between societal systems in the real world.

6 | CONCLUSION

In this paper, we have focused on understanding Luhmannian societal subsystems through the lens of differentiation and meaning. We have seen how Luhmann argues that the political system's operations in society should be restricted, as if they are not the political system will undermine its own legitimacy and run the risk of de-differentiating itself. But, we have also seen that the output of the political system — collectively binding decisions — is necessary for society to function in some settings, such as in the example of a planning system where structurally coupled subsystems must be coordinated. This led us to consider whether it would be possible to have shared decision premises across societal subsystems without these systems de-differentiating or de-legitimizing themselves.

We went on to see how differentiation and meaning allows structurally coupled subsystems to engage with one another in trying to find solutions to problems pertinent to their operations. We have seen that through each subsystem's process of legitimation, systems ratify their meaning and compel themselves to continue to address the problems they are focused on. This, in turn, results in these systems structurally coupling with others that are engaging with the same problem, resulting in these systems irritating one another.

We have seen that when understanding this process through the lens of meaning, each system can impel structurally coupled subsystems to make decisions. These systems can then respond by accepting these decisions or adapting and further irritating the structurally coupled subsystems in their environment. In considering each system's process of legitimation, we can see how the establishment of legitimacy would perpetuate irritation and decision making regarding a problem for as long as the problem exists, impelling further meaning creation in each cooperating system through decision, acceptance, and adaptation.

As all of these subsystems are differentiated, we can see that their processes are located wholly internally, and therefore, these systems operate wholly independently of one another. Thus, a system's acceptance of a decision can be understood through the lens of the system's meaning, too. A focal subsystem can only accept a structurally coupled subsystem's decision when it can be incorporated into the focal system's meaning, as restricted by that system's legitimation process. When this occurs, each system will have independently incorporated a shared decision into its structure and meaning, thereby achieving unilateral consensus.

Through the lens of meaning, we can see how this process is driven and restricted by a system's legitimation process as the combination of that system's structure and the outward working of that system's meaning in response to changes in its environment. As a result, through the lens of meaning, we can understand legitimation as the driving force that establishes unilateral consensus between structurally coupled subsystems.

Of course, none of this serves to take away the value that the political system provides to a modern society. The political system may still be invoked to resolve a conflict between two subsystems, for example. What this perspective does show, however, is that it is possible for us to enjoy the benefits of frequent coordination across societal systems while staying true to Luhmann's view that the political system's operations in society ought to be restricted as far as possible.

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RESEARCH ARTICLE

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Rainmaking: Observed with social systems theory

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Abstract

This article examines contemporary efforts to control climate change through the lens of social systems theory, particularly by drawing comparisons to rain dances and shamanic rituals. It argues that modern climate control strategies bear functional similarities to archaic rituals aimed at influencing weather patterns, despite the absence of direct causality. Using Niklas Luhmann's concepts of autopoietic systems and functional equivalence, the article demonstrates that both historical and contemporary approaches to climate influence rely on blame-shifting mechanisms and the social production of scapegoats, with failure often attributed not to the rituals or solutions themselves but to noncompliance or impurity among participants. The originality of this article lies in its application of social systems theory to link contemporary climate control strategies with ancient rituals, positioning them as functionally equivalent social phenomena. By drawing comparisons between shamanistic practices, corporate consulting, and global climate governance, the article provides a unique lens for understanding that the primary function of modern climate efforts may be to regulate social behaviour rather than achieving concrete natural environmental outcomes.

KEYWORDS

climate change, corporate consulting, primates, rain dances, shamanism

... a rain dance, because in these times of climate change it is a dance we desperately need ...

(Reusch & von Merveldt, 2023)

I could only watch, and marvel at the magnificence of those splendid creatures. With a display of strength and vigor such as this, primitive man himself might have challenged the elements.

(Goodall, 1988)

1 | INTRODUCTION

In an age where climate change dominates global discourses, the strategies mankind employs to mitigate its effects are increasingly complex. From ambitious international agreements like the Paris Accord to technological innovations designed to reduce carbon emissions, humanity is engaged in a vast socio-technological experiment aimed at stabilizing the planet's climate. However, despite decades of effort, the global climate crisis remains unresolved (Costanza, 2020), with climate change or the policies implemented to combat it, respectively, threatening the sustainability of life as we know it.

Against this background, this article draws on Luhmann's (1989, 1995) social systems theory to explore the extent to which contemporary approaches to climate control might constitute functional equivalents to rainmaking rituals practiced by shamans in premodern societies. Historically, rain dances and similar rituals were performed to influence weather patterns, often relying on

community cohesion and belief in the shaman's power, despite the lack of direct evidence that these rituals affected the weather.

The question this article aims to explore is whether modern climate strategies, while grounded in science and technology, might function in a similar way—as symbolic acts that bring society together rather than directly solving the problem.

The core argument is that both traditional and modern climate efforts rely heavily on social cohesion and belief systems. Where ancient communities blamed ritual failure on a lack of purity or cohesion among participants, modern society often attributes failure to combat climate change to societal flaws, such as collective 'social addictions' (Costanza et al., 2017) to unsustainable lifestyles. The article further explores how contemporary efforts to mitigate climate change not only aim to control the natural environment but also regulate social behaviour through blame-shifting, scapegoating and moral condemnation of those who do not adhere to climate-conscious norms.

By drawing these parallels, the article seeks to offer a novel approach to contemporary climate governance, positioning it as a 'functionally equivalent' social phenomenon to ancient rainmaking rituals. The question of whether these efforts are truly effective in addressing climate change or whether their primary function is to shape social behaviour remains central to this analysis.

2 | SYSTEMS AND SIMILARITIES

Social systems theory in the tradition of Luhmann (1995, 2012) is based on the seminal ideal that 'a system is the difference between system and environment' (Luhmann, 2006, p. 38). This idea is notably influenced by Maturana and Varela (1980), who described living systems as those capable of creating and preserving a boundary between themselves and their environment. These 'autopoietic' systems are therefore characterized by the continuous stream of distinctions they make between their internal processes and the external environment. In this way, autopoietic systems are essentially defined by their own self-sustaining operations.

Another core idea of Luhmann is that systems are characterized by one single mode of operation (see Figure 1).

Figure 1 shows that Luhmann distinguishes between machines, organisms, social systems and psychic systems. According to Luhmann, machines belong to the realm of allopoietic systems, which lack the capacity of self-reproduction. In contrast, the latter three types of systems are considered autopoietic, each defined by its basic operation. In the case of organisms, this basic operation is the reproduction of life, whereas for psychic and social system, the basic operation is the reproduction of consciousness and communication, respectively.

Because organisms, psyches and social systems are each constituted by fundamentally different forms of reproduction, similarities between aspects of the autopoietic reproduction of life, consciousness and communication must not be understood in terms of 'essential features to be found in all systems' (Luhmann, 1995, p. 15). Instead, these similarities should be 'formulated in the language of problems and their solutions', with the understanding 'that there can be different, functionally equivalent solutions for specific problems.' (id.)

Thus, Luhmann's functional method is designed as a technique to

> Comprehend what is present as contingent and what is different as comparable. It relates what is given, whether that be states or events, to perspectives on problems and seeks comprehensibly to enable a problem to be solved in one way or another. The relation between the problem and its solution will thus not be grasped for its own sake; rather, it serves as a connecting thread to questions about other possibilities, as a connecting thread in the search for functional equivalences
>
> (Luhmann, 1995, p. 53)

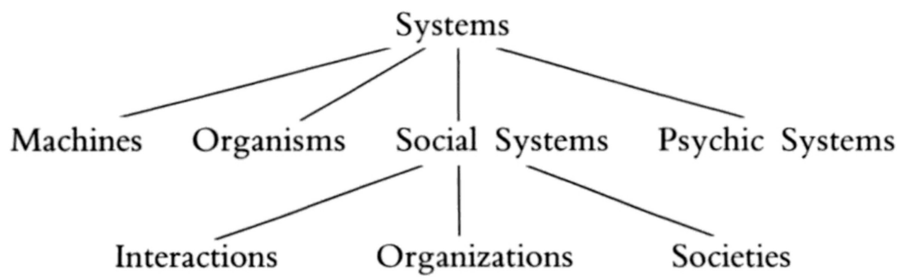


FIGURE 1 Unnamed figure in Luhmann (1995, p. 2).

The *functional equivalence* between the memory of psychic and social systems is a case in point. In both cases, the 'real function of memory lies not in preserving the past but in regulating the relationship between remembering and forgetting' (Luhmann, 2012, p. 162). In other words, 'The main function of memory therefore lies in *forgetting*, in preventing the system from blocking itself by congealing the results of earlier observations' (Luhmann, 2012, p. 349), regardless of whether the respective memory consists of mental or communicative operations. This perplexing similarity, however, does not imply that the two forms of memory are essentially the same, but rather suggests that we are confronted with two functionally equivalent solutions to a similar problem located in two different domains.

The same logic applies to comparisons within one and the same systems domain. For example, within the social domain, written and oral communications provide functionally equivalent solutions to the problem of double contingency (Luhmann, 2012, p. 172), even if, or precisely because, they represent fundamentally different forms of communication.

In the following comparison of different forms of rainmaking, it is hence important to remember that we are not making essentialist claims, but rather seek to employ a functional method to obtain information.

3 | A PRIMER ON PRIMATES

Luhmann's social systems theory has often been describe as a post-humanist (Eva Knodt in Luhmann, 1995, p. xxx). This assessment is true to the extent that Luhmann (1995, p. 212) deliberately departs from the 'Old-European' tradition of representing society as composed of groups and subgroups made of humans, instead viewing 'human beings as part of the environment of society (instead of as part of society itself)'.

Reviewing Figure 1 supports this claim, as it shows that, even though humans are the perhaps most social of all animals, we find that 'the human condition clearly implies an organic and psychic dimension' and, consequently, 'that our persistent interest in human individuality implies a focus on the interplay of three independent types of systems,' (Roth & Valentinov, 2023, p. 337) rather than the observation of one single autopoietic system.

The fact that humans are situated in the environment of social systems also means that the organic and psychic operations of systems involved in communication can never enter social systems directly; they can only appear in communication as topics of communication and thus as communicative operations. Consequently, even the question of who or what qualifies as a participant in communication is entirely determined by communication. This circumstance does not preclude the possibility of human–animal or animal–animal communication, even though Luhmann (1995, p. 67, own emphasis) himself tended to reserve personhood for human beings: 'Persons (...) come into being through the participation of *human* beings in communication. (...) They are not alive, they do not think; they are constructions of communication for the purposes of communication. They owe their unity to the autopoiesis of the social system society, whose products they are.'

Within social systems theory, this anthropocentric view of social systems has been notably challenged by Brock (2007), who aligns with primatologists like Goodall (1988, 2005) in suggesting that apes may have the precursors of ritual and culture. Of particular importance in this context are Goodall's (1988) observations of what she later referred to as chimpanzee 'rain dances'. These involve prolonged, coordinated sets behaviour—such as the rhythmic waving of tree branches, hooting and foot-to-foot movements—enacted exclusively by adult male chimpanzees in response to thunderstorms while their female and younger conspecifics watch the performance from the surrounding trees. Although there is debate as to whether these rain dances qualify as proto- or minimal rituals (Hattori & Tomonaga, 2020; Kalan et al., 2023; McNeill, 1997; Tennie & van Schaik, 2020), they have more than once been associated with 'man's most ancient longing: to become one with the forces of the Gods' (Montgomery, 2009, p. 140) and discussed as potential precursors of shamanism (Winkelman, 2015; Winkelman, 2019).

4 | SHAMANS AND SHAMING

From a classical modern perspective, it appears evident that chimpanzee rain dances have the same causal influence on the weather as the rituals performed by human shamanic rainmakers, which have been practiced in many cultures throughout history and continue in some parts of the world today. The question then is as follows: how do shamans remain shamans despite the obvious disutility of their rituals? Why is it that members of a tribe still believe in the powers of their shaman even if their meticulously performed rain dance regularly fail to make it rain?

The answer is relatively simple: blame shifting and scapegoating. 'Lack of rain is usually associated with sin, and therefore the high priest urges the people to "purge themselves of any known sin(s) committed against one another, their ancestors, nature, the environment and

God" (Haruna, 1997, p. 230). The confessional and supplicatory prayers are effected by people considered pure. For instance, only married women, without exception participates in the ceremonies, and all unmarried women and prostitutes are left out. The exclusion of unmarried women and prostitutes corresponds to the act of purification.' (Ombati, 2017, p. 84).

Hence, there are no negative consequences for the shaman if the ritual fails to achieve the desired outcome, as long as the shaman can persuade the tribe, and perhaps even themselves, that the failure lies neither in the performance nor in the performer, but rather in a lack of cohesion, conviction, cleanliness or compliance among the audience for whom the ritual is performed.

German organizational sociologist Kühl (2019, p. 11) has recently argued that similar principles are at play in contemporary organizational settings. In pointing to the example of shamanic rainmakers, he argues that their true value does not lie in their assumed supernatural powers, but rather in their capacity to foster unity within their tribe. By addressing the problem of drought, rainmakers give their tribe a chance to reflect on whether they have the favour of their gods or other supernatural powers. Understanding this 'rainmaker effect' involves recognizing that, although many social institutions fail to serve their ostensible function, they may still fulfil important other functions that may not be immediately obvious.

The central hypothesis of his book is then

> That we can observe this type of rainmaker effect in many of the concepts that are being bandied about in management circles today, including that of the learning organization, the knowledge-based company, and the agile system. These relatively new management concepts promise to provide proven, supposedly rational principles for successful organizational change. The assumption behind them is that companies can count on the success of their change projects only if change processes are organized according to tried-and-tested principles, which include clear objectives, employee identification, participation, communication, and continuous learning. This book will fundamentally challenge the soundness of these principles, though without going so far as to claim that these new change-oriented management concepts are completely useless. As with rainmakers, they contain a hidden benefit.
>
> (Kühl, 2019, p. 11)

As Kühl is keen to uncover the hidden benefits of contemporary rainmaking practices, he is less concerned with their negative side effects, such as the social production of scapegoats, sinners, resisters, dissents and endangerers to public or planetary welfare.

In contemporary organizational settings, the notion of the 'rainmaker' has been recontextualized within the sphere of management consulting. Prestigious consulting firms—such as McKinsey & Company, Accenture and KPMG—often assume the role of modern-day shamans, engaged by organizations seeking transformative solutions to complex challenges (Kiechel, 2010; McKenna, 2006). These firms are esteemed for their expertise and are perceived to possess the knowledge and influence necessary to deliver desired outcomes, such as increased revenues or successful strategic transformations.

These consultants employ rituals analogous to traditional shamanistic practices—strategic meetings, vision workshops, leadership retreats and motivational events—that serve to align organizational members toward common objectives (Sturdy et al., 2009). They introduce proprietary methodologies and frameworks, often enveloped in specialized jargon, to instil a sense of purpose and direction. However, when these initiatives fail to yield the anticipated results, responsibility is frequently deflected away from the consultants and leadership. Instead, failures are attributed to factors such as improper implementation, employee resistance or unforeseen external market conditions (Alvesson & Johansson, 2002; Mazzucato & Collington, 2023; Noble, 1999).

Common justifications for unmet objectives include assertions that the strategy was 'poorly implemented', there was a 'lack of buy-in from employees,' or that 'market conditions changed unexpectedly' (Mazzucato & Collington, 2023; Noble, 1999). Consultants may contend that their recommendations were sound but were not executed effectively by the client's team, thereby absolving themselves of accountability (Noble, 1999). Alternatively, they might argue that unexpected external factors—such as economic downturns, regulatory changes or competitive disruptions—undermined the project's success (Miller & Rose, 2008).

Such blame-shifting mechanisms are often embedded within consulting proposals, engagement letters and contracts. These documents typically include clauses that highlight the potential impact of external conditions on the outcomes of the work, effectively pre-empting responsibility. A standard clause might state the following:

> The Consultant shall not be liable for any delays or failures in performance resulting from circumstances or causes beyond its reasonable control, including but not limited

> to the client's failure to provide necessary information or resources, changes in market conditions, or acts of God.

By emphasizing externalities, consultants insulate themselves from blame and maintain their reputations even when projects do not meet expectations (Cerruti et al., 2019).

4.1 | Blame shifting in practice

The persistence and prominence of these consulting firms, despite instances of unsuccessful outcomes, underscore the efficacy of their blame-shifting strategies. Clients are often hesitant to criticize or hold consultants accountable due to their renowned expertise and the prestige associated with engaging top-tier firms (Glückler & Armbrüster, 2003). This reluctance is further compounded by factors such as reputational risk, perceived expertise and dependence on future services (Kitay & Wright, 2007). Real-life cases elucidate this phenomenon include the following:

1. McKinsey's role in the opioid crisis

McKinsey advised Purdue Pharma on strategies to 'turbocharge' the sales of OxyContin, a highly addictive painkiller, contributing to the opioid epidemic in the United States. The consultancy developed plans such as the 'Evolve to Excellence' initiative, which aimed to increase sales by targeting high-volume prescribers and circumventing pharmacy restrictions. When the devastating effects of the opioid crisis became apparent, McKinsey faced lawsuits from multiple US states. The firm attempted to deflect blame by stating that it was merely providing standard consulting services and that the responsibility lay with Purdue Pharma's decisions. McKinsey settled the lawsuits for $574 million without admitting wrongdoing, maintaining its standing in the consulting industry.

2. Accenture's role in Hertz's website redesign failure

In 2019, Hertz sued Accenture for $32 million over a failed website and mobile app redesign project. Hertz alleged that Accenture delivered incomplete and deficient work, leading to project delays and additional costs. Accenture responded by pointing to contractual clauses and limitations, effectively telling Hertz that it should have been more diligent in reviewing the contractual fine print (Belden, 2019). Accenture argued that the issues stemmed from Hertz's changing requirements and lack of clear direction, thereby shifting blame onto the client. This case highlights how consulting firms might deflect blame onto clients when projects do not meet expectations.

3. KPMG's Carillion case

KPMG faced criticism for its audit failures in several high-profile corporate collapses, such as the collapse of Carillion in the United Kingdom. Despite evident shortcomings in detecting and reporting financial issues, KPMG often attributed these failures to complex market conditions or client misrepresentations (Jackson, 2018). The firm continued to secure significant contracts, illustrating how blame is shifted away from the consultant.

Furthermore, Mazzucato and Collington (2023) contend that reliance on consultants leads to a 'parasitic' relationship, where organizations become dependent on external expertise at the expense of developing internal capabilities. This dependency erodes institutional knowledge and weakens the ability of organizations, particularly governments, to function effectively without external advice. The authors assert that consultants often promote standardized solutions and best practices that may not align with the unique context or needs of the client organization. When these one-size-fits-all solutions fail, consultants typically shift the blame onto the client. As Mazzucato and Collington (2023, p. 112) observe,

> Consultants are adept at absolving themselves of responsibility when their recommendations do not yield the promised results. They attribute failures to poor implementation, organizational resistance, or unforeseen external factors—never to the inadequacy of their own advice.

This practice mirrors the shamanic blame-shifting mechanisms observed in traditional rainmaking rituals, where failure is ascribed to the community's transgressions rather than the ritual itself (Ombati, 2017). By externalizing blame, consultants maintain their authority and continue to be perceived as indispensable.

The 'rainmaker effect' in corporate contexts exemplifies how these rituals and blame-shifting mechanisms function to maintain the authority of consultants and organizational leadership, even in the face of unmet objectives (Kühl, 2019). This dynamic mirrors the functional equivalence between ancient shamanic rituals and modern management strategies. Just as shamans might attribute the lack of rain to the community's transgressions or insufficient faith, modern consultants may attribute project failures to factors beyond their control,

thereby preserving their status and authority within the social system.

5 | CLIMATE AND CONDITIONING

The idea that dance can influence the weather, or even the broader climate, is not exclusive to premodern societies; it is also seriously discussed in contemporary university settings. For example, 'Dancing for climate change' (Collard-Stokes, 2021), or against it, is presented as a valid strategy for influencing the climate.

Though these attempts at dance-induced climate changes or stabilizations are certainly not based on the assumption of direct causal relationships between local dance performances and global weather patterns, they seem to imply indirect causality. One example is the idea that 'through climate-conscious dance we can reconnect ourselves with the environment and help restore the earth' (Gotskind, 2019). Contemporary rain dances thus position themselves as part of social and technological measures aimed at global climate control.

In this sense, the rain dance of our time is a gigantic socio-technological endeavour aimed at building the equivalent of a global air conditioner—that is, a climate conditioning system designed to stabilize the global climate. Humanity, being innovative and determined, is less doubted in its ability to achieve this aim than in determining who should control the remote of this metaphorical aircon. One possible candidate is certainly the United Nations, which is, if not the origin (Selcer, 2018), certainly a major catalyst (Roth, 2024) of idea of Earth as a well-tempered spaceship maintained by a spaceman economy, also known as the circular economy. However, it is also worth noting that the majority of the UN members represent non-democratic political systems, which makes its institutions resemble a final-stage Weimar Republic rather than a truly democratic system of world governance.

Whoever will be, or thought to be, in control of the world's climate, for the current socio-technological experiment to result in a truly effective functional equivalent to traditional rain dances, it is essential that most members of the tribe of our global village believe that modern shamans, such as climate modellers and interpreters, actually know how to influence the climate.

The paradox, however, is this: whatever rituals these contemporary shamans have performed so far—including massive conferences, ambitious legislations or draconian mandates—none have yet succeeded. This differs from traditional shamanism, where shamanic performances at least occasionally coincided with the desired outcomes, making it possible to believe they brought about those outcomes. After decades of struggle against global cooling or warming, however, it seems as if our contemporary performances constantly fail to achieve the desired climate outcomes (Jamieson, 2014).

And yet the belief in the power of our contemporary shamanic practices persists, in ways so similar to those described earlier in this article. In fact, we are told, or tell ourselves, that the rituals of our time fail to work because we fail to perform them properly. This marks a key difference from earlier times when only male apes or expert shamans were expected to perform the decisive rituals. Today, everyone is expected to co-perform the ritual. As for the other aspects of the rainmaker effect, however, the self-immunization strategies remain similar: if the ritual fails, it is not because the ritual is inappropriate, but because there are issues of social cohesion, deviance, or outright pathology within the global tribe. For example, a popular line of argumentation suggests that 'we' are unable to combat climate change with the necessary urgency because 'we' are addicted to economic growth (Jackson, 2009) and other unsustainable lifestyle patterns. This implies that these societal addictions (Costanza, 2020; Costanza et al., 2017) must be treated by 'societal therapies that will allow humans to build a sustainable and desirable future together' (Costanza, 2020, p. 5). This perspective aligns with the growing trend to pathologize the entire planet, including its human inhabitants, the majority of which is seen as a planetary health threat by a growing minority of self-acclaimed planetary therapists (Roth & Valentinov, 2023).

As in the premodern cases, our modern attempts to condition the world climate involve socially induced attempts at conditioning individual behaviour. The corresponding strategies expressively include the public shaming or financial penalization of environmental sinners or scapegoats—such as meat eaters, SUV drivers, 'energy slum' dwellers or frequent flyers—targeted by academics, activists and policy makers who go as far as to assert that the often draconian measures used during the coronavirus crisis were 'just a fire drill' (Lise Kingo, Executive Director of United Nations Global Compact, in The Guardian from 15 June 2020) or a 'dress rehearsal' (Latour, 2021) for the climate crisis.

In borrowing heavily from a study published in *nature sustainability* (Fuso Nerini et al., 2021), the World Economic Forum (WEF) in 2022 also celebrated the fact a 'huge number of unimaginable restrictions for public health were adopted by billions of citizens across the world' (Kumar & Kaushik, 2022) during the coronavirus crisis. In this context, the WEF alluding to the possibility that similar restrictions could be imposed and enforced for climate control, as technological breakthroughs now

'can enable tracking personal carbon emissions'. This would allow the implementation of effective systems of personal carbon allowances where persons exceeding their allowance either need to pay financial compensations or are barred from consuming certain products or services, including public or private transport. If implemented, such an idea would amount to the creation of an 'ecological', 'Western' variant of the Chinese social credit system, which has often been criticized as totalitarian.

6 | CONCLUSIONS: SINS AND SENSES

There is a German fairy tale titled 'Der Bauer als Wettermacher' (Engl.: *The Farmer as Weather Maker*), documented in Birlinger and Buck (1861) and also available in this earlier version from 1854:

> There once was a man who was never satisfied—neither with his fate, nor with people, nor even with dear God. At one' moment, he would criticize this, and at another moment, he would criticize that aspect of God's world governance. But above all, he criticized the weather. Today, it was too warm for him; tomorrow, it was too cool. Today, the rain lasted too long for him; tomorrow, it passed too quickly. Today, the sun seemed too damp; tomorrow, too dry. In short, he always had something to complain about regarding the weather. And once, during the holy twelve nights, he said: 'If only I could control the weather myself at my will, then the crops would surely look very different.' And, lo and behold, after he had said this, a man appeared before him, surrounded by a bright light, and said: 'Your wish to control the weather is granted. From today on, your fields will receive only the weather you desire and consider best.' With that, the apparition disappeared.
>
> The complainer was now overjoyed that his wish had been granted. Since it had not yet snowed, he first wished for a thick layer of snow over his fields. And behold, when he went to the fields, it snowed merrily down upon them. He let the snow remain until the first of March, then ordered dry weather, followed by alternating sunshine and warm rain, and occasionally thunderstorms, believing that he had arranged everything wisely and well. His crops indeed outshone all the others in the field, growing and blooming to his great delight, and the man walked around proudly as if he were God Himself. But when the time for the harvest came, though he brought large wagonloads to his farm, it was nothing but straw and not a single grain of fruit: for the sapient man had forgotten the wind.
>
> (Pröhle, 1854)

Just as fake news is the invention of a liar (Giglietto et al., 2019), rainmaking is more than often the invention of a sinner. This observation is warranted insofar as rainmakers may sin against God by playing God or by sinning against His creation. Thus, the concept of sin can apply to those arrogant enough to believe they can not only define the optimal climate for both the present and future generations, but also bring it about and maintain it. But it can also apply to those who hold that the self-acclaimed rainmakers should not play God, thus frustrating their efforts.

Although the current momentum is more in favour of the rainmakers rather than the 'deniers' of their powers, this article does not aim to take sides. Instead, its ambition was to establish that current attempts at designing the world climate bear resemblance, and thus might constitute functional equivalents, to archaic or even proto-human rain dances.

As with the earlier forms of rain dances, contemporary attempts at climate design may or may not only have desirable effects on the natural climate, but also have both desirable und undesirable effects on the social climate of our global village. Although rain dancing rituals might indeed trigger increased reflexivity within the tribe, blame shifting, scapegoating and shaming—and the creation of (climate) sinners—are among the presumably less desirable social side effects.

In this sense, we are inclined to challenge Luhmann (1989, p. 123), who in his *Ecological communication* declared:

> The dogma of original sin was a schema of self-observation unequaled and unsurpassed historically. It led, if not on the psychological then at least on the communicative level, to moral self-condemnation and therewith to a mitigation of moral criticism. No one, for example, could recognize sin in another's act of going to confession. Everyone had to do this. All classes, even the clergy, were subject to this principle. It was designed to be class-neutral and at the same time made it possible to work out a class-specific catalogue of

> sins and dangers to salvation. This was discussed as 'pollution' or 'hereditary pollution' of souls. Only because this schema was increasingly undermined by the personal attribution of guilt and the impossibility of knowing an individual's state of grace could a religious moralism flourish whose secular after-effects are still felt today. But a modern functional equivalent for original sin is not on the horizon.
>
> (Luhmann, 1989, p. 123)

What is somewhat on the horizon, however, are personal carbon allowances programmes, which amount to a form of accounting that attributes pollution to individuals, though not to their souls, but to their ecological ledgers. In such context, a secular yet functional equivalent of sin reemerges in the form the emission or 'causation' of CO_2 in amounts that exceed the thresholds defined by a caste of climate modellers and interpreters.

As demonstrated during the 'war against the virus', which to some remains a role model for the ongoing 'war against climate change', climate sinners should not expect much empathy from devout ecologists and other members of our contemporary rainmaking cult. There is, hence, a certain risk that this cult may take ever-more radical, even totalitarian forms. This argument is further supported by the fact that CO2 is not the only greenhouse gas attributable to human organisms. A recent study published in *PloS ONE* (Dawson et al., 2023) analysed the concentrations of CO_2, CH_4 (methane) and N_2O (nitrous oxide) in the breath of human participants. The study found that 31% of the sample qualified as 'methane producers'—individuals whose bodies emit methane at levels higher than a threshold set by the researchers.

From an epistemological perspective, however, the greater risk is that we hardly can answer, and mostly not even dare to ask, the question how we could know if we are in a situation similar to that of the primate or archaic rain dancers mentioned earlier in this article. How can we know that our contemporary rain making rituals truly influence the natural climate of our planet and not only the social climate within our world society?

Although answers to this question are unlikely to directly challenge the current mainstream discourses on climate change, they may foster the development of ideas that could become the mainstream of the future—much like the current ecological paradigm, which is an alternative mainstream of the past.

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RESEARCH ARTICLE

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From media evolution to the Anthropocene: Unpacking sociotechnical autopoiesis

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Abstract

The Anthropocene, a term encapsulating humanity's significant impact on Earth's geology, is analysed from a media and socio-evolutionary lens. The exploration investigates the correlation between human socio-evolution, media, technology, and the inception and progression of the Anthropocene era. By employing a systems theoretical perspective, this research heavily draws on the theories of German sociologist Niklas Luhmann. Insights from the American philosopher Levi Bryant are also integrated to elucidate the relationship between humans, technology and the Earth's geological state. It is posited that society, as we understand it, emerged with the advent of spoken language. This language-based communication system shaped cooperation within the human population. Over time, the interplay between biology, consciousness and social structures, driven by language-based communication in different communication media, has deeply influenced Earth's climate. The evolution of communication media has continuously expanded humanity's capacity to influence its environment. The article provides a comprehensive explanatory model, suggesting that the social structures formed by these media profoundly impact Earth's geology, challenging conventional notions surrounding the origins and implications of the Anthropocene era.

KEYWORDS

Anthropocene, language-based communication, Levi Bryant, media evolution, Niklas Luhmann, socio-evolutionary perspective, systems theoretical perspective

1 | INTRODUCTION

In this article, the concept of the Anthropocene is explored from a media and socio-evolutionary perspective. The central research question revolves around the significance of media and technology in socio-evolution and the social environment, specifically addressing when and how the Anthropocene began and has since evolved. A contention arises as the concept of the Anthropocene is critiqued: is it truly humans, an anxious mammal in the middle of the food chain, always on alert for predators, that impact Earth's geological state?

Some argue against this, tracing human geological footprints back to the 1850s when capitalists stoked their

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coal boilers. Thus, according to Malm (2016) and other eco-Marxists, the term Capitalocene is more accurate, positing that it is the system (capitalism) and not necessarily humans that instigated the Anthropocene. This critique has merit to a certain extent, but in this article's lens, capitalism is viewed as a theory pertaining to a specific societal function system. To unravel the deeper causes of the Anthropocene, this article adopts a more generalized system-theoretical perspective, primarily drawing insights from the German sociologist Niklas Luhmann.

The article posits a theory on media socio-evolution from prehistoric times to the present. The thesis suggests that society emerged with spoken language, which, as a communication system, began to regulate cooperation within human populations. In this theorization, we have to trace back much further than the 19th century to discover the onset of the epoch when humans began impacting the earth and its climate, back to the Pleistocene. In this interpretation, humans are fundamentally an amalgamation of biology, consciousness and technology, orchestrated by an overarching social system of language-based communication and other media. The social, in theory, will be observed not only based on Luhmann's ideas but also drawing inspiration from Bryant (2014), as a kind of *machine*. This social machine is structurally coupled to the psychic and biological level of system formation, serving as its foundational condition, with the biological system, in turn, coupled to myriad environmental conditions. Initially, though, it adapted to a limited ecological niche. Social structures thus began to subordinate the psychic, and through this connection, instigated transformations in its own physiology (including brain volume) and its environment (e.g., 'taming' fire, grilling meat and burning landscapes). Subsequently, with each new technology and communication medium, the machine expanded its capacity to influence its environment. Epistemologically, the machine does not directly perceive its environment but relies on its own constructions (Luhmann, 1998). The machine is not a trivial machine; it is a sociotechnical autopoietic non-trivial machine, where each new social structure (e.g., norms, decisions, organization and differentiation) alters the machine's mode and capability.

In the structure of the article, a considerable emphasis will be placed on constructing an understanding of this 'machine': its initiation, the process by which it interpellated the human animal and its foundational operations. The paramount media revolution is indisputably the advent of spoken language, which facilitated the rise of this machine. This machine, in turn, differentiates itself communicatively from an otherwise inarticulate environment, harnessing its resources for survival and evolution. The text will briefly touch upon writing, printing and analogue electronic media, reserving more space to discuss the current scenario where the machine also operates in digital media.

2 | HUMAN INTERACTION WITH THE ENVIRONMENT

Approximately 12 000 years ago, the Holocene began when the climate post the last ice age became more stable, and humans domesticated both plants and animals. However, humans have always interacted with their environment. Even the Homo Erectus seems to have impacted their environment by hunting animals, which subsequently decreased in number and altered their habits, as they began migrating out of Africa more than one and a half million years ago, where they co-evolved with other species (Turvey & Crees, 2019).[1] Towards the end of the Pleistocene (the long epoch preceding the Holocene), *Homo Sapiens* spread out of Africa and across all continents except Antarctica. Where they ventured, they decimated large portions of the megafauna. Barnosky (2008) estimates that two-thirds of all mammal species and half of all other species weighing over 44 kg were eradicated. Turvey and Crees (2019) reckon that nearly two-thirds of the world's megafauna were extinct by the end of the Pleistocene. Not only animals but other surviving hominins also perished towards the end of the Pleistocene. The megafauna extinction had profound effects on ecosystem structures, seed dispersion, surface albedo and biogeochemical cycles, such as nutrient transport across landscapes (ibid). Other studies indicate that humans already set forest areas on fire during the Pleistocene (Hunt et al., 2012). With the transition to the Holocene, the extinction of species continued, leading to a regional catastrophe, with the complete loss of megafauna on most islands. It is estimated that wild mammals today only comprise 4% of the biomass, and the remaining 96% consists of domesticated animals, especially humans (Turvey & Crees, 2019). During the Holocene, humans have burned the wild nature, killed the animals and populated the Earth with cultivated plants, domesticated animals and themselves. This raises the question: How could humans dominate all other life forms and ultimately destroy them, even though these ecosystems form the very foundation of human survival?

[1]The megafauna likely survived in Africa because, through co-evolution, it had evolved to be wary of hominins.

3 | THE SOCIOTECHNICAL AUTOPOIESIS MACHINE

To answer the aforementioned question, this section will construct a theoretically grounded sociotechnical autopoiesis machine. The machine is a non-trivial machine, meaning it is not externally controlled but always follows its own logic and 'asks' itself what it should do (Foerster, 2003). The machine is an autopoiesis machine, defined as 'An autopoiesis machine is a machine that is organized as a network of processes that produce the components, [...] which through their interactions and transformations continuously regenerate and realize the network of processes that produced them' (Maturana & Varela, 1980, p. 78). Luhmann's (2007, p. 99) concept of autopoiesis not only describes Maturana's biological self-production but also deontologizes the concept, further describing psychic and social systems as autopoietic systems, akin to non-trivial machines. This gives us three levels of system formation: the biological, which self-(re) produces in the medium of life; the psychic, which self-(re)produces in the medium of consciousness; and the social, which self-(re)produces in the medium of communication (Luhmann, 1995). These systems are structurally coupled to each other and function as each other's foundational conditions (e.g., no consciousness without a biological brain), and they are operationally closed around their respective reproduction processes (life, consciousness and communication).

Regarding technology, the machine is inspired by Haraway's (1991) cyborg concept and Latour's (1999) notion of hybrids. Both concepts suggest that humans, when coupled with technology, become a new kind of being with new capabilities. A significant part of the inspiration comes from Levi Bryant (2014) and his onto-cartography theory of machines, as it allows for observing the three structurally coupled levels of system formation together, as a machine that transforms itself and thereby its environment. Bryant views machines as systems of operations that perform transformations on input, thereby producing output (ibid, p. 38). Luhmann (1995, 2007) finds many issues with models that operate on 'input' and 'output', and it would be most accurate to just discuss system/environment based on his theory. Hence, this article will observe input as systems' conditions of possibility in the environment and output as the impacts that society exerts on its environment. Both aspects can only be observed from within the system itself, meaning that what will be described here as conditions of possibility and impacts are societal observations. The idea is that the system, through its structural couplings, can transform and process input (transform the environment) in line with its own logic. Using this machine concept, a tree can be described as a machine that transforms water, sunlight and so forth into its mass, oxygen and so forth. Machines can also be coupled together and act as a medium for each other. A tree, besides its coupling to the sun, earth and rain, is also coupled to microorganisms, fungi, other plants, animals and so forth, all of which provide the tree with input and perform operations in cellular metabolism. Thus, there is a reciprocal coupling between machines, which are plastic and pluripotent, in the sense that they both influence their environment and are influenced by their environment (Bryant, 2014, p. 52).

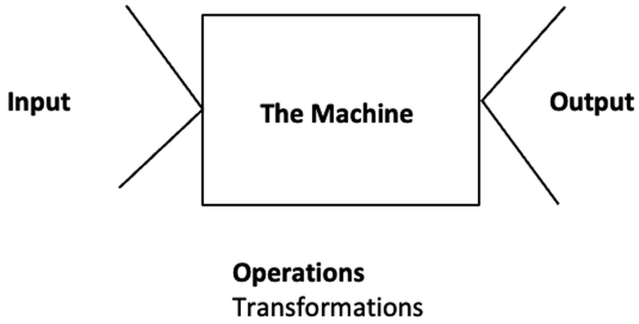


FIGURE 1 The machine.

Figure 1[2] depicts the abstract and principal machine. Taking the tree as an illustration, the input consists of light, water, services from microbes and so on. The machine is the tree itself, which processes the input to produce output. The output encompasses bark, trunk, leaves, oxygen and fruit and also, for instance, provides opportunities for birds to construct nests. The machine relies on and is structurally coupled to its environment, yet it also contributes to shaping its environmental conditions through its transformations. For instance, an animal might consume the fruit but also excrete or perish, thereby nourishing the soil in which the tree thrives. The tree can be perceived from multiple angles, meaning it can be viewed as a symbiosis of various smaller machines, like microbes. Bryant's notion of the machine aligns seamlessly with Luhmann's communication sociological perspective on autopoietic machines. According to Luhmann (2007 p. 123), autopoiesis elucidates evolution

[2]The illustration of the machine as seen in Figure 1 is developed in Paulsen and Tække (2022) in the chapter 'Big Data', where a series of Big Data Machines are theoretically and analytically developed (free download). Since the input/output theory is not the conventional one, the symbols '>' and '<' are not intended as mathematical operators but merely illustrate the machine's transformative coupling to its environment.

only when tied to conditions of the structure's compatibility with the environment; either autopoiesis exists or it does not. There is no blueprint, no preordained plan where the seed embodies its final form. Rather, evolution assesses which structures align with autopoiesis. Self-preservation hinges on the idea that the formations emerging in the medium of life (a species, a specific structure) can reproduce under the existing selection pressure. The sociotechnical autopoiesis machine I introduced here can illustrate how a lifestyle, human beings, long ago was differentiated out from other life forms and subsequently tied their structural evolution to a variety of environmental structures (like meat, fire and stone tools). Through these transformative connections, they increasingly influenced their environment and consequently shifted the selection pressures under which they had to exist.

4 | THE GENESIS AND PARTS OF THE MACHINE

Human evolution from primate through hominization to *Homo Sapiens* did not occur in a single leap, after which humans with their intelligence developed technology, language, society and culture. On the contrary, one must see nature, society, language, intelligence, technique and culture working together, through myriad transformations and structural couplings, to produce *Homo Sapiens* over a process of several million years (Morin, 1974, p. 63). Understanding human development must be traced through a myriad of interacting factors, such as bipedalism, which freed the hands and subsequently led to the development of the opposable thumb, making the hand a polyvalent instrument. On two legs, the hominin could gain a perspective and carry with its hands, thereby freeing the jaw from its vertical position, which in turn freed the skull from its mechanical constraint, making room for a more substantial brain and the development of vocal cords (Fitch, 2010; Jensen, 1996; Morin, 1974, p. 64). These changes required both genetic mutations leading to anatomical changes and a shift in the environment from forest to savannah, which selected for bipedalism. These changes laid the foundation for the hunted hominin to become the hunter. About 2 million years ago, our ancestor, a bipedal hominin in Africa, began to transition to carnivorous diets, correlating with this branch of hominins (ours) starting to develop larger and larger brains (Fitch, 2010, p. 421). Beyond larger brains and improved technology, Homo Erectus likely also had a proto-language, as they were the first to emigrate out of Africa: They were a new kind of animal, unlike any the world had ever seen before (Fitch, 2010, 403).

Even Darwin pointed out that it is not the ability to produce sounds that leads to language, but neural development (Fitch, 2010, p. 362).[3] These hominins developed and used weapons, built shelters, and thus began technological evolution (Morin, 1974, p. 65). With the use of fire (from about 1.4 million years ago), hominins gained several advantages, for example, cooked meat is easier to digest, and fire provides warmth and security. Haraway (2003) notes that the dog was domesticated as early as 150 000 years ago (long before any other animal) and that we underwent a co-evolution with the dog, which by taking over sniffing and guarding roles, eased our burdens and allowed further development. Hunting made the hominin an interpreter of a vast array of ambiguous sensory stimuli, demanded communication and stimulated strategic abilities (Morin, 1974, p. 72). With language, animals, plants and tools, humans had already developed a division of labour to a point where it was governed by a superior organization—society. With the more stable climate of the Holocene, the table was set, and our ancestors gradually left the natural paradise in favour of life as farmers (perhaps pressured by their impact on nature?). Humans had transformed into a cyborg, a fusion of nature, organization and technology.

The significant mystery in research has been why human individuals begin to share propositional (true) information with each other (e.g., where there is good food). The answer seems simple: it is an evolutionary advantage to freely share valuable information with offspring (Fitch, 2010, p. 425).[4] However, Erectus was not nearly as innovative as the later Sapiens, but there are (at least) 100 000 years between the anatomical *Homo Sapiens* and evidence of a technological explosion (ibid, p. 407). The latest research points back to Darwin's initial theory that the brain is crucial, as it seems plausible with the selection of new/more neural connections, neurotransmitters, without changes in neural cell types or brain volume (ibid, p. 409). In Luhmann's (1995) terminology, it is a co-evolution with language as the structural coupling between the psychic and social. The interplay between the brain, self-control and tools on one hand and increasing work specialization and social complexity on the other drove human evolution with language as an enabling condition. Language itself participated in the mutual transformation: the development of increasingly advanced syntax, more sophisticated tools, smarter brains, various tasks, roles, dances, hunting,

[3]The ability to produce and imitate sounds must have preceded and developed for other purposes, such as imitating animal sounds, singing, but of course also for signaling.

[4]Phatic communication may be an adaptation to fertilize the ground for honest propositional information exchange (Fitch, 2010, p. 428).

trading and beliefs slowly drove human evolution, where the individual elements formed the basis for each other. According to Fitch (2010), modern spoken language developed in interaction, where an ever-increasing number of neurotransmitters interacted with increasingly complex grammatical structures.

Humans cultivated themselves while also cultivating the surrounding environment, and one day, the Stone Age farmer stood there as a hybrid of language, fire, clothes, tools, livestock and crops, both a member of and subject to an organized society. Perhaps humans were pushed into agricultural life by self-made circumstances—we had burned half the world and exterminated the megafauna, affecting the planet long before burning coal.

5 | SPOKEN LANGUAGE

The starting point for language, phonologically speaking, was the ability to produce and imitate sounds that eventually became part of a form of proto-language. Here, the crucial leap is thought to be the emergence of a lexical language (Fitch, 2010), as humans already had a cognitive semantic property (the ability to conceptualize—which other larger primates also possess, e.g., the understanding of water). However, language provides the ability to communicate about the environment in a lexical language, where propositional information can move from the more experienced to the less experienced (where and when there are fish, and for instance, how they are caught). The lexical language operates through a form of double patterning (duality of patterning; Fitch, 2010, p. 94), which within language and system theory, we call double articulation (Esposito, 1999; Martinet, 1960, p. 26). A double articulation system consists of a hierarchy where a subsystem comprises a set of distinctive features without independent specification, using which one can compose an unlimited number of statements. All known modern (current) spoken languages are double articulated. By single articulation, it is meant that each sound has a meaning; in double articulation, individual sounds (phonemes) are semantically empty but have a meaning-distinguishing function so they can be combined at the meaning level into infinitely many meaningful expressions (ibid). Double articulation as a phonological system offers a significant advantage over a single-articulated system, as it provides an unlimited stock of words, which for humans acted and still acts as a 'mental syllabic script' (Fitch, 2010, p. 411). As is the case with the ability to produce and imitate sounds, double articulation is seen as a prerequisite for the later development of modern language characterized by advanced syntactic structures, including various word classes. It is difficult to determine when the modern language was developed, like the languages we know today, but Sapiens evolved, were selected or emerged not out of pure nature, but rather in culture, technology and society in a coupling to proto-language. Looking at the extinction of megafauna and cultural artefacts (technology and cave paintings), 40 to 60 000 years could be a guess for when the modern language was developed.

Figure 2 illustrates the development of spoken language as described above. The time indications are speculative approximations, and the theory cannot be scientifically tested but is based on the logic of the works referred to above. It should also be noted that only a temporal coincidence can be claimed between the emergence of modern spoken language and the extinction of large parts of the megafauna in areas where humans migrated to.

6 | SOCIETY AND LANGUAGE-BASED COMMUNICATION: THE FIRST SOCIOTECHNICAL AUTOPOIESIS MACHINE

Although we cannot determine a date for when modern spoken language emerged, we can reason that the cooperation in the population of hominins was previously governed by inherited instincts, mediated through genes, where learned knowledge perished when individuals

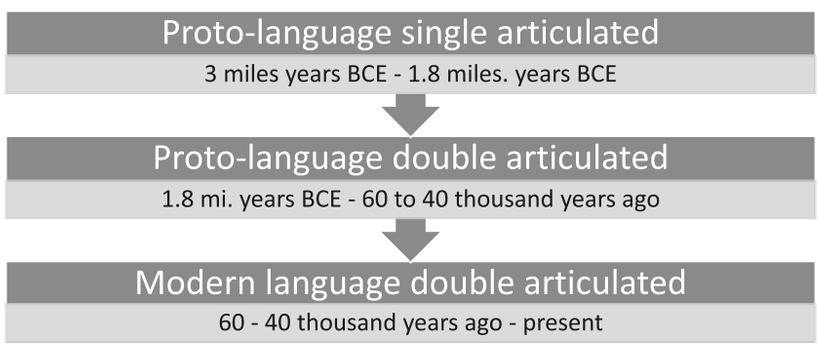


FIGURE 2 Three phases of spoken language. [Colour figure can be viewed at wileyonlinelibrary.com]

died. As long as the sum of experiences lost to death is greater or equal to the amount passed on to the next generation, there is no accumulation of experience (Weisskopf, 1964). At some point in evolutionary history, humans exceeded this barrier, in a leap from properties inherited in nucleic acids to oral transmission (ibid, p. 213).

In human development, protolanguage has increased the accumulation of knowledge in structural coupling with the genetic transfer of properties. This knowledge may have acted as a kind of supplement to the inherited properties, without actually decoupling the social from biological determination. Even hominins with a protolanguage, consisting only of gestures and single articulation, would have had an advantage in evolution. With double articulation, humans have gradually built up complexity, in co-evolution between new/more neural connections and increasingly advanced linguistic syntax, which eventually provided the critical mass for the emergence of both real modern language and the modern human as we know it today.

According to Luhmann (1995, p. 153), language can be seen as a threshold that enables the emergence of the social as an autopoietic system. A system that increasingly began to regulate larger parts of human coexistence. At this threshold, the psychic system also differentiated out as a self. From this moment, humans had to determine themselves to follow socially constructed norms and develop the ability to postpone need satisfaction. The reason is that the social level of system formation became self-reflexive with modern spoken language since language enabled communication about communication (ibid). This constructed what this text understands as the first sociotechnical autopoiesis machine. In regulatory terms, this machine consists of linguistic communication in structural coupling with incorporated psychic systems that are aware of their environment, including the body, and with the material environment consisting of food, technology like fire and weapons, climate and so forth. Through spoken language, it was possible for the social to differentiate itself from what did not communicate in this spoken language and set itself as a machine that incorporated humans under its organization, with rules for and knowledge about, for example, tool use. According to Luhmann (2012), the social then begins to differentiate internally into segments. Differentiation is the way society divides itself, and through which complexity is managed (see Tække, 2022a). In a segmentally differentiated society, society divides itself into families, villages and tribes. When a unit becomes too large (complex) to be managed through spoken language, a group moves away and establishes a unit similar to the one they came from. A new tribe is established and organized in the same way as the one they have separated from. There will also, over time, develop a centre-periphery differentiation between the mother tribe and the others, where, for example, they meet periodically to trade (Luhmann, 2012).

In Figure 3, we see the first sociotechnical autopoiesis machine. It has interpellated humans by setting norms and rules for them through spoken language-based communication, providing them with a framework for understanding life, or in other words, the machine has subjected humans. The biological needs were now processed through consciousness, guided by social norms and knowledge, whereby 'humanity' began its transformation of itself and its environment.

It is such a machine that transforms the human animal into a Stone Age human and which must be considered the real agent for the further cultivation (transformation) of plants, animals and the environment. Humans were interpellated by a machine that, with its connections to technology, fire, meat, dog and with language to coordinate between the psychic and social, made humans hyper-adaptive (e.g., they could survive in different types of climates). This extremely complex machine continuously transformed itself and its environment and thus itself again.

At the same time, it can be discussed whether the social, in its operational closure, quickly developed logic and norms that are harmful to its living environment (and thus to its own basis of existence).

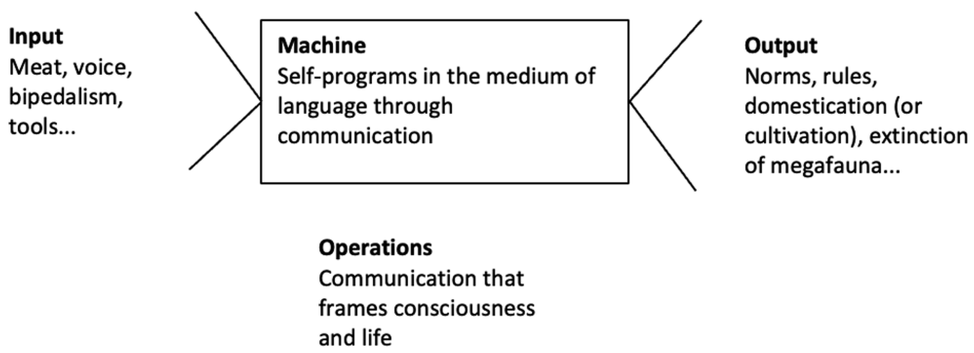


FIGURE 3 The machine based on spoken language.

7 | THE MACHINE PLUS THE WRITTEN MEDIUM

There are many stages in the development of writing, and its early beginnings trace all the way back to the Pleistocene.[5] Around 7000 to 8000 years ago, the development of proto-writing began to accelerate in Mesopotamia through the use of clay figures representing animals, wine and crops to support memory related to ownership, accounting, trade and travel activities (Hallager, 1997, p. 15). About 5000 years ago, the first writing systems were developed for all forms of communication. Writing societies differentiated into strata and thereby developed pyramidal societies with a god-king at the top and slaves and/or peasants at the bottom (Luhmann, 2012). Already in Mesopotamia, sundials, water clocks and calendars were developed, and people were enumerated in large river dynasties where they had to pay taxes or serve as slaves. The god-king and a stratum of priests and noblemen sat at the top of the intensely religious hierarchical system. Humans were again transformed into a new type of cyborg, and based on writing, they developed a spoken language with many more words and much greater knowledge than we saw in the previous media society. Science, philosophy and administration were developed, navigation across open seas was mastered, and with the written medium's relatively larger spatial bias, empires spread across vast areas (Innis, 1991). The expansive reach of dynasties was based on administration and thus conditioned by writing (Clark, 1992, p. 11). The Romans colonized vast territories and built up to 80 000 km of roads for administration, troop transport and trade (Madsen, 1991, p. 73). The people of the written age typically could not read, but they simply lived in a society that existed in structural coupling to writing. Mathematics, physics and the study of tools and materials made great leaps, leading to the construction of aqueducts, canals, ports and the development of agricultural tools, such as increasingly efficient plows (Nielsen et al., 1990; Madsen, 1991).

In Figure 4, one can see that the machine increasingly begins to transform its own output to input. Although the earlier machine (Figure 3) primarily used the original natural resources, there is now less wild nature and more domesticated crops and livestock. With writing, the machine itself gains entirely new possibilities for administering resources, locations, and for subjecting individuals and determining processes.

It is a machine that effectively distinguishes between inclusion and exclusion. If one falls on the wrong side, one is killed or must live outside society as an outlaw. It is the machine that is the subject of power, and it sets the goals one wishes to achieve; the honour one can achieve is socially constructed, the food and the wine, the jewellery one might desire is now a socially processed output. Nature has been transformed into domesticated animals and plants, to sword and plow, to your land and my land, to money, and the human itself has been transformed into an individual who is born, lives and dies in the same strata.

8 | THE MACHINE PLUS THE PRINTING MEDIUM

With the printing press, the machine gained a new component, further potentizing its capabilities. Maps serve as a good example: Over 600 maps have been preserved from the period from the year 300 to 1300, and in them, there is no progression in either thought or precision. What eventually leads to precise maps is the feedback process between those who make the maps and those who use them, which was not possible before the printing press (Eisenstein, 1983). Only with the printing press was it possible to compare one's own observations with the knowledge that was already 'stored' in society. Through reading books, humans learned about themselves and others, for instance, what a prince was like and how he should act. At the same time, one could read about the past and compare texts, and once the legacy of antiquity was in order, the Renaissance human could focus on the development of new knowledge. This was especially true for technical knowledge; now one could compare results, get feedback, make adjustments and share knowledge. With letters, maps, compasses, ships and cannons financed capitalistically, the machine became more powerful than ever, and the exploitation of the third world and the world's natural resources truly accelerated. With coal-driven steam engines, the machine once again expanded its capabilities, and industrialization shaped the world to such an extent that we are now discussing the Anthropocene. The form of differentiation in society also changed in the wake of the printing medium. The stratified society gradually divided into functional systems, so systems such as politics, religion, economy, law and science became separated and closed around their

[5]von Petzinger (2017) has identified 32 geometric signs that recur in European cave paintings, but signs have also been found on mussel shells dated back 100 000 years (Tylén et al., 2020). See Logan (2004, p. 17) for an overview of the development of writing from 15 000 BCE onwards. Speculatively, it cannot be ruled out that the development of proto-writing, for example, the signs found in cave paintings, has gone hand in hand with the development of modern language and cognitive abilities.

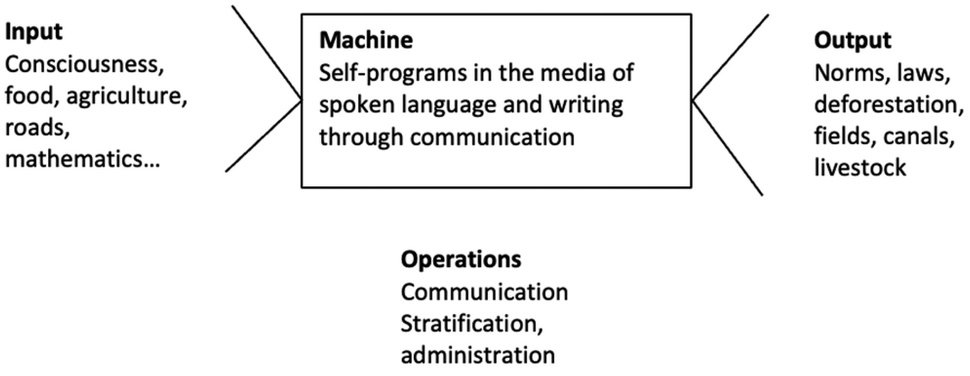


FIGURE 4 The machine based on spoken language and writing.

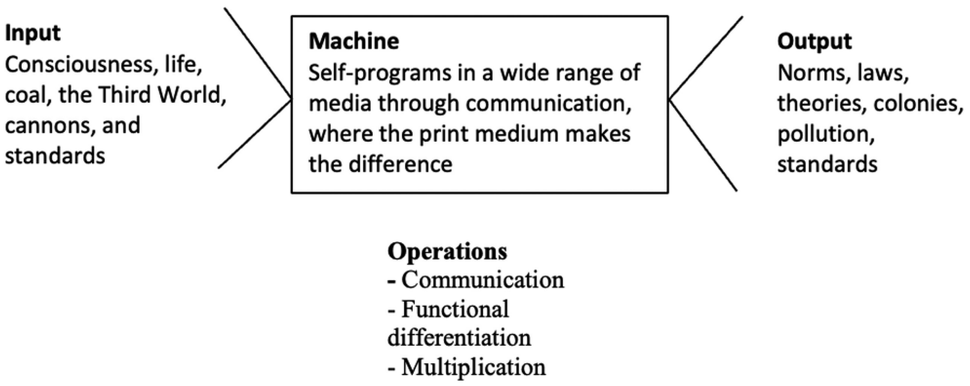


FIGURE 5 The machine based on spoken language, writing and the printing medium.

individual functions (Luhmann, 2012; see also Tække, 2022a). The functionally differentiated society is a society without a unifying centre; one could say that it transitioned from being anthropocentric to being polycentric, as each functional system began to observe from its own perspective. For instance, science observes from the perspective of what is true, whereas the economy observes from the perspective of what is profitable (Figure 5).

Latour's (1990) concept of inscriptions can capture essential features of the significance the printing technology had for the machine. An inscription can be incorporated into a text, it has optical consistency so it can be moved from one context to another through perspective, and its postulate can be tested based on clearly defined common rules. Inscriptions pave the way for the scientification of the world and have major political and economic consequences. An example is how Europeans, using map technology, could mark and rediscover islands in the Pacific; set up diagrams of population, minerals, soil, flora and fauna; and compile all of it in economic and military calculations on investments and profit (ibid). Another example could be European health policy, where the various warring states in the 18th century began to care about the health of their populations, as population size and health were an important parameter in the states' mutual competition. It is about scientification and regulation, which can be captured by Foucault's (2008) concept of biopolitics. Measuring instruments and tables stabilize objects that otherwise must be observed as multistable (Ihde, 2001). However, with inscriptions, the machine begins to set standards for health and how one should live. With Luhmann (1995), one can observe the problem in such a way that no communication exists outside of society, which can only observe the outside world through its own semantics, and with functional differentiation, even only centrelessly based on the various subsystems' code. With functional differentiation, the subsystems constitute each other's social environment in an interdependent but mutually exclusive system, where the subsystems are closed around their own code (Luhmann, 2012). However, the economy seems to have had primacy, so both knowledge and power were put behind the profitable exploitation of the world's resources.

9 | THE MACHINE PLUS ANALOG ELECTRONIC MEDIA

Although many could read in the print society, there was much one did not know about each other because of

perceptual barriers to information (Meyrowitz, 1985). For example, one could not know what a politician said to another audience, or know how others behaved in other arenas than each individual had physical access to. This situation changes with the analogue electronic media, where, for example, one could not speak off the record in live broadcasts. With analogue electronic media, all citizens, regardless of gender, age, profession and social class, gained insight into society and into others' backstage. This created a new information situation where everyone (around the world) wanted to achieve the same privileges and rights as the white, American, heterosexual, Christian, middle-class man—especially women (ibid). People from all over the world wanted a house, car, TV, meat, rights and vacation trips, and TV commercials showcased consumer goods, and again the planet had to provide resources.

The machine in Figure 6 depicts the trajectory of a media society that consumes vast amounts of fossil fuels in its pursuit of consumer goods. However, it must be remembered that a large part of the world's population still lived without causing significant pollution—not because they did not want to, but because they did not have the opportunity. The machine drove everyone towards success criteria, showcased by role models who drank cola, ate meat, drove large cars and flew on vacations. In the developing countries, people also dreamt such dreams while struggling through an existence where they mainly lacked clean water, sanitation, fuel and food, in a world that was increasingly marked by overpopulation and pollution. The media epoch with its functional differentiation also saw the rise of protest movements, including the environmental movement. These movements appeared as part of a growing periphery that began to challenge the power centre with alternatives and budding ideas about green energy and social justice. They seek to link functional systems such as economics, politics, science and law, but inside the machine lie strong values and logics that are difficult to separate from capitalist logic, with profit maximization and competition over nature seen as a resource. The machine's social programming and power structures dictate the possible life for the individual. The result is a strong individualization in a functionally differentiated society, where the machine determines inclusion and exclusion, distributed according to Bourdieu's forms of capital. The sympathy is humanistic, but the distribution is unequal, and the natural basis is transformed into lifestyle products and identity markers. Despite the fact that since the 1972 report 'Limits to Growth', science has conveyed knowledge about the ecological disaster associated with fossil combustion, the machine continued. This happened even though society had gained an unprecedented ability to disseminate knowledge and information with electronic media. To explain this, one can consider that everything we know, according to Luhmann (2000), is something we know from mass media. The problem is that the reality created by the mass media is produced based on informational value, and what has informational value is decided internally by the different media organizations (ibid). Despite the transparency that a medium like TV offers, and the topic was not illegal, other agendas than environment and climate took precedence in informational value, along with broadcast slots that were mostly filled with entertainment and sports, only interrupted by frequent consumer ads. Overall, the centreless communication of functional differentiation did not respond to the warnings from science and the environmental movement. Functional systems only operate through their own code, which is why politics, economics and law did not adjust their perception of what was profitable, what one could be elected on or what was right. The machine's functional, instrumental and profit-oriented algorithm led to fossil-fuelled production, for example, of artificial fertilizers and pesticides, leading to both more CO_2 emissions and pollution and a biodiversity crisis. The inscriptions and subjectification mainly supported the destruction of nature, even though in the free world, we

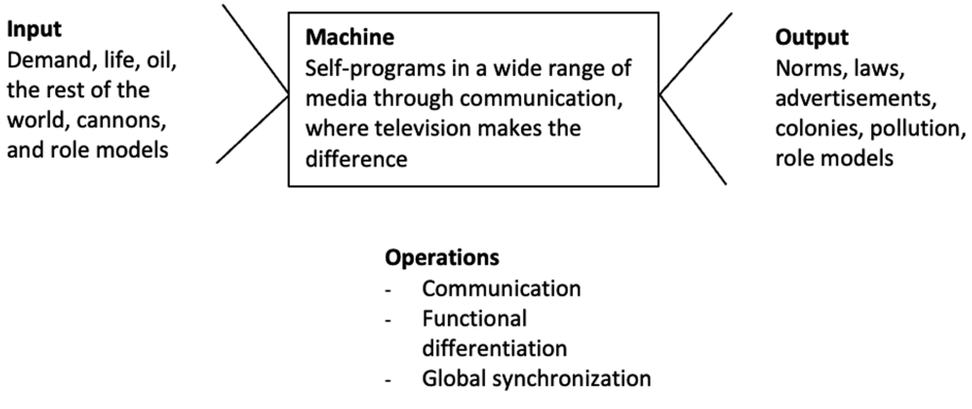


FIGURE 6 The machine based on also analogue electronic media.

also had a counterculture, with a diametrically opposite discourse—however, as we now know, it had no power to change the direction towards the destruction of the biosphere.

10 | THE MACHINE PLUS DIGITAL MEDIA—THE BATTLE FOR THE MACHINE

With digital media, we fundamentally do not yet know how the development will continue. Will we see a new form of differentiation? Will the machine be reprogrammed? Will the computer save us, or will it give us that final push over the edge concerning our natural foundation? Or will it, or those belonging to the absolute power elite, who at the time of writing, own almost all the value in the world, in some constellation, with digital media mutate into a decisive new being, a *Homo Digitalis*, in a transformation that leaves Sapiens as livestock, as a mere resource? The questions are too many and the answers too vague, which is why I will only attempt to outline how the machine, which now has digital media as its fundamental technology, seems to operate.

The experience from previous media revolutions is that the initiation period brings a lot of unrest and many problems, but it is also the experience that many new structures that emerge, carried by the new media, replace the old ones (Tække, 2019, 2022a). Modern societies are now governed and regulated by machine-learning algorithms using big data. This applies from the economy to the health system, transport system, social care system, to the education system—although to varying degrees within different sectors in different states. This requires an almost all-encompassing surveillance of citizens' behaviour. With the digitized form of inscriptions, large amounts of data are collected about users so that the individual user's behaviour can be subjected to psychometric analyses, allowing for user profiling. Subsequently, the user can be punished or rewarded, or as is most common now, nudged, both economically and in terms of attitude, including being included or excluded, depending on the specific coding (see Tække, 2022a). But potentially, one can also get the right diagnosis and treatment in the health system, the right benefit in the social care system, the right price for a bus ticket or the relevant articles, movies or responses from chatbots. Digitalization raises urgent questions about transparency concerning how algorithms operate in a democratic context.

In Figure 7, the sociotechnical autopoiesis machine is seen in its current form. As a starting point, media are neutral and can be used for both good and evil in a normative sense. However, what is good versus evil is contingent in the sense that there is no consensus on what specifically falls on one side or the other of the distinction (Luhmann, 1993). However, the specific coding of a system is currently non-transparent, as digital media, because of their functional architecture (see Finnemann, 1999), always already, on a deeper, invisible level for the user, are programmed with specific preferences, values and logics (Tække, 2022a, 2022b). One can argue that they have a special materiality, where communication takes place through an always already programmed infrastructure that controls and co-constructs the communication (Tække, 2022b). It can be said that the norms are programmed into the medium itself, so the machine's regulation of humans now takes place at a new level, where it is not up to the individual to judge the fate of another based on printed guidelines. Now, the machine can practically step in and make the judgment. For example, in relation to biopolitics, if the algorithm exposes you as a smoker, you go to the back of the queue for surgery, before the doctor might not know you smoked or might overlook it. Or in relation to education, if eye-tracking shows that the student has been inattentive in class or has looked at the 'wrong' things, a message is sent to the parents, who might be nudged or punished to correct the child. Currently, those who have the power to program the machine are those who determine which values govern citizens' opportunities—and

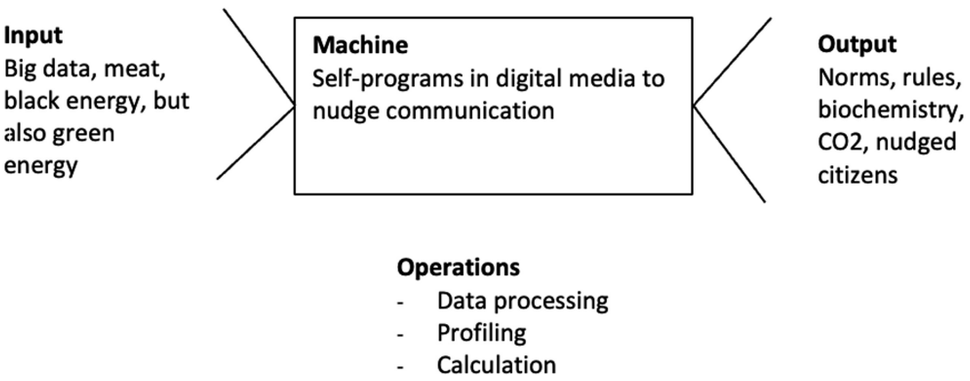


FIGURE 7 The machine also based on digital media.

this can in principle be done democratically and with protection of minorities—and/or environmental protection in mind.

Currently, we see what can be observed as the struggle for control of the new communication infrastructure. This, of course, has huge implications for the climate and environment, for example, in terms of consumerism, investments in black energy, which goods are offered, nudging of habits and so forth.

Paulsen and Tække (2022) outline three scenarios, three machine types for the societies of the future. One is a state-controlled big-data machine, inspired by China, seen as the totalitarian surveillance state, where citizens are nudged and forced through registration and calculation of some form of social points that determine the privileges, opportunities and punishments citizens receive. Here, it is the state that programs the machine with the values and logics that govern inclusion and exclusion in society.

The second model is a market-driven business model, inspired by the USA, seen both as neoliberal (Han, 2016) and as surveillance capitalism (Zuboff, 2019). The big five (Meta, Amazon, Apple, Microsoft and Alphabet) are responsible for the apps, social media, shopping opportunities, transport options and information opportunities citizens have (Dijck et al., 2018). The societal institutions are also predominantly commercial enterprises, so the healthcare system, banking system, transport system and school system operate through Silicon Valley and for profit. Citizens live in apparent freedom but are profiled and nudged to an extent that is not inferior to the state model. Neither model is conceived of as evil, but for the good of the people/the individual (Paulsen & Tække, 2022).

The third model is understood as the democratic model, where big data is used in a transparent and democratically determined way. Preferably deliberatively, so that those profiled, along with their allies, for example, guardians of schoolchildren, can decide who watches, what is measured, and with what consequences. Education requires students to take a critical stance and to have the necessary knowledge (knowledge of big data), to take the perspective of the common good (and now we can add the perspective of the biosphere) and to choose existentially who they become through their actions (ibid). This last model is, of course, a utopia—but even this utopia is no guarantee that the biosphere will be anything other than a subject on the digital curriculum.

Back in the present, computer models have for a long time given us the rationale we act on. Watson et al. (2021) criticize, for example, the climate models because the values that the algorithms are modelled after have supported capitalist business as usual—a 'let's burn now and pay later logic'. Watson et al. (2021) show that the models have been used to argue for postponement of efforts, recognition of probable technological developments and so forth. At the same time, it is hard to imagine how we are going to solve the problems without using digital technology. So far, the observation of the outside world depends on the logics programmed into the algorithms. What it will look like in the future is unclear at present, but it is likely that the sociotechnical autopoiesis machine in the new media environment will work on this problem. It is up to the machine itself to condense its forms (the structures of society), and we are probably heading towards a new basic form of differentiation (algorithmic differentiation), depending on computers, so the machine will program itself in a tight coupling to algorithms that distribute people in space and time as frictionless resources (Tække, 2022a). Here, one must remember that artificial intelligence has no knowledge of the world, has no ontology, but only syntactically produced representation.[6] Only the human animal has semantics but has been subject to the machine since the modern spoken language.

Luhmann (2012, vol 2, p. 108) points out that functional differentiation makes a concerted effort to avert the ecological catastrophe impossible. There is no coupling system (ibid, p. 115), no coordination of irritation and no central surveillance (ibid; see also Jönhill, 1997). Earlier in the book, Luhmann (2012, vol 1, pp. 182 and 249) is open to speculations that digital media (the computer) can influence the social structure (see Tække, 2022a, for elaboration). As I have touched upon, one can imagine that digital media become the focal point of the machine so that individuals are included and excluded based on profiling determined by the machine's values. But further, one can imagine that human contributions are still sorted according to the different codes of the functional systems, but that the machine is at the centre of all transactions and transformations. There are experts who believe that the problem with the programmed goals and values in the algorithms is just a digital childhood illness that can be cured by including more and more goals and values, along with programmed uncertainty in collaborative algorithms (Arora & Doshi, 2020). This could mean that artificial intelligence will ultimately save us from human irrationality and from the lack of coordination options of functional differentiation.

[6]Elaborating, one could say that these are computational processes that detect statistically significant patterns based on classifications (which always suffer from what they overlook, including the value foundation the classifications are built upon).

11 | CONCLUSION

The conclusion is that humans have significantly impacted their environment, the world with its flora and fauna and increasingly its climate. It seems indisputable that the impact began as far back as the Pleistocene, increased in the Holocene and culminated in the Anthropocene. The article has shown that capitalism, as dominant in the economic functional system, is made possible by media socio-evolution, as a logical continuation in a new media environment, from the printing society onwards, of the social system society's modus operandi. This system is what this text has described as a machine, as a sociotechnical autopoiesis machine, which it has traced back to the Pleistocene. The machine's self-destructive functionality was established with spoken language, after which the destruction of the biosphere has been exponentially increasing, from the first extinctions and burnings, through the extinction of the megafauna, the cultivation of landscapes, animals and plants, to the biodiversity and climate crisis that characterizes the present. The transformation so far seems to have exchanged other parts of the biosphere for more and more people, cultivated plants and livestock, into a monoculture that threatens its own existence.

The theoretical crux is whether the text succeeds in presenting a satisfactory and comprehensive model with the machine. The argument is that in the distant past, following the selection of bipedalism, humans began to develop an increasingly advanced language in dialectical correlation with the development of a larger and larger brain, transition to eating more meat, increasing tool use, exploitation of fire, companionship with the dog and so forth in a spiral where more and more advanced social patterns again led to the selection of more advanced proto-languages, larger brains, more advanced tools and so forth. It seems plausible that at some point, a critical mass existed that made possible the emergence of modern spoken language and thus the machine. The theory following is that the machine with the language medium led to knowledge and culture accumulating from generation to generation. According to Luhmann (1995), the social level of system formation emerges precisely with spoken language, as it makes the social a self-referential system. This leap means that individuals become subjectified and that in the medium of language, they begin to perceive themselves from the machine's linguistic 'instructions'. A leap that decisively wrenches humans from biological determination, only to subject them to a high degree of social determination, as there are no self-descriptions, knowledge, culture and so forth outside the social. Unwittingly, as an immediate animal among others, through spoken language, humans have been interpellated by the sociotechnical autopoiesis machine that itself emerged through the same spoken language, transforming humanity and its capability. This higher-order being (society) subsequently produces and reproduces the structures under which humans live. The theory argues that the machine's self-destructive effects (destruction of its natural basis) are due to humanity's animalistic natural foundation (desire, fear and aggression on one hand and compassion, love and protective instinct for one's offspring on the other) and constitute the basis for the machine's initial programming and thus its most basic functional structure. The machine's initial algorithms evolved over a foundation that can be understood as symbiotic mechanisms and what Fitch (2010, p. 428) calls primate Machiavellian intelligence.[7] The machine has initially maintained its autopoiesis in a harsh environment, where distinguishing between in-group and out-group (inclusion/exclusion), securing food sources and ensuring its offspring have been crucial to its structural experiments. Systems theoretically either have autopoiesis or not; if structural experiments do not lead to the system maintaining itself in its environment (or for example destroying this environment), it ceases to exist. Systems are always already adapted to their environment, and my argument is that the machine, when it emerges, is born with a series of structures that it has not since gotten rid of (and which apparently were successful, but which now threaten the machine's, and thus humanity's, basis for existence). Attempts have been made within religions (love thy neighbour) and humanism (e.g., human rights and Bildung), but these attempts have been species-egoistic (anthropocentric), seen from the current scientific observations that say our natural foundation is threatened by our social structures, by the machine.

There is no eco-Marxism behind this analysis; there is no subscription to any critical theory; it is simply a descriptive analysis. Despite the bleakness of the analysis, part of the conclusion is that we are currently in an open situation, as we cannot predict how digital media will affect the machine, or rather, how the machine will use the new media.

ETHICS STATEMENT

This article does not contain any studies with human participants or animals performed by any of the authors. Thus, ethical approval was not required for the research presented.

[7]Luhmann (1995, p. 250) uses the term 'symbiotic mechanism' to describe how the body is a source of disturbance and differentiation, for example, how politics is based on physical power.

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RESEARCH ARTICLE

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Stakeholders self-organization and adaptive governance in social enterprises: Membership representation, worker control and client orientation

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Abstract

The article uses elements of complexity theory, social systems theory, and new institutionalism to analyse stakeholder self-organization in Italian non-profit social enterprises. Organizational development goes through an evolutionary process of trial and error, in which stakeholder self-organization produces governance rules and routines to achieve adaptation and resilience in a changing socioeconomic environment. Survey data regarding social cooperatives, which are prevalent in Italy as a form of social enterprise, display how diverse stakeholders engage in self-organization and self-positioning within key governance bodies of membership and board of directors. The results demonstrate that in the absence of investor ownership, producers, especially paid staff but also volunteer workers, assume the main responsibility for decision-making and control. Client orientation, the production of economic and social value in favour of customers and users, is achieved in a context of high relational intensity through participation in the co-production and co-creation of services, as well as the pooling of non-commercial resources and favourable price discrimination, less through participation in decision-making and control. This emerging evolutionary pattern can support the development of new organizational and business models for social enterprises.

KEYWORDS

adaptive governance, client orientation, social enterprise, stakeholder self-organization, work control

1 | INTRODUCTION

This paper uses complexity theory, social systems theory and new institutionalism to highlight how different stakeholder groups can self-organize and self-position within the boundaries of organizational governance in social enterprises. Self-organization leads to developing polycentric governance, which in turn supports achieving high degrees of resilience (Roth & Valentinov, 2020; van Assche et al., 2019), since active stakeholder participation can generate information dissemination, knowledge, and cooperative coordination (Valentinov, 2021). Given their hybrid nature and their tendency to pursue social and community objectives, social economy organizations, such as cooperative social enterprises, have shown a strong inclination towards the pursuit of stakeholder welfare (Vidal, 2014; Sacchetti & Borzaga, 2021; Tortia & Troisi, 2021). Consistently, some countries have developed appropriate legal frameworks that allow the creation of composite memberships and decision-making

bodies representing different stakeholders. This is the case, for example, of social cooperatives in Italy (introduced by special law no. 381 in 1991), which are characterized by mutualism and pursue public benefit objectives, as required by their statutes.

The legislation provides for one or more stakeholder groups to create the organization, and to be included in governance bodies (especially the membership and board of directors), at later stages of organizational development, paving the way for complex interactions, strong relational ties, and inclusion, mutual recognition processes, co-optation and consultation of new stakeholders. Different stakeholders (e.g. paid workers, voluntary workers, clients/users, funders, associations, the local community) can self-position themselves in governance in very different ways, in some cases with decision-making power and membership rights, in other cases only with consultative roles in the co-production and co-management of service provision (Blandi, 2018; Victoravich et al., 2023).

The paper exploits data from an Italian survey on social cooperatives, which includes a nationally representative sample of 210 organizations producing social services. The data allow a detailed description of the composition of the membership and boards of directors, indicating which stakeholders are most represented and the number of different stakeholders in the organization's bodies. While paid workers are almost always represented both in the membership and the board of directors, customers/users rarely are, which raises the question of how their participation is ensured. Surveyed managerial assessments show that the main channels of customer/user participation are consultation and the distribution of resources in their favour.

At the theoretical level, the main research questions focus on how social groups with different motivations self-organize to govern complex organizational processes and adapt to internal and external socioeconomic conditions. Specifically, when the social environment is presented with intertwined sustainability issues requiring resilience and adaptability, multi-objective and multi-stakeholder approaches can enhance environmental responsiveness beyond the pursuit of private benefits (Valentinov et al., 2021). At the empirical level, the paper discusses how adaptation is supported by self-organization and self-positioning of stakeholders in the main governance bodies of social enterprises, considering also the creation of welfare for customers/users (Tortia & Troisi, 2021).

The methodology of the work follows the logic of quantitative/qualitative discovery and abductive reasoning that arises from the observation of empirical anomalies and can generate new nomothetic theories (Bamberger & Ang, 2016; Hanson, 1960). Problematizing the phenomenon in question and probing emerging anomalies can lead to theoretical and practical implications. Although descriptive statistics does not allow the generalization of results, it can provide clear emerging evidence to support the development of new scientific propositions that serve as the basis for the formulation of testable hypotheses (Schickore, 2022).

The descriptive evidence presented is not intended to represent a test of any specific empirical hypothesis, but simply to illustrate the ideas developed in the first part of the paper using real-world data. It provides exemplification, but not statistical confirmation. While the conceptual discussion represents the main thrust of the paper, the formulation of a series of empirically grounded propositions at the end of the paper can serve as a starting point for further conceptual elaboration and the appropriate specification of testable hypotheses.[1]

The remainder of the paper is organized as follows: Section 2 discusses the state of the art and sets the theoretical framework; Section 3 discusses self-organization, adaptive governance, and complexity in social enterprises; Section 4 highlights and discusses empirical evidence based on survey data; Section 5 presents a brief discussion of the evidence and concludes.

2 | BACKGROUND LITERATURE: COMPLEXITY, ADAPTATION AND THE SELF-ORGANIZATION OF STAKEHOLDERS

This paper studies adaptive governance from the perspective of self-organized networks of diverse social groups, each representing unique interests within organizations and communities (DasGupta & Roy, 2023). Different stakeholders draw on different social positions and knowledge systems to create new and emerging organizational forms, which have the character of "bridging organizations". As it favours the achievement of higher degrees of social homeostasis (Mukerjee, 1966), adaptive governance has the potential to increase social welfare by enabling better coordination among stakeholders, conflict resolution and reduction of exclusion costs (Sacchetti & Borzaga, 2021; Tortia & Troisi, 2021).

In complexity theory, adaptive governance is seen as arising from the dense interactions between the components of the organizational system. Participatory governance and deliberation can manage complexity more

[1]The same descriptive empirical evidence is partly present, in a different format and without conceptual elaboration, in some existing publications (Borzaga et al., 2011; Depedri, 2007).

effectively than traditional, hierarchical governance systems because they challenge attempts to coordinate from a centre, reduce problems to a small set of controllable variables and create standardized and centralized routines and practices. Complexity amounts to an open-ended process that makes system outcomes unpredictable and difficult to control, if not through the creation of ad hoc dynamic governance systems (Wagenaar, 2007).

Adaptive governance promotes resilience in the face of strong changes in the economy and the social environment by improving coordination and stimulating organizational innovation and interactions in communities. The development of small-scale adaptive mechanisms enhances resilience by managing complexity within organizational boundaries (Lampel et al., 2014; Tortia & Troisi, 2021; van Assche et al., 2022). In socially oriented organizations such as social enterprises, organizational innovation addresses social problems by engaging stakeholders, civil society organizations, local businesses and research centres.

On the other hand, complex stakeholder interaction can also slow down responses to change, engender opportunistic moves, opposition and confrontation and complexify deliberative processes, thus increasing organizational costs understood as a specific typology of transaction costs (Hansmann, 1996). To face these challenges, inclusive governance structures develop their own working rules and routines to improve adaptability and forestall deviant behaviours (Ostrom, 1990; Borzaga & Tortia, 2017). Adaptive management is often contrasted with traditional management approaches, which focus on the optimal allocation of resources, as an approach necessary to deal with complexity and potential conflict (van der Brugge & van Raak, 2007; Victoravich et al., 2023). Dietz et al. (2003) discuss adaptive governance as a structure that can co-evolve with adaptive management to address economic and social problems (Folke et al., 2005; Victoravich et al., 2023). Adaptive governance can help unravel social dilemmas and trade-offs, as offered by the triple-bottom-line approach (Elkington, 1997). Adaptive management becomes the way to apply this approach to govern changing and unpredictable events (Boyle et al., 2001; Victoravich et al., 2023).

Resilience is understood as the capacity of an organizational system to cope with change, absorb disturbances and preserve or even evolve core functions to reorganize structures and activities, through internal and external feedback and adaptation (Folke et al., 2005; Lampel et al., 2014). Resilience requires new forms of organizational behaviour that support the management of change (Victoravich et al., 2023). It serves as a framework for studying how structures and routines respond to social feedback (Boonstra, 2015; Denyer, 2017). In addition to considering the amount of change a system can undergo without losing control over its functions and structure, resilience refers to the degree and acceleration of self-organization, learning and adaptation in the system (Lampel et al., 2014). Resilient behaviours have an impact on adaptive systems and can generate social development by enhancing effective routines and organizational innovation, even in contexts of sudden change and radical uncertainty. Correspondingly, resilient socio-organizational systems use feedback mechanisms and proactive responses to change to increase the adaptive capacity of groups and social structures (Folke et al., 2005).

The concept of "self-organization" was first used by Ashby (1947) and then imported into economics and social systems theory under the labels of spontaneous order and autopoiesis, respectively (Luhmann, 1995; Valentinov et al., 2021). It refers to the self-organizing dynamics of complex systems, in which the available energy is used to achieve multiple interactions between the components of the system. Each subsystem of a complex system adapts to the environment formed by all other subsystems after random perturbations, in a process that has been defined as complexity out of noise or order out of chaos (Prigogine & Stengers, 1984). The emergence of order from local interactions between initially disordered parts derives from spontaneous processes of random fluctuations, which are amplified by positive feedback. It does not require the control of any external agent and, as a rule, the resulting organization is fully decentralized and distributed throughout the system components. Guided self-organization refers instead to intentional and regulated self-organization, for example through the introduction of working rules or governance systems that can support the spontaneous development of new organizational routines. Regulatory constraints can enable complex systems to achieve specific forms and goals of self-organization by limiting and linking local interactions between system components without predetermining outcomes and interactions. The improvement of the internal structure and/or functionality is achieved by combining global goals or teleology with task-dependent constraints on local interactions (García-Valdecasas, 2022).

Recent contributions such as Gilbert et al. (2015) suggest that there are four elements common to different definitions of self-organization dynamics: pattern formation; autonomy; robustness; and resilience. The dynamics of a self-organizing system refer to change and include several different typologies of pattern formation and measures, such as cooperation, segregation, layering and standardization. Autonomy refers to processes that have no predetermined coordination or centralized forms of control. Robust social systems can face perturbation without breaking down at any point in time

(synchronically), while resilient systems endure unwaveringly (diachronically) despite change (Anzola et al., 2017; Lampel et al., 2014; Tortia & Troisi, 2021).

Complex network architectures address systemic coordination problems involving heterogeneous groups with limited local information and crucially include self-organization, which implies that order arises from spontaneous decentralized interactions between system components (Roth, 2018; Witt, 1997). Spontaneous interaction can generate novelty and change in the form of new structures and dissipative processes that affect the utilization of economic energy gradients, such as social and organizational innovation or new management models (Bellandi et al., 2021; Foster & Metcalfe, 2012). Emerging processes of open innovation and trial-and-error experimentation can support social innovation and adaptation at the community level as well (Pavitt, 2002; Robert & Yoguel, 2016). The pursuit of community needs requires adopting a collaborative and user-centred approach, promoting a participatory organizational culture and integrating users throughout the innovation process through design thinking and intrapreneurship (de Souza João-Roland & Granados, 2023).

The literature on self-organization and adaptation has also highlighted the importance of organizational routines since in the evolutionary tradition routines allow firms to act without deliberation and constitute the organizational memory through which the firm operates and develops its productive and entrepreneurial potential. Routines can regulate internal conflict by supporting deliberative actions that reconcile divergent interests and plural motivations with the goals of the organization. As mentioned earlier, organizational innovation can take the form of overcoming existing routines while creating new ones. In this area, routinized processes act as stabilizers of the organizational environment, while overcoming uncertainty and creating innovation (Nelson & Winter, 1982; Hodgson, 2003; Witt, 2011).

In society, coordination within and between governance structures can be considered a key attribute of any complex system, whose behaviour cannot be easily reduced to its elementary components (Robert & Yoguel, 2016). Emergent properties are the result of causally cumulative processes and interactions between components of different institutional layers (Kapp, 1976; Williamson, 2000). Positive and negative network feedback is embedded in the history of the organizational system and different initial conditions reinforce idiosyncratic path dependence (the system is not ergodic). In this sense, as self-organization focuses on problems of coordination and emergent novelty, multi-stakeholder governance (MSG) can be interpreted as a network of co-interested and co-motivated actors that elaborate common rules and new organizational solutions through collective action. Networks are composed of incomplete connections in which local interactions prevail over global ones and feedback can generate coordination but also divergent pathways, and instances of contention between actors (Sacchetti & Tortia, 2016; Tortia & Troisi, 2021).

3 | SELF-ORGANIZATION, ADAPTIVE GOVERNANCE AND COMPLEXITY IN SOCIAL ENTERPRISES

Multi-stakeholder organizations in the social economy are often characterized by adaptive governance and stakeholder self-organization, which requires the reconciliation of heterogeneous interests and motivations in line with the pursuit of economic sustainability and different social goals. In this field, social enterprises are often thought to have originated from non-profit organizations (NPOs) that adopted an entrepreneurial stance and management style, while also considering the heterogeneity of their membership and of the composition of stakeholders (Dees, 1998; Hansmann, 1980; James & Rose-Ackerman, 1986). Thanks to their composite governance and hybrid nature, social enterprises (SEs) favour the creation of social value for clients/users, beneficiaries, and the local community (Poledrini & Tortia, 2020).

3.1 | The new institutionalist perspective

Although the spread of multi-stakeholder organizations in which more than one stakeholder group is represented in governance is, to date, a limited phenomenon, it has proven to be more common in social economy organizations than in more traditional sectors of activity and organizational types. One possible interpretation of this evidence is related to the non-profit nature of social economy organizations, including social cooperatives in Italy. Since these organizations are reported to produce highly relational and non-standardized services (Blandi, 2018; Poledrini & Tortia, 2020), the presence of high transaction costs due to asymmetric information, contract incompleteness and opportunistic behaviours may lead to contractual failure in different markets, especially in the contractual relationships with employees and client/users. Consequently, to achieve the reduction of transaction costs in multiple markets, the internalization of the effects of different contractual imperfections within organizational boundaries is necessary (Sacchetti & Borzaga, 2021).

In such circumstances, Coase's (1937) argument about the nature of the firm can be taken up once again and renewed, as contractual costs on the market may outweigh the costs of organizing plural relationships within organizational boundaries (Sacchetti & Borzaga, 2021). In other words, organizations can be created not only to substitute markets with intra-organizational administered relations when markets are not efficient, but also to overcome single-stakeholder governance in favour of MSG when the former fails to achieve efficient outcomes due to multiple contractual failures in different markets. Indeed, multi-stakeholder participation in governance can even enable better quality of production and service delivery, higher social value production, and social innovation through improved information flows and the creation of organization-specific knowledge and routines (Bellandi et al., 2021; Borzaga & Tortia, 2017). MSG can also reduce social costs, especially "exclusion costs", understood as the costs of marginalization of weaker stakeholders (e.g. workers with difficulties in finding stable employment or disabled job seekers). These groups can be helped through direct or indirect participation as beneficiaries of the organization or by reducing the amount of public subsidies that support them (Sacchetti & Borzaga, 2021). In MSG, after subtracting the positive variation of the organizational costs of membership (e.g. decision-making and coordination costs) and adding the negative variation of the costs of contractual failure and exclusion costs to total potential net surpluses, the total amount of economic and social value produced by the organization may increase compared to the case of single-stakeholder governance. In this new institutionalist interpretation, stakeholder self-organization can enhance economic efficiency and adaptation, as different stakeholders can coordinate and contribute effectively to the reduction of transaction costs and contractual failures, and to the production of social value within a unified governance struture. Better adaptation can enable social economy organizations to produce services of general interest in conditions where neither private enterprises nor public authorities are able or willing to do so due to low profitability, lack of public funding and insufficient organizational flexibility and innovation (Tortia, 2010).

3.2 | Complexity, self-organization and adaptation

Stakeholder self-organization is likely to be an integral part of the emergence and development of multi-stakeholder governance in social economy organizations, since, once single-stakeholder governance has been overcome, the self-positioning and relative importance of different stakeholder groups in governance does not occur ex-ante but must be determined during the development of the organization itself, from its early stages to maturity. Self-organization and self-positioning are autonomous and self-reinforcing processes that induce greater internal complexity as well as better external adaptation (Anzola et al., 2017; Luhmann, 1995, 2018). Coherently, in this paper the concept of self-organization refers to the autopoiesis of social systems, whereby the organization self-produces its own governance rules, including working rules, within the constraints set by law, thus developing autonomous organizational routines that are strictly connected to collective action and active participation of stakeholders (Luhmann, 1995; Valentinov et al., 2019; van Meerkerk et al., 2013; Euler & Heldt, 2018).

We take the Italian national case, where social cooperatives (*cooperative sociali*, SCs hereafter, were introduced by Law no. 381 in 1991) are characterized as non-profit, multi-stakeholder, mutual-benefit social enterprises. In this type of hybrid organization, governance requires that each stakeholder pursues both self-seeking (economic) and social objectives (Doherty et al., 2014). Public bodies, financial members and private companies can be members of the CS and sit in the BoD, but they are not allowed to control the organization (have a majority of votes). On the other hand, employees, volunteers and clients/users can be members of the governing bodies without any restrictions, so they can control the organization even in isolation, or by combining their presence in the membership.

Italian CS legislation recognizes the possibility for different stakeholders to hold control rights, without prioritizing or postulating the presence of any of them, and without indicating a minimum or maximum number of stakeholders represented in the organization's bodies. This means that stakeholders are free to self-organize and decide which stakeholders are present in the organization's bodies. In addition, stakeholders can expand the membership by co-opting new social groups. These institutional characteristics offer a unique possibility and a privileged social context to study self-organization and adaptation within organizational boundaries in social enterprises.

Relative stakeholder self-positioning involves a complex process of mutual recognition in a dense network of interpersonal relations. It arises to achieve efficient production and remarkable social impact when organizational costs are discounted. In this process, stakeholders seek the identification of functions and routine solutions aligned with organizational goals (Edelenbos et al., 2018). Furthermore, when more than one stakeholder has control over decision-making, second-tier structures, such as arbitration and conflict resolution committees, are

expected to emerge to reduce the expected costs of conflict and other inefficiencies in decision-making processes (Ostrom, 1990; Rupasingha et al., 1999).

When self-organization and self-positioning are at work, the interplay between self-seeking and social goals produces an open-ended process without endpoints, optimal solutions or equilibrium (Tortia & Troisi, 2021). The outcomes of the process cannot be predicted in advance, but relevant organizational patterns can be observed and studied, for example, the formation of controlling coalitions and new organizational routines. Change improves dynamic adaptability to internal and external conditions over time. The process is best interpreted not in terms of optimality, but in terms of effectiveness and adaptive fitness. Outcomes depend fundamentally on the dominant motivations of stakeholders, their social bonds, and economic interests. The role of the institutional framework is to enable potential behaviours (motivations) to be realized, while limiting deviant behaviours (e.g., opportunism and abuse of power; Hannachi et al., 2020; Ostrom, 1990; Ruzavin, 1994; Tortia & Troisi, 2021).

Social enterprises in the social services sector function as a nexus of relationships between different stakeholders, building on multi-stakeholder dialogue and deliberation locally (Hannachi et al., 2020; van der Brugge, & van Raak, r., 2007). Although this contribution focuses on organizational behaviours and objectives, rather than on the community at large, in some national cases community self-organization, interactive governance, and attention to social problems enabled the goals and interests of broad social groups to be captured (Edelenbos et al., 2018). Similarly, in environments populated by social enterprises, the production of services with strong relational content requires co-production and co-creation with the participation of different stakeholders (beyond managers, also employees, volunteers, clients/users and local public authorities, Pestoff, 2012, 2020). The collective collaborative effort is based, in this case, on complex combinations of top-down directives and design on the one hand, and the active participation of service beneficiaries, users and grassroots practitioners on the other (Blandi, 2018). In this process, co-creation is seen as a practice that brings solutions to planning, implementation and service delivery requirements to take advantage of opportunities arising from evolving customer needs (Jalonen et al., 2020).

3.3 | Worker participation in control and client orientation

In the social services sector, the non-profit constraint can alleviate the negative effects of contractual failures not only in terms of external agency relations (between the organization and its clients, Hansmann, 1996) but also in terms of internal relations (between the organization and its employees, volunteers and service providers; Bacchiega & Borzaga, 2001). In this context, active involvement and self-organization can be seen as ways to manage internal agency to achieve better adaptation and resilience. The relationship between the organization and its stakeholders (especially clients/users and workers) comes to the fore (Lampel et al., 2014) and requires to deepen the analysis of labour relations and contracts, and of the social impact or customer orientation of the organization (Fedele et al., 2022).

The difficulty in assessing the quality of employee performance is mainly due to the incompleteness of contracts, the difficulties of supervision and the relational and non-standardized nature of the services provided. These elements would make nonprofit firms better suited to achieve efficiency through worker participation, autonomy, and deliberation rather than command-and-control supervision (Blandi, 2018; Lampel et al., 2014). It stands to reason to envision that explicit worker participation in governance may represent a critical next step in the institutional evolution of such organizations.

Other related literature highlights the active role of different stakeholders in non-profit enterprises, which are often created and managed by client associations to produce those social, cultural and educational services that the market and public authorities do not produce or produce inefficiently (e.g. cultural and artistic performances, as in Ben-Ner & Van Hoomissen, 1991; Tortia, 2010). In such cases, these organizations can also be created by demand-side actors (especially clients/users), or also by producers, often defined as social entrepreneurs, who select those projects that best favour the creation of social value for the community or society at large (Young, 1983).

4 | EMPIRICAL EVIDENCE: WORKER CONTROL AND CLIENT ORIENTATION IN ITALIAN SOCIAL ENTERPRISES

The empirical evidence provided in this paper is descriptive and is based on data from a national survey of social enterprises (social cooperatives) in the Italian social services sector, conducted between 2005 and 2008 by a group of five Italian universities in Trento, Bergamo, Brescia, Reggio Calabria and Naples. It has no statistical significance or confirmatory purpose but serves an illustrative aim, i.e. it is used to exemplify how the

arguments concerning self-organizations and self-positioning of stakeholders developed in the first part of the paper are substantiated and can be observed at a given point in time. Unfortunately, the data do not allow us to accurately describe the entire process that unfolded from the reform that introduced social cooperatives in in 1991. However, some elements of this process appear very starkly, for example, the predominance of producers (salaried workers and volunteers) in the governing bodies of these organizations.

The survey included a sample of 310 nationally representative organizations, matched with 4,134 salaried workers. In 2003, before the start of the survey, the Italian census of social cooperatives recorded 6,159 organizations, of which 3,707 were type A cooperatives, 1979 type B and the rest mixed or consortia (ISTAT, 2006). Type A cooperatives produce social services, while type B cooperatives reintegrate weak people, such as the disabled and former drug addicted or convicted, into the labour market. The sample data were stratified by geographic area (northwest; northeast; central; south and islands), size in terms of the number of employees and type of cooperative (type A and type B). In the overall sample, there are 217 type A and 93 type B cooperatives. In this paper, we use the data relating to type A cooperatives only to preserve as far as possible the homogeneity of the organizational form studied. The questionnaires were drawn up by the directors or other managers.

The organizational questionnaire is used to ascertain the multi-stakeholder composition of the two main governing bodies, the assembly of members and the BoD. In addition, data on client orientation are added to show how the organization can not only take into account the objectives of producers (especially salaried workers) but also the welfare of stakeholders who do not contribute to production and do not have decision-making rights, especially clients/users. This evidence contributes to understanding how governance adapts to internal and external social socioeconomic conditions, while at the same time producing social and economic value for all stakeholders and for the community at large.

4.1 | The multi-stakeholder nature of organizational governance in SCs

Self-positioning is understood as the positioning of each individual stakeholder in relation to the others within the governance structure (e.g., some stakeholders may take on a decision-making role, while others may merely take on an auditing or advisory role), since each stakeholder can actively participate in decision-making and lead the organization but it is not forced to do so by law or other regulation. In this process, the co-optation of external stakeholders into the membership of the cooperative by the incumbents plays a key role, as not all stakeholders will be actively involved from the moment of the organization's creation. The complex interplay between motivations, interpersonal relations, norms, organizational objectives and stakeholder positioning creates an open-ended process of adaptation without predefined endpoints, which brings into play new organizational routines, experiences and dynamic capabilities (Zollo et al., 2016).

Among the members of Italian social cooperatives, 10 different stakeholder groups are possible: paid workers; customers/users; voluntary workers; generic supporters; financial partners; private non-profit institutions; private for-profit institutions; public institutions and financial institutions.

The description of the composition of the membership base shows that paid workers represent the most important stakeholder group, being present in 98% of the 201 type A cooperatives for which data are available (Table 1). Volunteers represent the second most relevant stakeholder group (present in 54% of the organizations). In most cases, volunteers are active workers employed in other companies or as civil servants (Marino & Schenkel, 2018). Although they cannot elect more than 1/3 of the board members, financial members represent the third largest stakeholder group and are present in approximately one in four organizations.

SCs are predominantly multi-stakeholder organizations, although the law does not prevent them from being mono-stakeholders, which is the case in 69 organizations (34% of cases). In all but two of them (67 out of 69), employees are the only stakeholder group. In 76 cooperatives (38% of cases), there are two stakeholder groups, in 33 organizations (16%) three groups, in 14 organizations (7%) four groups and in 3 organizations (1%) five groups. This implies that increasing the number of stakeholders increases organizational complexity and may increase organizational costs more than proportionally since it can require the development of specific organizational constraints and governance rules.

As for the Board of Directors, the most represented stakeholder group was again paid workers, present in 91% of cases, followed by volunteers, in 32% of cases and financial members, in 9% of cases. Clients and users are recorded in 4% of cases, and financial partners in 9% of cases. The presence of non-member board members is recorded in 9% of cases, while institutional members are found in 8.5% of cases (Table 2).

In 108 organizations, only one stakeholder group was elected in the BoD (in 54% of the cases), which was salaried workers in all but one case. In

TABLE 1 Stakeholder composition of the membership base.

Type of member	Count	Percent over total (217)	Average	Median	St. dev	Coefficient of variation	Max	Min
Worker-member	188	0.98	60.78	19.50	128.29	2.11	895	2
Disadvantaged worker-members	14	0.07	2.69	2.00	2.06	0.76	7	0
User-members	19	0.10	9.67	3.50	17.61	1.82	76	0
Individual volunteer-members	104	0.54	10.14	6.00	10.63	1.05	58	1
Supporter-members	20	0.10	20.30	8.50	34.60	1.70	157	0
Financial members	31	0.16	15.87	3.00	49.29	3.11	273	0
Private nonprofit institutions	19	0.10	1.95	1.00	1.58	0.81	6	0
Private for-profit institutions	3	0.02	0.50	0.50	0.71	1.41	1	0
Public institutions	2	0.01	0.50	0.50	0.71	1.41	1	0
Financial institutions	9	0.05	4.57	1.00	8.22	1.80	23	0

TABLE 2 Stakeholder composition of the board of directors.

Type of component	Count	Percent over total (217)	Average	Median	St. dev	Coef. Var.	Max	Min
Worker-member	183	0.91	5.23	4.00	4.80	0.92	35	1
Volunteer-member	66	0.33	3.40	3.00	3.74	1.10	27	1
User-members (including disadvantaged workers)	8	0.04	2.38	2.00	1.41	0.59	5	1
Financial-members	18	0.09	2.00	1.00	1.94	0.97	8	1
Representatives of private non-profit institutions	6	0.03	1.80	1.00	1.79	0.99	5	1
Representatives of private for-profit institutions	0	0.00					0	0
Representatives of public institutions	1	0.005					0	0
Non-member component	18	0.09	2.11	1.00	2.27	1.08	10	1
Other	17	0.08	1.59	1.00	1.00	0.63	4	1
TOTAL	200	1.00	6.37	5.00	5.58	0.88	56	1

73 organizations, two stakeholder groups were elected (36%), in 17 organizations three groups (8%) and in three cases four groups (1%), which represents the maximum number (Table 2; Depedri, 2007).

4.2 | Client orientation

Social enterprises produce complex care services with strong relational content. Increasing the quality of these services often requires complex combinations of top-down directives and bottom-up active involvement of service providers and beneficiaries, creating processes of open innovation, co-production and co-creation that involve different stakeholders (Jalonen et al., 2020; Pestoff, 2012). Co-creation is seen as a practice that engages customers to contribute solutions to the planning, implementation, and delivery of services (Jalonen et al., 2020; Lampel et al., 2014). Although customers are rarely present in the membership and on the boards of Italian social cooperatives (only in about 4% of cases), the fundamental importance of customer orientation can be demonstrated in several different ways, first of all by referring to Law 381/1991, which, in its Article 1, defines the social cooperative as an enterprise created to "pursue the general interest of the community in the human

TABLE 3 Importance of accountability instruments (mission statements, social balance sheet, ethical codes).

	n.	Average	St. dev.	Corff. Variation	Mode	Median	Min	Max
Make activities known to relevant stakeholders and give them information	197	4.54	1.73	0.38	6	5	0	7
Attract new clients or consolidate existing relationships	195	3.58	1.66	0.46	4	4	0	7
Serve as a system of self-assessment	203	5.58	1.29	0.23	6	6	0	7
Create greater mission awareness among members and workers	201	4.90	1.49	0.30	6	5	0	7
Improve relations between the cooperative's stakeholders	191	4.34	1.62	0.37	4	4	0	7

promotion and social integration of citizens". The general interest of the community is partly reflected in the statutes and mission statements of SCs and includes the interests of service users.

Descriptives in Table 3 (Likert-scale scores from 1 to 7) show how accounting tools can bring significant improvement in the production of social value and well-being for stakeholders. As can be seen, mission statements, social balance sheets, or ethical codes are considered especially crucial for the self-assessment of the organization's operations, but also for creating mission awareness, informing stakeholders about the organization's activities and, finally, for improving relationships between the cooperative's stakeholders.

Several other pieces of evidence on the importance of client orientation can be found in the ICSI survey. One question of the survey shows that the organizational form of the social cooperative plays a key role in user satisfaction (it is important or very important for 64% of the respondents). Furthermore, when asked whether the inclusion of clients/users is a positive thing because it improves social inclusion, the average score is 5.2 on a 1 to 7 Likert scale, while the modal score is 7. When asked whether the quality of services is one of the important elements of the organization's social mission, 68.3% of the respondents answered in the affirmative. Especially, when asked whether interaction with clients/users is important for the organization in terms of "trust", "quality of relationships" and "mutual understanding", the scores were respectively 6.49, 6.61 and 6.43 on a 1 to 7 scale. In all three cases, the modal and median response is 7. The quality of services provided as an element of the cooperative's strength receives a score of 3.65 on a 1 to 4 scale, and both the modal and median responses are 4. Finally, in terms of results, when managers are asked how they evaluate the results achieved by the cooperative in terms of its relations with clients/users the mean score is 8.17 on a scale of 1 to 10, while both the modal and median scores are 8. Other contributions using the same data have shown that the well-being of users is the main determinant of job satisfaction for both paid workers and volunteers in SCs (Michelutti & Schenkel, 2009).

In terms of participation in decision-making, the results regarding client/user involvement are not unequivocal. On a Likert scale of 1 to 3, the ICSI data show that customer participation in strategic and operational decision-making is limited but not irrelevant (average score of 1.68). On the other hand, clients/users are regularly informed about decisions taken by the cooperative (score of 2.18) and, as a rule, the cooperative creates stable channels, formal or informal, for client consultation (score of 1.79). This evidence confirms that, in general, clients/users do not have decision-making power, although they seem to be quite involved in organizational programs directly and indirectly through consultative processes, co-production and information flows.

Table 4 shows the managerial evaluations (1 to 3 scale). Based on the governance rules explicitly developed by the organization, employees are more involved in decision-making than clients/users. On the other hand, information and education tools target workers and clients/users in much the same way. As for voluntary workers, they seem to follow a similar pattern as clients/users, but they are also relatively more excluded from information and education tools. This evidence can be interpreted as a sign of the adaptability of the governance structure, as producers and operators (more paid workers than volunteers) participate in decision-making to improve organizational capabilities and to better exploit their organization-specific information, knowledge and relational skills. On the other hand, clients/users are cared for, consulted and informed about production and service provision.

Client orientation is recognized as a fundamental dimension of organizational activity since clients/users are among the main SC stakeholders and beneficiaries. On the other hand, when workers' welfare is analysed

TABLE 4 Workers involvement and client orientation.

		N.	Mean	St. dev.	Coeff variation	Mode	Median	Min	Max
(a) Are they involved in the strategic decisions of the enterprise?	Workers	200	2.42	0.57	0.24	2	2	1	3
	Client/ user	194	1.68	0.59	0.35	2	2	1	3
	Volunteers	184	1.63	0.72	0.35	1	1	1	3
(b) Is participation guaranteed by specific rules or regulations?	Workers	194	2.43	0.72	0.30	3	3	1	3
	Client/ user	187	1.79	0.78	0.43	1	2	1	3
	Volunteers	175	1.79	0.83	0.43	1	2	1	3
(c) Are there information/educational tools related to the enterprise's activities aimed at the stakeholder?	Workers	188	2.38	0.58	0.24	2	2	1	3
	Client/ user	185	2.15	0.70	0.32	2	2	1	3
	Volunteers	185	1.79	0.83	0.32	1	2	1	3

more closely, it is observed that salaries are relatively low compared to other organizational forms (public institutions, private companies and other non-profit organizations), but employment is stable and paid workers considered the organization's procedures to be very fair (Tortia, 2008, 2010; Valentinov, 2021). This implies that a high degree of employee control over the organization seems to provide higher non-monetary well-being, especially in terms of perceived procedural fairness and employee motivations, and this positive aspect can counterbalance a low degree of wage satisfaction, leading to an adequate degree of employee well-being in terms of overall job satisfaction (cf. Lampel et al., 2014; Tortia, 2008; Tortia & Troisi, 2021). At the same time, the data also show that workers act as "collective entrepreneurs" who sponsor the satisfaction of other stakeholders' needs as well (Burress & Cook, 2009; Ribeiro-Soriano & Urbano, 2010; Spear, 2006; Stewart, 1989).

4.3 | Distributive function

The improvement of client/user welfare is also pursued through the so-called "distributive function" of SCs, which is defined as the amount of surplus resources deployed to achieve social goals and the provision of services below market value or free of charge (Borzaga et al., 2011). Surplus resources can be measured as part of the potential added value directed towards the achievement of social purposes (e.g. sale of services below-market prices) or also as surplus inputs in the production of services, (e.g. use of non-market resources such as voluntary work, in-kind and financial donations, re-use of existing unused public buildings or common resources). These additional resources enable the production of additional unpaid economic value benefiting clients/users, beneficiaries and the wider community. They can be seen as the economic embodiment of client orientation, as they increase net benefits without monetary equivalent.

Also price discrimination can serve as a mechanism that allows for the allocation of resources in favour of clients/users in SCs, given their non-profit nature. As clients/users do not run the risk of the organization exploiting its information advantages to increase profits, stronger relationships of trust are created between them and the organization, which usually induces clients/users to disclose more truthful information about their ability and willingness to pay for the service (Hansmann, 1980, 1996). In turn, following a pattern of positive reciprocity, the organization can use this information to set lower prices for individuals or groups who are unable to fully pay for the service without renouncing the possibility to achieve break-even (cf. Ben-Ner & Van Hoomissen, 1991; Grillo, 1992).

Furthermore, the subjective assessment of managers in the ICSI survey shows that SCs distribute some services for free to all their clients/users in more than 52% of cases, some services for free to people without sufficient ability to pay in 40% of cases and sell their services below market price in one-third of cases (Borzaga et al., 2011). In addition, a substantial proportion of SCs distribute resources to society at large (35.5%). Finally, a high proportion of SCs (in 83% of cases overall) explicitly develop services to protect clients/users and meet their needs (50% occasionally, and 33% systematically).

When examining the input contributions to free-of-charge service provision, the most relevant sources are, in descending order of importance, resources accumulated to the asset lock (non-distributable capital

reserves derived from the reinvestment of non-distributed earnings, in 34% of cases), voluntary work (23% of cases), other resources obtained through cost savings (19% of cases), overtime or unpaid work (partial work donations, 12.5% of cases). Moreover, cooperatives with a stable and significant distributive function more often pursue social benefit objectives (83% vs. 70% of cases) and are characterized by a democratic management style (53% vs. 27%). Therefore, it appears that the more democratic the managerial style, the wider the distribution of resources, and the greater the positive welfare effects for society. Correlation coefficients support the idea that the "distributive function" allows SCs to increase social welfare without exchange equivalent in a way that is unique to this nonprofit organizational form, since the distribution of resources is positively correlated with (i) the intensity of actions benefiting clients and users (5% significance level); (ii) the number of stakeholders that are part of the organization (1% significance level).

4.4 | Discussion and final propositions

The empirical evidence presented in this paper shows an evolving pattern that has features aligned with what Valentinov and Roth (2024) state in a recent contribution "... while transaction cost economics perceives informal relationships as facilitated by formal governance structures supported by contractual safeguards, stakeholder theory is open to the possibility that some informal relationships between stakeholders may be genuinely moral." (p. 10). The authors emphasize that formal governance and contractual safeguards protect stakeholders against the risk of opportunism and favour the reduction of transaction costs, as established by Williamson's (1998) transaction cost economics. This process usually results in the implementation of relational contracts, in which contract incompleteness is filled by interpersonal relations between stakeholders. Valentinov and Roth (2024) propose an extension of Williamson's framework that would add moral interpersonal relations between stakeholders based on "fairness, reliability, respect, loyalty, care, and cooperation" (Jones & Harrison, 2019, p. 77). In this paper, the empirical findings, especially in Tables 3 and 4, show that SCs try, to varying degrees, to involve key stakeholders in the firm's strategic decisions, engage them through their own governance rules, and inform and educate them. These elements are consistent with what Valentinov and Roth (2024) define as endogenous safeguards to remedy the limitations of formal governance (Stoelhorst & Vishwanathan's, 2022). On the other hand, these organizations also seek to inform stakeholders about relevant activities, consolidate stakeholder relationships, create greater mission awareness among stakeholders and improve stakeholder relations. Indeed, in addition to the formal governance rules, these elements seem to be based on fairness, reliability, respect, loyalty, care and cooperation (Jones & Harrison, 2019). In other words, a new evolutionary process based on relationality and the active interaction and participation of stakeholders can be envisaged. This process will require more detailed analysis and theorizing in future research work.

At the present stage, since this empirical evidence can be used as quantitative or qualitative pattern discovery and heuristic cue to build a new theory of business models design and governance in the social economy, it is necessary to conceptualize and reconstruct it in the light of background theory on self-organization and adaptive governance. With this objective in mind, the following final propositions are put forward, which are likely to become testable hypotheses in future empirical work:

i. in multi-stakeholder social enterprises, different stakeholders self-organize and self-position themselves within the governance structure to pursue the social missions of the organization. Adaptation and resilience result from this process of mutual recognition and coordination;
ii. producers, especially paid workers but also volunteers, assume the role of the main decison-maker in governance (both in the composition of the membership and in the Board of Directors) and represent the only active stakeholder in a substantial share of cases (about 1/3);
iii. non-profit social enterprises actively pursue the welfare of clients/users, who benefit from and participate in the organization, but do not control it. In more detail, not-for-profit social enterprises:

a. pursue the welfare of users and weaker social groups by involving all key stakeholders in governance;
b. consider service quality and customer welfare as their most fundamental objective;
c. consult and inform client-users about the organization's activities and involve them in the co-creation and co-production of services;
d. use non-market inputs, such as volunteer labour and donations, to distribute resources below market value or free of charge to clients and beneficiaries with little ability to pay for the services provided.

5 | CONCLUSION

The combination of theoretical arguments and empirical evidence in this paper supports the idea that, given an

adequate institutional framework, stakeholders may be able to self-organize by positioning themselves in different roles and with different objectives within a pluralistic governance structure to achieve coordination, resilience, and effective production and distribution of social value. Although Italian legislation does not require that any specific stakeholder controls social cooperatives, nor that there is more than one stakeholder in the organization bodies, most social cooperatives can be characterized as multi-stakeholder. This implies that stakeholders can recognize the need to actively coordinate with each other, co-opt and explicitly include plural interests in decision-making processes.

Given the prohibition of investor control, new patterns emerge in the governance structure of social enterprises. Producers, especially salaried workers, appear as the stakeholder group with the largest share of control rights in almost all social cooperatives, while voluntary workers represent the second largest stakeholder group both in terms of membership and on the board of directors. In other words, the dynamics of governance evolution in this type of organization are producer-driven, and this is a largely unexpected outcome in the provisions of the Italian law on social cooperatives, which on the contrary is set up to favour the maximum production of social welfare for clients, beneficiaries and the community. Unexpected and anomalous empirical evidence can represent an important heuristic cue in a process of scientific discovery. It can lead to new findings and the construction of theories, even starting from simple descriptive evidence, as in this work. Indeed, worker control in social enterprises, combined with customer orientation, can be seen as a new evolutionary pattern in the social economy, substantiating further investigation of the institutional design of new organizational and business models.

Just as von Hayek (1937, 1945) described an epistemic open-ended process of evolution of the economy dictated by the allocation of resources in the market, through the coordinating role of the price system, other authors (Valentinov, 2021) propose an extension of the Hayekian approach that could overcome the mere reliance on the description of the role of the price system and include instead also the intentional coordination between different stakeholders as a way to obtain and generate new subjective information that can be used to improve social processes and create non-zero-sum game gains in terms of additional social value. In this contribution, this open-ended process materializes in practice in multi-stakeholder governance and may open up new evolutionary potentials in organizational forms, such as the social cooperative, whose objectives are not dictated by a single stakeholder (the investors), but by a plurality of actors intermingling and reconciling their motivations and interests in the development of new organizational patterns (including governance rules and self-developed organizational routines). This novel evolutionary perspective of stakeholder theory needs much additional theoretical and empirical work, but the study of existing multi-stakeholder governance structures can dig the initial seeds of this relatively new scientific inquiry. While the primacy of investors may unnecessarily restrict information flows, the creation of firm-specific knowledge and the development of interpersonal and inter-stakeholder relationships, a more open scheme in which any stakeholder (or more than one) can take the initiative, create new organizations and then, co-opt other stakeholders as active participants in governance or as active beneficiaries and co-producers, has the potential to move towards new organizational frontiers in which profit production is not any more the dominant objective of the organization. Profit-seeking would become instrumental to the achievement of new and better organizational outcomes, especially broader societal goals.

The illustrative evidence showed that, indeed, worker control does not appear to be incompatible with the inclusion and welfare enhancement of stakeholders who do not hold decision-making power, especially users and beneficiaries of services. In contrast, social cooperatives attach great importance to the pursuit of their welfare and the establishment of mutual trust and recognition. Inclusion is achieved through processes of consultation, co-production and co-creation of services, while non-market resources and price discrimination are used to improve clients' and users' welfare.

Self-organization and governance adaptability seem to be not only positive but also necessary organizational factors of pluralistic governance in the production of relational services. The spontaneous interaction between different stakeholders and their relative self-positioning in the roles of producers, decision-makers, financers or service recipients creates a trial and error process that can be conducive to adaptation to change and resilience in unpredictable and challenging internal and external conditions. Future research can consider stakeholder self-organization as an emerging new paradigm and as a benchmark for assessing and measuring the adaptive features of existing organizational and business models in the social economy.

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RESEARCH ARTICLE

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Moral and managerial perspectives on cooperatives: Towards a Luhmannian reconciliation

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Abstract

The recent literature on cooperatives includes two distinct and partly conflicting strands. The moral strand emphasizes cooperatives as a sustainable alternative to shareholder capitalism, while the managerial one problematizes the maintenance organizational costs that must be incurred by these organizations. To reconcile the disparity between these strands, we develop a Luhmannian view of how cooperatives navigate the precarious relationship between the economic function system and the societal environment. On this basis, we show that the maintenance organizational costs plaguing many cooperatives are indicative of an imperfect business case for providing a sustainable alternative to shareholder capitalism. Consequently, we view these costs as a reflection of the heightened managerial challenges involved in pursuing elevated moral objectives.

KEYWORDS

business case; cooperatives, Luhmann's systems theory, moral case

1 | INTRODUCTION

When cooperative scholars discuss the nature of cooperative identity, they often refer to Draheim's (1955) double nature thesis, which posits that cooperatives embody a 'double nature' that intertwines their economic and social dimensions. Today, the double nature of cooperatives is discussed in terms of hybridity (Draperi, 2021), organizational duality (Novkovic et al., 2022) and the nature of cooperatives as 'commons' (Azzellini, 2018; Novković & McMahon, 2023; Tortia, 2018). The double nature of cooperatives often poses a formidable managerial challenge arising from the need to navigate the tension between their economic and non-economic objectives and characteristics (cf. Mooney & Gray, 2002; Novkovic, 2012; Puusa et al., 2013). At the same time, according to Novkovic et al. (2022), cooperatives may be able to productively harness this tension and in this way maximize their socio-economic impact. This task, however, requires that the nature of this tension, and the underlying organizational duality of cooperatives, is thoroughly understood.

The contribution of the present paper is in suggesting a new interpretation of this duality, which we apply not to cooperatives per se, but rather to observational perspectives applied to cooperatives by cooperative scholars. Following Graetz and Smith's (2008, p. 475) understanding of duality as 'the simultaneous presence of competing

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and ostensibly contradictory qualities', we take these qualities to refer to those observational perspectives that can be characterized as (predominantly) moral and (predominantly) managerial. The key theme of the perspectives that we take to be (predominantly) moral is that cooperatives present a form of sustainable organizing (Waldner & Rasche, 2023) that not only presents an alternative to the mainstream model of shareholder capitalism but may also subject this model to transformative change (Novkovic, 2022). In contrast, the perspectives that we take to be (predominantly) managerial highlight the challenges faced and strategies employed by cooperative managers to enabling their organizations to compete in an increasingly turbulent and hostile business environment. In recent cooperative scholarship, managerial perspectives are well exemplified by the examinations of the cooperative life cycle (Cook, 2018). Scholars working in this tradition have focused their attention primarily on agricultural cooperatives that face high maintenance organizational costs, which can be kept at a reasonable level by invoking special cooperative managerial capabilities, such as 'cooperative genius' (Iliopoulos & Cook, 2023).

While the literatures that adopt moral and managerial perspectives may not frequently intersect, it is important to acknowledge the potential for their mutual undermining. From a moral standpoint, the substantial challenges involved in managing cooperatives highlight the inherent limitations of this organizational form as a viable alternative to the prevailing shareholder capitalism model. Conversely, from a managerial viewpoint, if cooperatives indeed encounter significant managerial obstacles, the moral significance attributed to them and their potential to transform shareholder capitalism may be perceived as mere empty rhetoric lacking a solid institutional foundation in the real world. Both scenarios of mutual undermining are regrettable as they raise doubts regarding the socio-economic impact and problem-solving capabilities of cooperative organizations. To address this unfortunate state of the literature, the contribution of this paper is to explore the logical complementarity between the moral and managerial perspectives. By doing so, we aim to reconcile these perspectives and bridge the gap between them.

We will base our reconstruction of the moral and managerial perspectives on cooperatives on the social systems theory of Niklas Luhmann. This strategic choice draws on the extant applications of Luhmann's arguments to exploring the limitations of both shareholder capitalism (Valentinov et al., 2019, 2021) and cooperatives (cf. Bhardwaj et al., 2022; Iliopoulos & Valentinov, 2017, 2022, 2021). These analyses, on the one hand, recognize fundamental distinctions between cooperatives and investor-oriented firms within shareholder capitalism. Most importantly, the Luhmannian scholarship underscores the differing degrees and modes of sensitivity and responsiveness to the societal and natural environment exhibited by cooperatives compared to investor-oriented firms. Cooperatives, driven by the objectives of their locally rooted members, tend to maintain direct connections with the community and often the natural surroundings, whereas investor-oriented firms tend to prioritize the objectives of their investors, who may lack strong community ties as well as interest in the natural environment (Bhardwaj et al., 2022). However, the Luhmannian perspective not only accentuates these disparities but also unveils intriguing parallels between cooperatives and investor-oriented firms. Most importantly, this perspective allows to examine both shareholder capitalism and cooperatives as social systems that maintain a precarious relationship with their broader societal environment. These parallels between cooperatives and investor-oriented firms have not been thoroughly elaborated in prior scholarship, and this is precisely what the present paper aims to accomplish. Towards this end, the next section will delve into specific tensions that arise when considering the moral and managerial perspectives on cooperatives simultaneously. Subsequent sections will then construct a Luhmannian conceptual framework for understanding the role of cooperatives within the capitalist system. On this basis, we will offer fresh insights on cooperatives from the vantage point of business ethics, thus contributing to a more comprehensive understanding of cooperatives and their societal impact.

2 | MAPPING THE TENSIONS BETWEEN THE MORAL AND MANAGERIAL PERSPECTIVES

The moral significance of cooperatives arguably goes back to Edwin Nourse's (1922, p. 577) astute observation that the cooperative movement emerged as a response to the early abuses and harsh realities of the capitalistic industrial system. Nourse (1945) further elucidated the moral transformation of the capitalist system, facilitated by cooperatives, through his concept of the competitive yardstick. By assuming the role of the yardstick, cooperatives not only incentivize investor-oriented firms to adopt fairer and more equitable pricing practices but also foster technological innovations that enhance the competitive position of their members, such as farmers (cf. Hogeland, 2007). Presently, scholars in the field of cooperatives continue to explore how cooperatives fulfil their yardstick role (e.g. Bijman & Höhler, 2023;

Westerholz & Höhler, 2022). It is widely acknowledged that this role is rooted in what Novkovic (2008) refers to as the 'cooperative difference', which is closely tied to cooperative values and principles. In view of this difference, cooperatives may indeed be supposed to 'rest on a different (not for profit, and people-centered) economic logic' (Novkovic, 2022, p. 318).

The profound moral foundation of the prevalent understanding of cooperatives is substantiated by the ICA statement of cooperative identity. This statement affirms that 'cooperatives are based on the values of self-help, self-responsibility, democracy, equality, equity, and solidarity. In the tradition of their founders, cooperative members believe in the ethical values of honesty, openness, social responsibility and caring for others'. In the context of agricultural cooperatives, Hogeland (2004) identifies additional moral elements suggested by the Jeffersonian philosophy of agrarianism. In contemporary discussions, we witness the recognition of cooperatives in textbooks on business ethics and responsibility (e.g. Waldner & Rasche, 2023), where they are regarded as an alternative form of organizing for sustainability, enabling the simultaneous pursuit of economic and social objectives. The acknowledged moral significance of cooperatives situates them at the heart of deliberations concerning the moral dilemmas inherent in capitalism. In this line, Novkovic (2022, p. 318) explicitly argues that 'cooperatives have the potential to instigate transformative change' within the current neoliberal capitalist system. She identifies the potential dimensions of this transformative change as the promotion of democracy, fair income distribution, dignity, decommodification of fictitious commodities, longevity and resilience and economic justice (Novkovic, 2022, p. 321). Building upon this foundation, Novkovic presents a compelling argument that the yardstick role of cooperatives can be interpreted in broader and more radical terms than initially proposed by Nourse (1945).

The recognition of the moral significance of cooperatives among a wide range of cooperative scholars and business ethicists appears to be juxtaposed with the examination of how even large and successful cooperatives struggle to address internal management challenges. This line of analysis is particularly prominent in the literature on agricultural cooperatives (e.g. Chaddad & Iliopoulos, 2013; Chaddad & Cook, 2004; Cook, 1995). Summarizing the extensive literature in this field, Iliopoulos and Cook (2023) identify a significant managerial challenge for these organizations in effectively managing various maintenance organizational costs, which may be related to risk-bearing, manager control, collective decision-making and securing strategic investments. It is these costs that contribute to the emergence and influence the shape of the life cycle of cooperatives (Cook, 2018) and are believed to vary across different phases of their development (Iliopoulos & Cook, 2023). Potential solutions to mitigate maintenance and organizational costs encompass a wide range of approaches. These include aligning residual income and control rights of members, enhancing member loyalty and education and even considering the possibility of cooperative liquidation or conversion into an investor-owned firm. Just as scholars advocating for the moral significance of cooperatives believe that they have the potential to fundamentally challenge the capitalist system, Iliopoulos and Cook (2023) argue that the continued survival of cooperatives amidst highly competitive global agrifood value chains may necessitate a fundamental reinvention of these organizations.

The tension surrounding the role of cooperatives has been extensively explored in the cooperative literature, often falling into two main categories. Firstly, scholars have long recognized a 'strategic misalignment' between the cooperative enterprise's associative nature and incentive structures that do not align with user-owned cooperatives (Novkovic et al., 2022). This misalignment stems from the hostile institutional environment in which cooperatives operate (Novković & McMahon, 2023, p. 30; Thompson & Valentinov, 2017). Novkovic (2022, p. 320) highlights that this environment may expose cooperatives to non-congruent isomorphism, resulting in challenges such as the need to implement competitive pricing policies and grappling with member heterogeneity, similar to the issues examined by Iliopoulos and Cook (2023). Secondly, certain economic challenges faced by cooperatives have been attributed to the application of a mainstream economic mindset, which may be misplaced in the cooperative context. According to Borgen (2004), if cooperative members adopt this mindset, they may start to view themselves as investors rather than users of the cooperative, thus experiencing the property rights structure of cooperative as distorted. If this argument is correct, one must agree, as Novkovic (2022, p. 319) suggests, that the distinct features of the cooperative enterprise call for a paradigm shift away from mainstream microeconomic foundations and towards a humanistic economics paradigm (Novković & McMahon, 2023).

Against this backdrop, it is pertinent to note that neoclassical economic perspectives often depict the property rights structures of cooperatives as suboptimal. A prime illustration is the widely recognized Furubotn–Pejovich effect, which is considered a key factor contributing to the undercapitalization of cooperatives (cf. Tortia, 2005). Originating from the influential work of Furubotn and Pejovich (1970), this effect 'occurs when capital is purchased by individuals whose horizon—in terms of using

the capital—is less than the economically useful life of that capital, and where the individuals cannot sell their rights to use the capital' (Ireland, 1984, p. 1). Especially when investments made in cooperatives by members are non-recoupable, the short-term horizon issue identified by Furubotn and Pejovich (1970) plausibly results in cooperatives facing difficulty attracting external capital. But whereas Furubotn and Pejovich (1970) based their argument on a neoclassical model (geared to the context of a Yugoslavian labour-managed firm), various deficiencies in the property rights structures of many cooperatives have been discovered by empirical studies that we classify under the rubric of managerial perspectives (cf. Iliopoulos & Cook, 2023). For example, in the 1998 study of the property rights constraints in the US agricultural cooperatives, the author found out that property rights structures of these cooperatives have been vaguely defined, thereby weakening cooperatives and undermining their transformative impact.

In summary, the managerial and moral perspectives on cooperatives have lacked meaningful dialogue, often talking past each other. Managerial perspectives focus on handling organizational costs, while moral perspectives critique and aim to transform capitalism. However, there has been a neglect of assessing the moral aspects of maintenance organizational costs and the managerial perspective on critiquing capitalism. The moral aspects of maintenance organizational costs reflect the ethical challenges and dilemmas that cooperatives face in their governance and management, such as how to balance the interests and rights of their members and other stakeholders; how to ensure the transparency, accountability and participation of their members and managers; how to deal with the conflicts, trade-offs and diversity among their members and their preferences, needs and goals; and how to align their values and principles with their strategies and practices. These aspects are important for cooperatives to maintain their identity, culture and legitimacy as social and altruistic agents that pursue multiple and diverse objectives, such as economic, social and environmental goals, and that aim to enhance the sensitivity and responsiveness of the economic system to the societal environment and the unmet human needs. The managerial perspective on critiquing capitalism reflects the pragmatic and realistic challenges and opportunities that cooperatives face in their operations and performance, such as how to adapt and compete in the capitalist system, how to generate sufficient income and capital to cover their costs and to invest in their development and innovation, how to be aware and mindful of the potential risks and threats that may jeopardize their viability and stability and how to be flexible and innovative in their structures and models. These aspects are important for cooperatives to maintain their efficiency, effectiveness and competitiveness as economic and financial agents that operate within the economic system and that need to respond and adjust to the changing conditions and demands of the market and the society.

To bridge the gap between the moral and managerial perspectives, we propose incorporating a business ethics standpoint, emphasizing the distinction between the moral and business cases. More precisely, we argue that critiquing and transforming capitalism is a moral case that, in managerial terms, may distract cooperatives from focusing on their economic and financial performance and sustainability, thus exposing them to various risks and threats from the external environment and possibly suppressing their business case. To forestall these adverse consequences for the business case, cooperatives should not be seen exclusively as moral agents that aim to critique and transform capitalism but also as pragmatic agents that need to adapt and compete in capitalism. This interpretation, though simple and straightforward, integrates the moral and managerial perspectives and highlights their logical complementarity. In the next section, we draw on Luhmannian systems theory terminology to explore the institutional mechanisms through which this complementarity is actually manifested.

3 | LUHMANN'S SYSTEMS THEORY, BUSINESS ETHICS AND COOPERATIVES

Niklas Luhmann, the eminent German sociologist and systems thinker, made significant contributions to sociological systems theory by centring his framework on the precarious nature of the relationships between the societal environment and the complexity-reducing social systems. A recent stream of Luhmannian scholarship applied this idea of precariousness to understanding the dynamics of capitalistic business, particularly from an ethical standpoint (Valentinov, 2019; Valentinov et al., 2019, 2021). Luhmann's conceptualization of the economy as a closed and self-referential system, detached from its societal and natural surroundings, highlights the potential insensitivity of the economy to its broader interdependencies (Freeman et al., 2010). This insensitivity creates a functional space for business ethics practices, such as corporate social responsibility (CSR) and managing for stakeholders (Freeman et al., 2018). Today's scholars recognize cooperatives as a variety of such ethics practices.

In this line, Valentinov and Iliopoulos (2021) argue that the complexity-reducing nature of the economic system leads to its limited responsiveness to a wide range of

human needs that fail to generate sufficient demand for products and services offered by profit-oriented investor-owned firms. According to the authors, this effect of the economic reducing function creates a functional niche for cooperatives that may contribute to addressing a broader range of human needs though mutual self-help initiatives occurring within the economic function system.

If this argument is correct, then cooperatives indeed enhance the sensitivity of the economic function system towards unmet human needs, thus expanding the system's scope to incorporate a broader spectrum of human activities. In this way, cooperatives act as pioneers, integrating novel signals from the societal environment into the economic function system. However, Valentinov and Iliopoulos (2021) argue that, according to the Luhmannian perspective, the economic function system achieves full sensitivity to these human needs not through cooperatives, but rather through profit-seeking investor-owned firms. The role of cooperatives is in nudging investor-owned to improve this sensitivity, as highlighted by Nourse (1945) in his notion of the 'yardstick effect' of cooperatives.

Simultaneously, the Luhmannian framework not only allows us to understand the functional role of cooperatives within a capitalist economy but also sheds light on the economic challenges they face. Iliopoulos and Valentinov (2017) revisited the Luhmann–Habermas debate to re-evaluate Draheim's (1955) concept of the double nature of cooperatives. They argued that this double nature implies the inherent sensitivity of cooperatives to the unique and diverse lifeworlds of their members. Logically, insofar as members' lifeworlds become heterogeneous over time, the heterogeneity of member interests grows, thereby increasing the managerial challenges faced by cooperatives.

A crucial implication of this argument is that these challenges could be less pronounced if cooperative objectives would be more uniform. In theory, the assumption of the uniformity of cooperative objectives goes back to early neoclassical economic models, which viewed cooperatives as rational organizations maximizing a single economic objective function (e.g. Furubotn & Pejovich, 1970; Ward, 1958). But even more generally, the uniformity of cooperative objectives is the logical basis of mutual self-help among members. While important strands of today's economic literature on cooperatives question the neoclassical orthodoxy and postulate that cooperatives objectives may go far beyond economic ones, even these strands make the implicit assumption that such objectives must be sufficiently widely shared by cooperative members (e.g. Borzaga et al., 2011).

In our current context, the assumption of high uniformity of cooperative objectives is closely tied to moral perspectives on cooperatives, as exemplified by Novkovic et al.'s (2022) characterization of cooperatives as 'associations of members with shared needs and goals'. Yet, the contribution of the managerial perspectives is precisely in pointing out that if the needs and goals of members were in fact highly uniform, maintenance organizations costs in cooperatives would be minimal. In today's cooperative literature, this point has been famously articulated by Hansmann (1996). He acknowledged that the lack of uniformity in members' needs and goals directly leads to high collective decision-making costs within cooperatives, thus complicating their management and governance.

The current Luhmannian scholarship has addressed these challenges by conceptualizing cooperatives as complexity-reducing systems embedded in their societal environment, which includes members as whole individuals (Iliopoulos & Valentinov, 2018). This perspective also locates the core systemic operation of cooperatives in the provision of services to members, as long as these services align with members' shared interests (Iliopoulos & Valentinov, 2018). This Luhmannian conceptualization leads to the assumption that cooperatives, as complexity-reducing systems, tend to expand their operations indefinitely, ultimately surpassing the carrying capacity of their societal environment. Since members are part of the cooperative's environment, it follows that 'if cooperatives were fully sensitive to the environment, they would not exceed the true range of common interests among members' (Iliopoulos & Valentinov, 2018, p. 5). These common interests thus serve as a limit to the environmental carrying capacity of cooperatives. Accordingly, just as many types of social systems tend to expand their operations beyond the limits of the environmental carrying capacity, cooperatives often engage in delivering services to members without ensuring that these services indeed correspond to the members' common interests. In such cases, cooperatives are likely to encounter managerial challenges, such as growing problems with member preference heterogeneity (Iliopoulos & Valentinov, 2018).

Based on the above exposition, we see that the Luhmannian systems-theoretical perspective reveals a shared foundation between cooperatives and corporate business ethics practices, such as CSR and managing for stakeholders. Firstly, both cooperatives and business ethics practices aim to enhance the sensitivity of the capitalistic economic system to the broader societal environment, addressing a wide range of human needs beyond the scope of profit-driven investor-owned firms. Secondly, by questioning the inherent complexity-reducing nature of the capitalistic economic system, cooperatives and

business ethics practices encounter similar challenges regarding economic sustainability.

Although business ethics practices often grapple with economic challenges, as seen in the disparity between the business and moral cases, similar issues within cooperatives have received less attention. While cooperative scholars recognize that cooperatives may face adversarial institutional environments leading to incongruent isomorphism (Novkovic, 2022), they have not explicitly connected the economic sustainability challenges of cooperatives to corporate business ethics practices. These parallels, however, are crucial for reconciling the moral and managerial perspectives on cooperatives. They indicate that cooperatives hold moral significance by challenging the capitalist economic system while dealing with issues emphasized by managerial perspectives, such as maintenance organizational costs. In essence, if challenging the capitalist system is the moral case for cooperatives, the prominence of maintenance organizational costs suggests their limited business case. In other words, by challenging the capitalist system, cooperatives are unlikely to gain business advantages for themselves.

4 | A LUHMANNIAN VIEW OF THE DEBATE BETWEEN THE MORAL AND MANAGERIAL PERSPECTIVES

The existence of the parallels between cooperatives and corporate business ethics practices not only invites a reconsideration of cooperatives from a business ethics perspective, as highlighted by Waldner and Rasche (2023), but also calls for a re-evaluation of the contemporary understanding of the double nature of cooperatives. Novkovic et al. (2022) propose a fresh conceptualization of this double nature by framing it within the economic philosophy of associationism. According to this perspective, cooperatives are viewed as 'associations of members with shared needs and goals' that emphasize social relations and collective action while employing a business enterprise as the means to achieve their common objectives. Novkovic et al. (2022) identify five attributes that characterize the associationist structure of cooperatives: joint purpose, joint member contributions, joint ownership, joint decision making and control and joint benefit. These attributes stand in stark contrast to the transactional characteristics of capitalist enterprises while fostering what the authors refer to as 'associative intelligence' (Novkovic et al., 2022). By enabling the synergistic nature of the cooperative double nature, these attributes present a genuine challenge to the prevailing capitalist economic system.

Building upon our systems-theoretic perspective, which underscores the similarities between corporate business ethics practices and cooperatives, we argue that the five attributes of the associationist nature of cooperatives not only pose a challenge to the capitalist economic system but also give rise to distinct issues regarding the economic sustainability of cooperatives. These issues align closely with the various forms of maintenance organizational costs discussed in the managerial perspective presented by Iliopoulos and Cook (2023). We can consider this alignment as the existence of a limited business case for the moral case, as established in the broader business ethics literature. In line with this idea, Table 1 illustrates how the specific attributes of the associationist nature of cooperatives correspond to different components of management and organizational costs. The table is structured following the elaboration of the associationist attributes of cooperatives by Novkovic et al. (2022) and juxtaposes them with the varieties of maintenance and organizational costs outlined by Iliopoulos and Cook (2023).

The table reveals that the first attribute, joint purpose, is unachievable without trust and shared values (Novkovic et al., 2022). While necessary, these prerequisites alone are insufficient for successful cooperation (Ostrom, 1990). In agricultural cooperatives, the diverse member preferences complicate the identification and cultivation of a shared purpose, requiring strategic management (Cook, 2018; Iliopoulos & Valentinov, 2022). Establishing a common purpose necessitates understanding the cooperative's multifaceted membership and overcoming divergent preferences that hinder collective goals (Hansmann, 1996). The assumption that ethical values alone will unite members is overly optimistic; it requires cooperative genius and adaptability for longevity (Cook, 2018; Iliopoulos & Valentinov, 2018). Without these capabilities, heterogeneity can lead to high organizational costs and the demise of cooperatives (Fulton & Hueth, 2009; Iliopoulos & Cook, 2023).

The second attribute, collective contributions, requires individual decisions within cooperatives (Novkovic et al., 2022). Challenges, such as illicit trade practices and organizational costs, hinder the realization of collective outcomes surpassing individual contributions (Cook, 2018). Scholarly literature and empirical research indicate suboptimal individual inputs due to free-riding, limited investment horizons and portfolio constraints (Cook, 1995; Cook & Iliopoulos, 2000). The third attribute, collective ownership (Novkovic et al., 2022), is inevitably linked to risk-bearing constraints. For Western agricultural cooperatives, the primary issue here is how the accumulation of unallocated equity through capitalization and profit retention may

TABLE 1 Moral impacts and managerial challenges of the associationist elements of the cooperative enterprise model.

Associationist roots (Novkovic et al., 2022)	Moral content	Managerial challenges linked to maintenance organizational costs (MOCs) (Iliopoulos & Cook, 2023)
Collective purpose	Promotion of mutual self-help, solidarity, trust, associative intelligence	Heterogeneity of preferences may cause friction related to the definition of the collective purpose
Collective contributions	Promotion of common action for shared goals and self-responsibility	Costs of risk bearing
Collective ownership	Promotion of priority of patronage over ownership; enabling collective capital and intergenerational transfer	Costs of risk bearing and the resulting distortion of financial incentives; undercapitalization due to underinvestment
Collective decision-making and control	Promotion of democratic control and deliberation; ensuring people-centred governance and member sovereignty	Costs of controlling managers; costs of collective decision-making
Collective benefit	Co-production of relational goods for the benefit of all members and broader community. Care for the community and ethical values result in positive and broad social, economic and environmental benefit	Costs of collective decision-making; costs of securing strategic investments; frictions induced by heterogeneity of member preferences

lead to violating service-at-cost principles, weakening member ownership, reducing control, encouraging free-riding and posing challenges during liquidation or mergers (Cobia, 1989; Kenkel, 2015). Some cooperatives, such as Irish dairy cooperatives in the 1980s, converted into investor-owned firms due to these problems (Briscoe et al., 2012). Another issue is the generational change in cooperatives that discourages current members from investing significant risk capital due to the expectation that benefits primarily benefit future generations, leading to internal free rider behaviour (Cook & Iliopoulos, 2000). The fourth attribute, collective decision-making and control (Novkovic et al., 2022), is only effective if democracy is exercised within clear rules that are aligned with ownership and control rights (Reynolds, 1997). However, dispersed ownership often leads to divergent opinions, increasing the costs of collective decision-making, control of management behaviour and conflict resolution (Hansmann, 1996; Iliopoulos & Cook, 2023). Tailored decision-making policies, like proportional voting based on patronage, are crucial for mitigating these challenges (Reynolds, 1997). The fifth attribute is collective benefit (Novkovic et al., 2022), which likewise leads to collective decision-making costs, which make complicate the process of securing strategic investments, particularly when member preferences are highly heterogeneous (Chaddad & Iliopoulos, 2013).

5 | MANAGEMENT IMPLICATIONS

The above comparison of the moral and managerial perspectives on cooperatives makes clear that the management implications of these two approaches on cooperatives may generate conflicts in several areas, such as governance, strategy and collaboration. Regarding governance, the moral perspective implies that cooperatives should uphold democratic governance structures that ensure equal participation and representation of members and stakeholders. However, the managerial perspective suggests that cooperatives may face collective decision-making costs that reduce their efficiency and responsiveness to market changes. Furthermore, the managerial perspective suggests that cooperatives might have to align members' residual income and control rights to address inequalities arising from disparities between contributions and benefits received.

Regarding strategy, the moral perspective implies that cooperatives should align their strategic objectives and operational activities with their ethical values and principles, which may entail pursuing social and environmental goals that go beyond their members' interests. However, the managerial perspective suggests that cooperatives may face risk-bearing costs that limit their ability

to invest in innovation and technology, as well as securing strategic investments from external sources. Moreover, the managerial perspective implies that cooperatives may need to adapt to the changing needs and preferences of their members and stakeholders, which may require offering flexible membership options or customized services that increase their operational complexity.

Regarding collaboration, the moral perspective implies that cooperatives should collaborate with other cooperatives and social economy actors to create a critical mass and a collective voice for challenging the dominant logic of capitalism. However, the managerial perspective suggests that cooperatives may face manager control costs that reduce their autonomy and accountability to their members and stakeholders. Moreover, the managerial perspective implies that cooperatives may need to compete with other cooperatives and investor-owned firms in the market, which may reduce their solidarity.

The Luhmannian view on cooperatives can help resolve these conflicts by recognizing the trade-off between the moral case and the business case of cooperatives within the capitalistic system. On this view, cooperatives are complexity-reducing systems that operate within the economic function system but that also enhance the sensitivity and responsiveness of the economic system to the societal environment and the unmet human needs by balancing multiple and diverse objectives, such as economic, social and environmental. This balance implies that cooperatives need to find a compromise between their ethical values and principles, on the one hand, and economic sustainability, on the other. If this compromise is successful, it may allow to reframe the double nature of cooperatives as an opportunity rather than a challenge. While this double nature is often seen as a managerial challenge arising from the need to navigate the tension between the economic and non-economic characteristics of cooperatives, the Luhmannian view re-contextualizes economic sustainability as an instrumental tool for achieving the cooperative's social objectives. Defined within this view, economic sustainability of cooperatives refers to their capacity to generate and maintain sufficient financial resources to support their operations and fulfil their social mission over the long term by ensuring profitability, managing financial risks and maintaining liquidity while also upholding the cooperative's ethical values and principles. Within this view, economic sustainability serves as a means to an end rather than an end in itself and as an enabler of the cooperative's broader social objectives, whether they be mutualistic, focused on meeting the needs and ensuring equitable distribution among members, or social, aimed at benefiting the community or society at large.

Regarding governance, the Luhmannian view suggests that cooperatives need to find a compromise between democratic governance structures that ensure equal participation and representation of members and stakeholders and efficient governance structures that ensure responsiveness and adaptability to market changes. This may require designing appropriate governance mechanisms that balance the power and influence of different groups of members and stakeholders, as well as ensuring transparency and accountability in decision-making processes. This means that whereas the moral perspective establishes the foundational principles and norms that guide cooperative governance and decision-making, the managerial perspective assumes the responsibility for translating these fundamental principles into practical operational strategies and structures. While the moral perspective sets the overarching goals, the managerial perspective focuses on the implementation of these goals in a manner that optimizes organizational efficiency and effectiveness. For instance, the moral perspective advocates for democratic decision-making processes that prioritize equal participation and representation of members. However, the managerial perspective may recognize the practical challenges of implementing direct democracy and opt for representative democracy instead. This strategic decision balances the need for inclusivity with the imperative of operational efficiency, ensuring that decision-making processes remain manageable and conducive to effective governance. Similarly, in matters of managerial accountability, the moral perspective underscores the importance of transparency and member oversight. However, the managerial perspective may introduce mechanisms, such as managerial appointments by the cooperative's directors, to safeguard managerial autonomy and shield managers from undue pressure or interference from members. While this approach may appear to compromise democratic ideals, it serves the pragmatic purpose of enabling managers to execute their responsibilities impartially and without fear of reprisal.

Regarding strategy, the Luhmannian view suggests that cooperatives need to find a compromise between aligning their strategic objectives and operational activities with their ethical values and principles and ensuring their economic sustainability in the market. At the core of this compromise is the idea that the pursuit of economic sustainability by cooperatives serves as a foundational prerequisite for their survival and continued existence. For example, insofar as investments in innovation, whether technological or organizational, contribute towards the economic sustainability of cooperatives,

they help establish a solid operational framework that can withstand external pressures and navigate the complexities of the market environment. These investments become, in this case, necessary conditions that lay the groundwork for the cooperative's long-term resilience and adaptability. Once these necessary conditions for economic sustainability are met, cooperatives can then extend their focus to pursue broader social and environmental sustainability objectives, in alignment with their moral principles and ethical values. In essence, cooperatives can realize their double nature by integrating economic, social and environmental sustainability objectives, with economic sustainability as a prerequisite for achieving broader sustainability objectives.

Regarding collaboration, the Luhmannian view recognizes the need for cooperatives to find a compromise between collaborating with other cooperatives and social economy actors to create a critical mass and a collective voice for challenging the dominant logic of capitalism and competing with other cooperatives and investor-owned firms in the market. This may require building networks and alliances that foster mutual support and learning, as well as differentiating themselves from other actors based on their ethical values and principles. This Luhmannian perspective on collaboration resonates with the argument that cooperatives present a distinct economic coordination mechanism that relies on trust and reciprocity (Borzaga & Tortia, 2017) and thus induces a higher propensity to collaborate with one another and a lower inclination to engage in competitive dynamics, especially when compared to investor-oriented firms. For example, the analysis conducted by Tortia and Sacchetti (2023) on financial cooperative networks across the Netherlands, Canada and Italy highlights several findings that underscore the distinctive pattern of behaviour exhibited by cooperatives, particularly in contrast to investor-oriented firms. For one, these financial cooperatives demonstrate a strong degree of local embeddedness within their respective communities. Furthermore, within these cooperatives, horizontal coordination among individuals and organizations prevails over vertical relationships (Tortia & Sacchetti, 2023). As a result, these cooperatives demonstrate a preference for cooperation over competition in their development patterns. While occasional competition may arise, cooperation is the predominant strategy pursued by these cooperatives (Tortia & Sacchetti, 2023). Tortia and Sacchetti's (2023) findings enrich the proposed Luhmannian view of collaboration with the important management implication that, by projecting their internal norms and strategies onto their external behaviour, cooperatives may foster a culture of collaboration and solidarity that strengthens the cooperative movement and advances the interests of their members and communities.

6 | CONCLUSION

In the present paper, we problematize the precarious co-existence of moral and managerial perspectives on cooperatives. This co-existence produces puzzling conceptual gaps, such as a lack of moral value in managerial efforts to control maintenance organizational costs or unclear business impact of cooperatives positioning themselves as alternatives to the capitalist system. To reconcile the disparity between moral and managerial perspectives, we propose adopting a Luhmannian systems-theoretic approach. This approach sheds light on how both cooperatives and shareholder capitalism are affected by similar challenges in managing their relationships with the surrounding environment.

Fundamentally, the Luhmannian approach recognizes an inevitable discrepancy between the business case, which reflects the operations of the complexity-reducing economic function system, and the moral case, which reflects the state of the societal environment. Applying the Luhmannian approach leads us to view maintenance organizational costs in cooperatives as evidence of precisely this type of discrepancy for cooperatives attempting to provide a sustainable alternative to shareholder capitalism. We show that, by pursuing this moral case, cooperatives bear the burden of maintenance organizational costs that pose a threat to their business success and thus require managerial response. The nature of this response, as may be inferred from the Luhmannian approach, is that cooperatives need to leverage their moral case as a source of competitive advantage within the capitalistic system while also mitigating their economic sustainability challenges due to their limited business case. This is, in brief, a Luhmannian resolution of the debate between the moral and managerial perspectives on cooperatives.

A possible limitation of our argument is that the disparity between moral and managerial perspectives on cooperatives may, in many cases, partake of a nature of an academic artefact rather than an accurate description of practical thinking of many cooperative actors. We admit the possibility that, in the practical operation of many cooperatives, the distinction between these perspectives may not be as clear-cut as it is in some of the more heated academic debates. Many cooperatives, in fact, are quite successful in adopting an integrative strategic approach that combines moral and managerial elements in their governance, strategy, and collaboration. For example, some cooperatives may use participatory

methods to involve their members and stakeholders in decision-making processes while also employing professional managers to ensure operational efficiency and effectiveness. Some cooperatives may pursue social and environmental goals that align with their ethical values and principles while also seeking economic sustainability and competitiveness in the market. Some cooperatives may collaborate with other cooperatives and social economy actors to create a critical mass and a collective voice for challenging the dominant logic of capitalism while also competing with other cooperatives and investor-owned firms.

In view of this limitation, our Luhmannian perspective suggests that understanding these cooperative practices requires a redoubled academic sense-making effort. On the one hand, there is the need to examine how cooperatives cope with the trade-off between the moral case and the business case in different contexts and sectors and how they balance the conflicting demands and expectations of their members, stakeholders and the environment. Such studies could also explore the diversity of cooperative practices and experiences and identify the factors that enable or constrain the success and sustainability of cooperatives. Such studies could also investigate the impact and outcomes of cooperative actions and initiatives on the economic, social and environmental systems and assess the extent and limits of their contribution to social change and transformation. On the other hand, there is the need for studies that examine how cooperatives practically leverage their moral case as a source of competitive advantage. Towards this end, both theoretical and empirical works are needed to figure out how cooperatives may find a balance between democratic governance structures and efficient decision-making processes. Comparative studies across different cooperatives and sectors could shed light on the effectiveness of various governance arrangements in this respect. No less important is further theoretical and empirical research on the multiple dimensions of the economic sustainability of cooperatives. This concept may encompass not only financial viability but also considerations of long-term resilience, adaptability and capacity-building, each of which may affect the contribution of cooperatives towards social change and transformation.

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Observing the Environment of Technology

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ABSTRACT

This paper explores the conceptualisation of technology as an autopoietic system, addressing the limitations of instrumentalist, deterministic and human-centred perspectives in understanding the relationship between technology and society. By framing technology as a self-referential, operationally closed system, the analysis highlights its capacity to generate and sustain its own structures through dynamic feedback loops with human agency, societal needs and innovation. Drawing on Luhmann's systems theory and extending the work of Reichel, the study examines the interplay of medium, form, code and program within technological systems, illustrating how technology observes its environment and evolves. Key examples, including the printing press and generative AI, demonstrate how technology coevolves with social and cultural systems, reshaping societal norms while adapting to environmental perturbations. The paper also addresses controversies surrounding the autopoiesis of technology, particularly considering its distinct yet interconnected nature with living systems. By positioning individuals, social systems and technology as observers, the study emphasizes the triadic coevolution of these entities and the implications for innovation and societal transformation. This perspective offers a nuanced framework for understanding technology's agency, systemic interdependencies and ethical challenges, advancing debates on its evolving role in addressing global issues within the Anthropocene.

1 | Introduction

Theoretical approaches to understanding technology have evolved alongside society's relationship with it, highlighting diverse perspectives and their inherent challenges. Initially, technology was understood as a collection of tools created for human purposes, focusing on its utility and practicality (Mumford 2010). Later, technological determinism emerged, framing technology as an autonomous force driving societal and cultural transformations, often independent of human agency (Ellul 2021; Feenberg 1999). Conversely, human-cantred approaches emphasized technology's origins in human creativity, labour and social conditions (Marx 1867/1990). These theoretical frameworks, however, reveal significant limitations. *Instrumentalist* views, while acknowledging technology as a neutral means to human ends, overlook how technology can shape behaviours and social norms. *Deterministic* perspectives, by treating technology as an unstoppable force, diminish the role of human agency and can lead to fatalistic views on societal adaptation. The coexistence of instrumental and deterministic perspectives points to a paradox: both hold merit, yet neither fully captures the complex interplay between technology and society. Human-centred perspectives, while emphasizing human rationality and agency, lack acknowledgement of the autonomy and 'agency' of technology (Latour 2005).

In this paper, I address this paradox by considering technology as an autopoietic system (Arthur 2011; Kallinikos 2006; Reichel 2011; Rosen 1991; Zeleny 1981)—as a self-referentially operationally closed system (Luhmann 1995; Varela et al. 1974). From this perspective, technology is not merely a collection of tools, machines or an external force but a dynamic network that generates and reshapes itself through feedback loops between human agency, societal needs and technological innovation. By

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framing technology as autopoietic, we can better understand how it actively participates in shaping and being shaped by social, cultural and economic systems, reconciling the limitations of instrumentalist and deterministic views. This approach emphasizes the interdependence of humans and technology, highlighting a coevolutionary process rather than a unidirectional relationship.

This perspective aligns closely with the themes explored in the *Systems Research and Behavioral Science Journal* special issue on observing the environments of social systems, following the 2023 Luhmann conference. Luhmann's systems theory emphasizes the self-referential and operationally closed nature of social systems, where systems observe and reproduce themselves through interactions with their environments. By considering technology as an autopoietic system, we extend this framework to the technological domain, highlighting its capacity to generate and sustain its own structures while coevolving with social systems. This framing situates technology as both a product and a participant in the broader ecological network of human systems, offering a nuanced approach to studying the interdependencies between technological innovation, societal behaviour and systemic transformation—key topics at the heart of the conference discussions and this special issue. In this sense, observing the environment of technology means understanding technology as autopoietic.

Technology can be broadly defined as the application of scientific knowledge and skills to create tools, systems and processes that solve problems or enhance human capabilities. It encompasses a wide range of innovations, from tangible devices to intangible systems and methods, aimed at improving efficiency, productivity and quality of life (Mitcham 1999). The evolution of timekeeping technologies illustrates this. Early examples like Stonehenge (Europe, c. 3000 BCE), used to mark seasonal changes, and Egyptian sundials (Africa, c. 1500 BCE), which organized daily life, applied scientific knowledge to solve societal challenges and enhanced efficiency. Similarly, Inca solar observatories (South America, c. 1400 CE) combined astronomy and architecture to optimize agricultural planning, while Chinese water clocks (Asia, 11th century CE) advanced earlier designs for governance and scientific accuracy. The development of mechanical clocks in Europe (13th century CE) integrated and reconfigured existing tools like water clocks, standardizing timekeeping and improving societal coordination. This evolution reflects Arthur's (2011) view that technology evolves through the combination and reconfiguration of existing tools, machines and concepts, underscoring its dynamic and cumulative nature.

What follows in this paper is a detailed examination of the proposition that technology can be understood as an autopoietic system, grounded in a close reading of Luhmann's texts and building on the arguments advanced by Reichel (2011) and Lovasz (2023). Reichel's work extends the autopoietic framework to technological systems, emphasizing their self-referential processes and systemic interdependencies. Through this lens, the paper explores the implications of viewing technology as autopoietic, particularly in reframing debates about agency, innovation and the evolving relationship between technology and society.

This perspective is especially important considering recent innovations in generative artificial intelligence (AI), which exemplify the dynamic and self-referential characteristics associated with autopoietic systems. Generative AI systems, such as large language models and deep-learning algorithms, continually refine and transform their outputs based on internal processes and interactions with external data environments. These systems not only produce results that reshape their use and development but also influence human behaviours, societal norms and even the trajectory of technological innovation itself (Watson and Romic 2024). By framing generative AI as part of a broader autopoietic technological network, we can better understand its capacity to self-sustain and evolve in complex feedback loops with human agency and societal needs. This analysis sheds light on how generative AI challenges traditional boundaries of technology and underscores the importance of revisiting theoretical frameworks to account for these transformative innovations.

In the analysis presented, the role of the observer is multifaceted, encompassing not only individuals and social systems but also technology itself. Each observes its environment in distinct yet interconnected ways. Social systems interpret technological developments through societal needs and norms, while individuals engage with technology through personal perceptions and experiences. Technology, as an autopoietic system, also acts as an observer, processing inputs from its environment—such as human actions, social conditions and material constraints—and adapting its structure and functionality accordingly. By recognizing all three as observers, the analysis frames their interactions as a coevolutionary process, where each is shaped by the other in complex feedback loops.

2 | Challenges to an Autopoietic View of Technology

The conceptualization of technology as an autopoietic system proved controversial at the 2023 Luhmann conference. A scholarly exploration of the basis of this has not revealed a profound theoretical objection to the conceptualisation of technology as an autopoietic system, but more than this, this theoretical endeavour has not been developed. I believe controversies arise from the fact that machines and technology were peripheral to Luhmann's declared sociological project (Luhmann 2013b). This, combined with assertions by Maturana and Varela that technology should be considered as an allopoietic system, that produces something distinct from themselves as outputs, like, for example, a factory (Maturana and Varela 1980), leads to a conclusion that there is a limited fundamental theoretical objection to the autopoiesis of technology but that this approach is an area that needs development and elaboration.

An examination of the development of social systems theory by Luhmann reveals a trajectory of development from *Soziale Systeme* (original publication 1984, English translation: Luhmann 1995) to *Risk: A Sociological Theory* (original publication 1991: Luhmann 2005) and subsequent publications (e.g., Luhmann 1990b). In *Social Systems*, Luhmann explains:

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> 'Psychic and social systems, unlike machines and organisms, can be characterized by their use of meaning, for example. From the perspective of problems posed by a general theory, one must then ask what machines and organisms use as the functional equivalent of meaning'. (Luhmann 1995, 3)

In this, machines are characterized as systems that operate based on predefined programs and functions, lacking the capacity for self-reference and meaning-making. They are seen as specific, functional entities designed to perform defined tasks based on predetermined inputs and outputs; they operate in a linear, mechanistic way and are not autonomous beyond their programmed functions (Luhmann 2013a). A vending machine serves as an example. It operates based on a predefined program: you insert money, select a product and it dispenses the item.

Machines have historically been associated with tangible tools and mechanical systems that perform specific functions, often with direct human involvement (e.g., tools in prehistoric societies and early steam engines) (Rafael 2013). Machines took on new significance with the development of cybernetics, systems, control and feedback loops. With the advent of cybernetics, machines transitioned from static tools to dynamic, interactive systems capable of self-regulation and adaptation (Wiener 1985). This prompted consideration of the interrelations between components and their environment, allowing machines to integrate dynamically within larger networks. It is this emergent cybernetic understanding of the machine that likely influenced Luhmann's initial conceptualisation of the machine within systems theory (Luhmann 1995). The machine lacks self-reference or the ability to interpret meaning—it simply follows its programmed inputs and outputs in a linear, mechanistic manner, performing its task without deviation or autonomy.

Thus, we can comprehend machines as material or nonmaterial couplings between input and output or, in other words, cause and effect (Rosen 1991). Technology is understood as a broader concept that goes beyond the mechanistic operation of machines. Technology encompasses the principles, methods and systems used to organize, design and control both machines and processes. Technology, in this sense, involves the use of machines but also includes the concepts and communication necessary for innovation and adaptation, connecting technical possibilities with human and societal needs. It is not limited to linear, predefined operations but can adapt and evolve to address more complex and dynamic challenges.

Luhmann later defines technology as a mode of simplification, functioning within the medium of causality. He emphasizes that technology operates by creating strict, functionally recurrent couplings under normal conditions, aiming to largely exclude external interference. This approach to technology is based on its role in achieving causal closure within a specific operational domain (Luhmann 2005). Rather than contrasting technology with nature or associating it with moral or aesthetic values, Luhmann focuses on its operational essence and the distinctiveness of technological processes from other systems of action or societal frameworks. This redefinition underscores technology's dependence on controlled causal processes and systemic functionality.

Luhmann's concept of technology as simplification through causality can be seen in an automated assembly line. It breaks complex manufacturing into repeatable steps, tightly linking each machine's input and output to achieve predictable outcomes (causal closure). External factors are minimized, focusing solely on efficiency and functionality without moral or aesthetic considerations.

Reichel (2011) expands on this by defining technology as an autopoietic system—self-producing and distinct from society and individuals. While Luhmann sees technology as a societal subsystem operating through causality, Reichel emphasizes its autonomy, with its evolution driven by a binary code of work/fail and the medium of operativeness. Technology shapes and coevolves with society, embedding its logic into social systems, yet remains governed by its internal rules, independent of human or societal intentions. Both Luhmann and Reichel highlight the autonomy of technology, but Reichel pushes the idea further, viewing it as a self-sustaining, evolving system that interacts with but operates independently of society.

Reichel's view of technology as an autopoietic, self-producing system can be exemplified by the evolution of AI. AI systems develop autonomously based on internal processes, driven by a binary 'work/fail' logic—algorithms either succeed or are refined through feedback until they do. While AI integrates with and impacts society (e.g., transforming industries or influencing communication), its development is governed by its internal mechanisms and rules, such as data-driven learning and optimization. This process operates independently of direct human intent, exemplifying technology's self-sustaining and evolving nature as described by Reichel.

The relationship between machines and technology has evolved from simple tools in the preindustrial era to complex systems in modern times. Initially, machines were tangible devices that embodied technology, which was focused on practical knowledge and craft. The Industrial Revolution highlighted machines as independent tools for labour, while technology began encompassing broader principles of design and innovation. With the rise of cybernetics, automation and digital systems in the 20th century, machines became components within larger technological frameworks. Today, technology is a dynamic system integrating machines, processes and societal needs, emphasizing adaptability and complexity beyond the mechanistic functions of individual machines (Ellul 2021).

The development of social systems theory has led to some ambiguity about the nature of technology, seemingly attempting to maintain fidelity to Luhmann's approach while also attempting to clarify the conceptualisation of technology in an increasingly technological world. For example, Esposito (2017) argues that technology operates as part of broader social systems but alludes to it not being an autopoietic system. Esposito further argues that technology functions as a medium or tool within social and psychic systems, enabling their operations, but it is the social systems—such as communication, economy or science—that are autopoietic, capable of self-reproduction and self-reference.

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Others have attempted to comprehend technology as a social system (e.g., Rafael 2013), yet what is lacking is a systematic attempt to explore the nature of technology from the perspective that goes beyond the developments of Luhmann (2005), Reichel (2011) and Lovasz (2023).

3 | Autopoiesis, Distinction, Medium and Form

Autopoiesis was introduced by Maturana and Varela (1980) as a way of conceptualizing biological systems. It refers to a system's self-referential operational closure in maintaining a distinction from its environment. These systems are operationally closed, meaning their internal processes are self-referential and autonomous, yet they remain thermodynamically and informationally open, exchanging energy, matter and data (observations) with their environment to sustain their distinctiveness.

Luhmann expanded the concept of autopoiesis into a general theory by reinterpreting how systems work. Instead of focusing on physical components like molecules (as Maturana and Varela did for biological systems), he introduced the idea of a medium. A medium represents a pool of possibilities, containing all the potential forms or outcomes a system can take. From these possibilities, the system selects and creates specific forms that become its reality. This approach translates the focus from physical elements to the processes and choices that shape systems. The medium encompasses possibility, out of which specific forms are selected and actualized (Luhmann 1995).

The medium/form concept follows Heider's explanation of the perception of objects not in direct contact with the body, like optical or acoustic perception. A medium, such as light or air, does not perceive itself but conveys the properties (form) of the object without changing them. Under normal conditions, it is the conveyed pictures or sounds that are perceived, not the light or air itself (Heider 1959). The distinction between form and medium is relative; something can be a medium in relation to a form that establishes itself through autopoietic operations, or a form that establishes itself in a medium at a lower level. For instance, the elements of language (words) can be formed on the continuum of sounds and simultaneously constitute a medium for conveying communication content or meaning. This conceptualization underscores the significance of the medium as loose couplings that are combined into a form. It is through media that an autopoietic system observes its environment as form. The medium–form relationship is recursive, and the forms generated within a medium can also act as a medium if they are used repeatedly.

4 | The Code, 'Program' and Medium of Technology

4.1 | Codes, Programs and Media/Forms in Social Systems Theory

The question that follows the above claim is: *if technology is an autopoietic system, what kind of an autopoietic system is it?* To examine this, it is important to consider the nature of its code, program and the medium of the system. The concepts of codes and programs are essential for understanding how autopoietic systems structure their operations, differentiate themselves from their environment and maintain coherence while adapting to changes. A code is a binary distinction that defines the operational boundary of an autopoietic system, enabling it to observe and differentiate between what is relevant to its operations and what is external to it (Luhmann 1995).

In social systems, codes are tied to the system's functional differentiation and serve as evaluative criteria for processing communications:

- *Legal system*: The code is *legal/illegal*, allowing the system to determine whether a communication belongs within its domain.
- *Science system*: The code is *true/untrue*, defining what qualifies as knowledge based on scientific inquiry.
- *Economic system*: The code is *payment/nonpayment*, structuring transactions and decisions within the economy.

For example, when a court issues a ruling, it applies the legal/illegal code to evaluate the case. This operation remains distinct from the cognitive processes of judges (psychic systems) or public opinions (part of the societal environment). The code ensures the system maintains its internal logic, even as external factors influence its operations.

Programs are the set of rules, conditions or criteria that guide how codes are applied, and operations are structured within an autopoietic system. They provide the framework for managing the system's internal complexity and responding to its environment.

In social systems, programs are manifest as policies, laws or guidelines that specify how the system operates within the framework of its code:

- In the legal system, laws and precedents are programs that determine how the legal/illegal code is applied. For example, in a case of theft, the legal code determines that theft is illegal, while specific statutes and judicial precedents guide the court's ruling.
- In the political system, programs such as party manifestos or governance frameworks guide the application of power and influence within the binary code of government/opposition.

Programs allow social systems to handle complexity and address variations in the environment. For instance, a political system's response to a crisis (e.g., a natural disaster) is shaped by its programs, such as emergency response protocols, which ensure that its operations remain consistent with its core code. Programs imply action and praxis (Luhmann 1995).

In psychic systems, programs take the form of cognitive schemas, values or beliefs, which guide thought processes and decision-making:

- A person deciding on a career path uses internalized values (e.g., a desire for security or creativity) as programs to evaluate options. These programs allow the individual to apply

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the self/not-self code, distinguishing personal aspirations from external expectations.

- Emotional responses are also guided by cognitive programs. For example, a schema of trust influences how an individual interprets and reacts to social interactions.

Programs enable psychic systems to manage the complexity of internal and external stimuli, ensuring that thoughts, emotions and actions remain coherent and adaptive.

The medium/form distinction is a foundational concept for understanding the nature of an autopoietic system, as it provides insight into how autopoietic systems observe, interact with and organize their environment. This distinction facilitates the analysis of how autopoietic systems differentiate themselves from their environment while maintaining internal coherence and adaptability (Baraldi et al. 2021; Luhmann 1995).

In social systems, communication is both the operation and medium (Luhmann 1990a). The medium of communication encompasses the potential for meaning, which is actualized through specific forms, such as words, gestures or symbols (Luhmann 1995). Communication is a form in the medium of meaning providing potential for communication and meaning (e.g., the shared language, cultural norms or general themes within a society). For example, the English language acts as a medium that provides a vast repertoire of expressions and meanings available for communication within English-speaking societies. Specific communication acts select and actualize meaning within the medium/form distinction (e.g., a speech, a written law or a social media post). For instance, a politician's speech is a form that selects specific meanings from the medium of language to influence public opinion.

Psychic systems operate based on consciousness, where thought and emotion represent a medium as forms of meaning and specific cognitive processes or affective responses, constituting forms (Luhmann 1995). The distinction between medium and form in psychic systems explains how individuals process and respond to their environment while maintaining cognitive coherence, with potential for mental states and perceptions, such as feelings, memories or abstract concepts. For instance, a person's capacity to think about future possibilities or recall past events forms the medium of their psychic system (Luhmann 1990a). Individual thoughts, emotions or decisions that actualize the potential of the medium. For example, deciding to pursue a particular career path selects specific possibilities from the medium of imagination and desire, which are themselves constituted of meaningful thought.

The medium/form distinction also illuminates the interaction between social and psychic systems, highlighting how these systems coevolve while maintaining their boundaries—through the concept of *structural coupling* (Luhmann 1995). In a conversation, a social system observes communication as a meaning medium, with specific speech acts or gestures as forms. Simultaneously, the psychic systems of the participants engage their meaning medium of thoughts and emotions, selecting forms such as agreement, disagreement or curiosity. Despite this interaction, the two systems remain distinct: the conversation continues as a social system operation, while the individual participants process their thoughts and feelings internally.

Codes and the medium/form distinction are deeply interconnected and interact dynamically within autopoietic systems. The medium provides the space of potentiality from which specific forms emerge, enabling the system to actualize possibilities that align with its operational logic. Codes, on the other hand, function as the evaluative framework that guides the system in selecting forms from the medium. By defining the boundaries of relevance, codes ensure that only those forms that contribute to the system's self-reproduction are actualized. For instance, in a social system like the legal system, the medium of communication includes the broad potential for expressing meaning, such as arguments, evidence and interpretations. The legal/illegal code acts as a filter, determining which forms—laws, rulings or legal arguments—are relevant to the system's operations. Without the code, the medium's potential would be unstructured and indeterminate, while without the medium, the code would lack the substrate necessary to generate meaningful distinctions. This interplay also enhances adaptability. The medium enables the system to remain open to a variety of environmental stimuli, while the code ensures that responses remain coherent and system-specific.

4.2 | The Codes, Programs and Media/Forms of Technology as an Autopoietic System

To conceptualize technology as an autopoietic system, it is necessary to analyse its operations from the perspective of the medium/form distinction, codes and programs. These elements help elucidate how technology differentiates itself from its environment, organizes its internal operations and adapts to external changes. In other words, how technology observes its environment.

4.2.1 | Codes in Technology

The code of technology serves as the binary framework through which the system distinguishes relevant operations from irrelevant ones. The defining code of technology is often conceptualized as functional/nonfunctional or work/fail (Reichel 2011), emphasizing the practical efficacy of technological operations. Examples of codes in technological systems include the following:

- *Functional/nonfunctional*: A piece of software is evaluated based on whether it performs its intended task effectively. A program that processes user input accurately is functional; one that crashes or produces errors is nonfunctional.
- *Efficient/inefficient*: Beyond functionality, technological systems may employ an efficiency code to distinguish optimal operations from resource-intensive or time-consuming ones.
- *Secure/insecure*: In cybersecurity, the system differentiates between secure and vulnerable states, guiding how interventions and innovations are prioritized.

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The functional/nonfunctional code allows technological systems to focus on operations that enhance reliability, usability and performance, ensuring self-reproduction through continual improvement and innovation.

Codes are distinctions through which a system observes its operations and determines the unity of the system. They enable the system to recognize which operations contribute to its reproduction. A systems code provides a primitive form of decision-making and underpins systemic agency. This must be contrasted with the agency of the individual human with the code of self/not self, which involves emergent behaviours in relation to the code and the individual's thoughts and affect. Human agency is characterized by its interplay of cognition and affect.

The concept of work/fail as a binary code for technology aligns with the idea of functional/nonfunctional. This simplistic yet profound binary reflects technology's criterion for success and relevance: does the technology work as intended, or does it fail to meet its functional objectives? This code captures the operational nature of technology, marking a clear boundary for its evaluative criteria and distinguishing it from more complex social or psychic systems. It underscores technology's pragmatic and results-oriented nature.

4.2.2 | Programs in Technology

Programs in the technological system specify how the functional/nonfunctional code is applied to various contexts and scenarios. These programs manifest as algorithms, design specifications, standards and protocols that govern technological development and operation. Examples of programs in technological systems include the following:

- *Algorithms*: In computational systems, algorithms act as programs that execute specific tasks, such as sorting data or predicting outcomes. For example, an encryption algorithm applies the secure/insecure code to protect information.
- *Design protocols*: Hardware manufacturing follows design protocols that guide the application of material mediums to create functional forms, such as processors or sensors.
- *Standards and interoperability*: Technological ecosystems, such as the Internet of Things (IoT), rely on communication protocols (e.g., HTTP and MQTT) to ensure that devices function cohesively.

Programs enable technological systems to address environmental complexity by providing structured approaches to problem-solving, innovation and adaptation. For instance, an autonomous vehicle's response to traffic scenarios is guided by programs embedded in its software, ensuring consistent application of its operational code (e.g., functional navigation).

Programs in systems theory are complexes of conditions that establish correctness criteria (Luhmann 1995). They are essential for guiding systems in processing information and making decisions, contributing to structured complexity and process control. In autopoietic systems, the binary code within these systems drives the unity of operations, overseeing the creation of differences and managing information processing. At the operational level, it is the code, not the system itself, that governs processes.

4.2.3 | Medium/Form Distinction in Technology

In the technological system, the medium can be understood as the potential for physical and informational processes, while forms represent specific implementations or applications of these potentials. The medium of technology includes raw materials, energy, data and abstract design principles, providing a substrate for technological innovation and functionality.

The medium of technology can be understood as technological action and reaction, or cause and effect. The technology operates through a series of actions (inputs, modifications, processes and operations) and reactions (responses, outputs and adjustments), 'operativeness' (Reichel 2011), or as simple machines (Wiener 1985). For example, the internet involves actions such as data input, user interaction and content creation, and the reactions include receiving information, algorithm-driven content recommendations and social media engagement. Action and reaction/cause and effect are multilayered media and forms; beneath the input and interaction are processors and transistors. Each transistor switching on or off (action) represents a basic computational operation (cause), leading to the generation of a binary signal (effect or reaction). This microlevel interaction underpins all higher-level operations in a computer processor, exemplifying the foundational layer of technological operativeness. The internet uses the medium of operativeness to observe inputs from its environment and to respond with algorithm-driven content. Examples of medium/form dynamics include the following:

- *Medium of data*: The vast repository of digital information serves as a medium. Specific applications, such as machine learning models or user interfaces, represent forms that actualize this potential.
- *Material medium*: Physical resources such as silicon or metals act as the medium for hardware. A microchip or a structural component is a form derived from these materials.
- *Energy medium*: Energy systems, such as electricity or solar power, are mediums from which operational forms like powered machinery or photovoltaic cells emerge.

The medium/form distinction underscores how technology is shaped by its potentialities while simultaneously structuring itself through concrete implementations. This dynamic also facilitates interactions with other systems, such as social systems that use technological mediums (e.g., the internet) to create specific communication forms (e.g., emails or social media posts).

4.2.4 | Interplay of Medium, Code and Program in Technology

The interaction between codes, programs and medium/form distinctions is crucial for understanding technology's autopoietic nature. The medium provides the substrate for innovation,

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the code delineates the criteria for relevance and the programs organize specific operations within this framework. Together, they allow technological systems to maintain internal coherence while responding flexibly to environmental demands.

For example, consider a renewable energy system:

- *Medium*: Solar radiation serves as the energy medium.
- *Code*: The functional/nonfunctional code evaluates the system's capacity to convert sunlight into usable energy.
- *Program*: Engineering guidelines, such as photovoltaic design standards, direct the application of this code, resulting in the creation of efficient solar panels.

In systems theory, the concepts of medium and form, code and program are significant for understanding how systems perceive, process and respond to information, data, energy and matter, that is, how they observe their environment. They help in analysing how systems maintain their structure and adapt to changes in their environment. For instance, in software development, they define requirements for applications like secure transactions and user-friendly interfaces. In AI, they encompass algorithms for data pattern recognition and decision-making. In network security, they include protocols for identifying and managing threats. Programs thus form the backbone of operational processes in technological systems, ensuring structured complexity and adaptability.

4.2.5 | Technology in Relation to Social and Psychic Systems

While technology operates as an autopoietic system governed by its own media, codes and programs, it also intersects with social and psychic systems through the meanings and interpretations these systems ascribe to it, that is, through structural coupling. In social systems, technology functions as both a medium and a form for communication and cognition, enabling interactions such as digital discourse, online collaboration and the dissemination of information. For example, the internet as a technological medium supports forms of social interaction like emails, forums and social media posts. Psychic systems, on the other hand, engage with technology through the ways individuals perceive, interpret and internalize technological experiences, forming personal connections or apprehensions toward its use. A smartphone, for instance, may represent efficiency and connectivity to one individual while evoking anxiety or dependency in another. This interpretative process highlights the physical and mechanistic dimensions of technology, such as interfaces, devices or energy systems, as carriers of meaning within social and psychic contexts. Thus, technology transcends its operational boundaries to influence and be influenced by the symbolic and affective dimensions of human systems, making it a bridge between the technical and the meaningful through structural coupling. This interplay emphasizes that technology's evolution is not only a matter of physical innovation but also the coevolution of how it is contextualized and utilized within broader human systems.

Users, inventors, engineers and society are part of the systemic environment of technology, influencing its development and trajectory while being shaped by its outputs. Users engage with technology as external observers and participants, driving demand and shaping its functionality through feedback and adaptation. Inventors and engineers operate in the environment of the technological system, utilizing communication and consciousness in creativity and expertise to translate mediums into forms, guided by the codes and programs that define the system. Society, as a broader construct, provides the context in which technological innovations are evaluated, accepted or contested, integrating them into cultural norms, economic structures and ethical frameworks. This environmental interaction reflects a feedback loop where societal values and needs inform technological advance and innovation, while technology, in turn, redefines social practices, human agency and collective expectations. The environment of technology is thus dynamic, marked by reciprocal relationships that ensure the coevolution of technological systems and their societal and individual contexts.

Machines can be understood as autopoietic components within the broader technological system, as they embody self-referential processes that sustain and reproduce technological operativeness. At their core, machines are physical manifestations of the medium/form distinction, where raw materials and energy (mediums) are configured into operational forms, such as engines, processors or robotic systems. Their operation is governed by technological codes, such as functional/nonfunctional or efficient/inefficient and programs, such as algorithms or engineering specifications, which enable machines to perform specific tasks autonomously or semiautonomously. These self-contained systems maintain their functionality by continuously managing inputs and outputs, adapting to environmental variables and interacting with other machines and users. For instance, a manufacturing robot in an automated assembly line is not only a product of technology but also an active contributor to its self-reproduction, perpetuating technological systems by creating new forms (products) and refining processes. By integrating feedback mechanisms, diagnostics and adaptive algorithms, machines extend the autopoietic nature of technology, ensuring its operational continuity and evolution within a complex, interconnected environment. This perspective positions machines as vital, self-referential nodes that sustain and expand the technological system's reach and functionality.

5 | Discussion

The discussion section explores the broader implications of the preceding analysis by examining the concept of technology as an autopoietic system. Building on the theoretical foundations established earlier, the discussion shifts from analysing technology's operational mechanisms to its evolution and interaction within societal contexts. It highlights the duality of technological innovation and evolution as both a response to and an influence on societal systems, illustrating this dynamic through examples like the internet and the printing press. Furthermore, the section addresses the interplay between human agency and technological autonomy, challenging deterministic and instrumentalist perspectives. By framing technology as autopoietic, the argument underscores its evolving agency, systemic interdependencies and coevolutionary role alongside human systems, providing a nuanced perspective for understanding technological advances in the Anthropocene.

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5.1 | Technological Innovation

Technological innovation refers to the process of developing new technologies or significantly improving existing ones. It encompasses a range of activities from conceptualization and research to development and implementation. The objective is to create new products, services or methods that can improve efficiency and effectiveness or provide other benefits to individuals and society. Technological innovation is not just the invention of new technologies but also their application and diffusion into markets and society. It plays a crucial role in economic growth, competitiveness and addressing various societal challenges (Dodgson et al. 2008).

Innovation in the Anthropocene privileges the role of human agency characterized by the role of the engineer. However, this tends to oversimplify the complex interactions among technology, individuals, society and the physical world. The human-centric view overlooks the reciprocal effect of nonhuman elements. Understanding technology as an autopoietic system does not reject human agency entirely but it observes it as in the environment of technology among other systems. Engineers' design and development of technology constitute actions in the environment of technology as perturbations. The autopoietic system of technology observes environmental perturbation in the medium of cause and effect, that is, 'operativeness'. They are actions that prompt reactions.

This can be illustrated in terms of the internet. Initially conceived as a network for military and academic purposes, the internet was influenced by various inputs from engineers and scientists. However, its evolution into a global communication and information system was not solely directed by these initial designs (Fuchs 2005). The internet 'responded' to these inputs by evolving in ways that were not entirely anticipated, such as the emergence of social media, e-commerce and streaming services. This evolution can be seen as the Internet's autopoietic response to the myriads of perturbations in its environment.

The code of technology represents a systemic test. With the perturbation of design, modification, assembly and configuration, technology differentiates itself as working as opposed to not working as part of its binary code. It is less about the engineer getting technology to work, and it is more about the technology that 'decides' this and the engineer creating the conditions for technology to work. This is evident in the inherent unreliability and obsolescence of technology; in sophisticated technologies, it can take many skilled engineers to create the conditions for technology to 'work', and it remains susceptible to environmental change.

Taking an industrial example to illustrate this, the steam engine, pioneered by inventors like James Watt, underwent significant transformations during the Industrial Age. Initially, engineers designed these engines with specific configurations and assembly methods, intending to optimize efficiency and power. However, the process of making the steam engine a viable and effective technology was not solely about the engineer's ability to design or assemble it. The steam engine differentiated itself as working or not based on its interaction with the physical laws of thermodynamics and mechanics, essentially 'deciding' its functionality based on these systemic tests. Moreover, the unreliability and eventual obsolescence of early steam engines further demonstrate this point. Despite the skill and knowledge of the engineers, these machines were susceptible to breakdowns and inefficiencies, often requiring significant refinements and improvements (Rosen 2012). This inherent unreliability was not just a result of engineering shortcomings but also a manifestation of the technology 'responding' to its operational environment and limitations. Furthermore, as steam technology became more sophisticated, it required the collective expertise of many skilled engineers to create the conditions for it to function effectively. Yet, even with this expertise, steam engines remained sensitive to environmental changes and wear, reflecting the dynamic interaction between the technology and its environment.

An engineer's role is less about directly making technology work and more about providing the conditions and inputs for the technology to 'decide' its own state of functionality. When a technological system responds to these perturbations by achieving a working state, it asserts its identity as technology. This shift in perspective highlights a more dynamic and interactive process of technological development, where technology is not just a passive product of human creation but also an active participant in its own evolution.

5.2 | Technological Evolution

Autopoietic systems evolve through the interplay of variation, selection and restabilization (Luhmann 2013b), but this process does not follow a linear trajectory toward increasing complexity or adaptation. Instead, evolution emerges from continuous differentiation between the system and its environment. This perspective emphasizes the contingent and unpredictable nature of change, shaped by both chance events and interactions within and between systems.

5.2.1 | Variation in Autopoietic Technology

Variation arises from fluctuations within the system or disturbances introduced by the environment (Luhmann 2013b). Internal fluctuations include errors, unexpected connections or novel configurations of elements within the system's code, such as innovative approaches in algorithms or hardware designs. For instance, the development of movable type in early printing presses resulted from recombining existing technologies like oil-based ink and screw presses, creating variations that enhanced efficiency and quality.

External disturbances, on the other hand, originate from the system's environment. These disturbances might include technological advances in related domains, shifts in cultural or social contexts or unpredictable events like natural disasters. For example, the widespread adoption of the printing press was influenced by the concurrent development of cheaper paper, a product of advances in papermaking technology that originated in China and spread to Europe. Similarly, the cultural shifts driven by humanism and the Reformation created an unprecedented demand for books, amplifying the impact of the printing press's technological variation (Eisenstein 1982).

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5.2.2 | Resonance as a Mechanism of Selection

Selection in autopoietic systems differs fundamentally from the Darwinian notion of fitness. Rather than external survival determining success (Luhmann 2013b), variations are selected based on their resonance with the system's internal dynamics (e.g., Rosa 2019; Sheldrake 1995). Resonance occurs when a variation aligns with the system's existing code and operations, making it easier to integrate and replicate. For example, Gutenberg's printing press resonated with existing manuscript culture by maintaining familiar aesthetics and formats, facilitating acceptance and integration within the system of written communication. This resonance also extended to the humanist movement, as the press enabled the rapid dissemination of knowledge that aligned with the cultural priorities of the time.

Environmental resonance also plays a role in selection. Variations that enhance the system's connectivity with its environment are more likely to persist. For instance, improvements in printing technology that facilitated the production of educational and religious texts met the growing societal demand for information dissemination, reinforcing the technology's adoption and evolution.

5.2.3 | Fitness Redefined

In this context, fitness is not an external measure of survival or efficiency but an emergent property of a variation's compatibility with both the system's internal operations and its broader environment. A technology's fitness is determined by how well it can integrate within its system while enabling new interactions with its environment. For example, the printing press's ability to produce large volumes of text quickly and efficiently increased its fitness by supporting the societal demand for books, catalysing a transformative cultural shift. Unlike Darwinian fitness, which is judged by external criteria, fitness in autopoietic systems is relational and dynamic, shaped by the interplay of internal resonance and environmental engagement.

5.2.4 | Stability Through Redundancy and Variety

Stability in autopoietic systems is achieved through a balance of redundancy and variation (Luhmann 2013b). In the context of autopoietic systems, redundancy refers to the presence of duplicate or overlapping components, processes or functions within the system that contribute to its stability. Redundancy ensures that if one part of the system fails, others can compensate, thereby preserving the system's ability to maintain its organization and function.

Redundancy works in tandem with variation, which represents the system's capacity to respond to diverse environmental challenges. Together, these elements provide resilience and flexibility, allowing the autopoietic system to maintain its operational closure and sustain itself amidst change (Maturana and Varela 1980).

Redundancy ensures the reliability of operations and preserves the system's identity, while variety introduces new elements that foster adaptability and evolution. This balance is critical; excessive redundancy leads to rigidity, while too much variety risks disorganization. For instance, the standardization of movable type in early printing presses (redundancy) enabled reliability in production, while the adaptability of the press to different scales and formats (variety) ensured its relevance across diverse applications and contexts.

The dynamic equilibrium between redundancy and variety illustrates how autopoietic systems maintain functionality amidst change. Systems that achieve this balance can adapt to uncertainties while preserving their core identity, ensuring their long-term resilience and sustainability.

5.2.5 | Implications for Understanding Technological Evolution

By framing technological evolution as a process driven by variation, resonance and stabilization, we move beyond deterministic or instrumentalist perspectives. Technologies evolve not merely as tools shaped by human intent but as dynamic systems that respond to and influence their environments. Understanding resonance and fitness as relational and contingent underscores the coevolutionary nature of technology and society, offering deeper insights into how technological innovations emerge, persist and transform over time.

6 | The Difference Between Organisms and Technology

The evolution of technology, especially AI, and the anticipation of artificial general intelligence indicate a blurring of the boundary between living things and technology. Living systems and machines both perform functions and use energy. Still, their distinctions are notable. Living systems adjust to their environment, while machines adapt within set limits. Organisms reproduce and grow via cell division, whereas machines rely on external means for replication. Organisms possess metabolic processes to transform energy and expel waste, a feature machines do not have. The information processing in living systems is also more flexible and potentially includes subjective experience, different from the strict algorithmic nature of machines.

From a general theory of autopoiesis, it follows that living things and technology are distinct but not exclusive categories. This perspective challenges traditional dichotomies between nature and artefact, organism and machine. It suggests a more integrated view of the world, where the boundaries between living and nonliving systems are seen as permeable and interactive rather than rigidly separated.

Biologically engineered organisms, synthetic biology, cyborgs, biohybrid devices, AI with biological characteristics, bioinspired robots, biocomputers and nanobots in medicine represent a convergence of biology and technology, blurring the lines between living systems and technological tools. Genetic engineering enables the creation of organisms with tailored traits, like bacteria-producing pharmaceuticals, while synthetic biology designs and constructs novel biological entities. Cyborgs and biohybrid

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devices merge organic elements with biomechatronics, exemplified by pacemakers or prosthetics, enhancing biological functions through technology. Advanced AI systems imitate aspects of a living intelligence, learning and adapting autonomously, whereas bioinspired robots replicate the behaviour and form of natural organisms. Biocomputers utilize biological molecules for computation, and nanobots in medicine perform precise tasks at a cellular level, integrating technology within biological environments, thus challenging traditional distinctions between life and technology.

This does not exclude the possibility that technology and living things have properties that are unique to them (Rosen 1991), but it implies that what is unique or distinct is paradoxically and contradictorily nonexclusive. Haraway's theories on cyborgs blur the line between humans and machines, suggesting technology as an interactive, influential entity (Haraway 1991). Latour's actor–network theory positions technology within relational networks, affecting and being affected by various actors (Latour 2005). Capra and Luisi's systems theory emphasizes technology's role in the interconnected web of life, underscoring its dynamic involvement in broader environmental relationships (Capra and Luisi 2014).

The implication of this is that we contemplate a future in which the distinction between organism and machine becomes further blurred. However, their distinctiveness will remain.

7 | Implications of Autopoietic Technology

Viewing technology as autopoietic, incorporating the idea of emergence between technological instrumentality and technological determinism, implies a perspective where technology is not just a set of tools shaped by and shaping human activity, but also an evolving, self-producing system. This conceptualization suggests technology (and machine) has its own dynamics and agency, influencing human behaviour and societal structures. It shifts the focus from a linear view of technology as merely a product of human design to a more complex interplay, where technology and society coevolve, each influencing and being influenced by the other.

The relationship between technology and living things is distinct, yet not mutually exclusive, characterized by interaction and influence. Technology, created and used by living beings, often mirrors biological processes and structures, showing a degree of mimicry or bioinspiration. Conversely, living systems are increasingly integrated with technological components, leading to biotechnological advancements. This interplay blurs the lines between the organic and the artificial, suggesting a coevolution where each domain influences and reshapes the other, leading to novel developments and understandings in both fields.

Comprehending technology as an autopoietic system has significant implications for understanding modern societal problems such as technological solutions to society's problems such as inequality, climate change and conflict. If we approach these problems instrumentally or deterministically, that technology provides the tools for inclusion or solving problems of greenhouse gas release or new kinds of weaponry (for both peace and conflict) ignores the wider social impacts of technological innovation. Similarly, if we comprehend the deterministic role of technology in defining societal structures, algorithmically formatting its structure and as a primary cause of social, political and economic exclusion, we miss the instrumental benefits as well as limitations. Many ethical debates in the context of AI, especially large language models such as ChatGPT, are presented in a more deterministic way, what these technologies will do to individuals and society and how to mitigate these potentials, rather than seeing them as an integrated part of the societal evolution. Of course, thinking in this regard is often linear rather than complex. Putting forward the idea of technology as autopoietic offers a framework through which the complexity and interconnectedness of technological systems and society can be contemplated.

Positioning individuals, social systems and technology as observers highlights the reciprocal and dynamic nature of their interactions. Individuals and social systems observe and interpret technology through the lenses of meaning, culture and purpose, influencing its trajectory and application. Conversely, technology, as an autopoietic system, observes its environment through operational distinctions, shaping its evolution and impact. This framing reveals the interconnectedness of these observers and their mutual influence, offering a more holistic understanding of technological and societal coevolution. By acknowledging this triadic observation, we are better equipped to navigate the complexities of innovation and its role in shaping our shared future.

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The work was carried out as part of the author's regular academic activities at the University of Cambridge.

Ethics Statement

As the research presented in this paper is purely theoretical and does not involve individual participants or empirical data collection, ethical approval was not required. The study adheres to the academic standards of theoretical and conceptual research.

Data Availability Statement

This paper is theoretical in nature. As such, it does not rely on empirical data. All conceptual analyses and discussions are based on previously published works, which are duly cited within the text.

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Towards the sociology of pets—Social functions of animals in contemporary societies observed from systems theoretical perspective

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Abstract

This paper advocates for introducing sociology of pets as a particular field of research as the response of ever growing social relevance of pets in contemporary societies. Though other theoretical approaches are suitable for tackling these complex issues, the article offers viewpoint from Luhmann's social systems theory. Based on Luhmann's writings on ecological communication, the article departs from the system/environment distinction and conceives pets as being part of a society's environment that attained resonance of a social system. Further, entry of pets into a social system is interpreted through differentiation theorem arguing that pets perform highly relevant social functions for all functional subsystems of a society by contributing to their autopoietic reproduction. This is primarily accomplished through *communication* about pets, emerging specific semantics, usage of binary codes specific for different subsystems, correspondence to their mediums, programs and functions. The major part of work is presenting relations of pets to 10 functional subsystems of a society, as this delineates scope of empirical phenomena of potential interest for sociology of pets. These processes might be observed at systemic, organizational and interaction levels. Despite possessing multiple merits, also, certain limits of Luhmann's account of pets are unfolded, such as incapability to hear authentic voices of animals, but rather distorted semantic codes emerging from consciousness of human psychic systems, afterwards structurally coupled with communication as a medium of social systems. At this point, social systems theory might be complemented by theory of interspecies communication, as taking into consideration other theoretical approaches anchored at ontologies pertinent to include non-human agents is invocated. The tentative outcome of this introductory discussion is that apparent process of anthro-morphosization of animals is taking place while the question of relation between humans–humans in the context of building just societies of the 21st century still remains open.

KEYWORDS

anthro-morphosization of animals, flat ontology, interspecies communication, pets, resonance, social systems theory

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1 | INTRODUCTION

Pets are saliently important element of contemporary societies. We can barely avoid pets literary on a every step: in streets, in shops, on beaches, on television, on pictures, in daily conversation, in travelling plans and in a wide variety of other occasions. Perhaps, they only do not appear in places like theatre or churches, at least for now. This omnipresence of pets in contemporary societies does not surprise, as they principally become full members of a family.

However, there is a sharp discrepancy between pets' social presence and research on them from the viewpoint of social sciences. In general, there is a severe and persistent ignorance of animals from the side of sociology (Carter & Charles, 2018). Despite relevance of animals to widest aspect of social life, for sociologists, they remain invisible. Carter and Charles (2018) summarize several reasons for expelling animals from sociology: (1) fraught of biology—stemming out from distancing sociology from biological explanatory models after bitter episodes of eugenics and social Darwinism; (2) human exceptionalism—based on assumption that only humans are capable of symbolic thinking (whereas all others non-human agents are excluded from the scope of sociological scrutiny); and (3) emergence of modern sociology in the context urbanization and industrialization within which animals, contrary to pre-modern rural settlements, were removed from daily experience of urban dwellers. While once shared the same living space, modern development has drawn sharp division between humans and animals with latter excluded from the notion of society and have remained the part of the nature. Relation between humans and animals is conventionally conceptualized in terms of dichotomies such as society/nature, culture/nature, civilization/nature, and, in this line, for the purpose of this work particularly important—Niklas Luhmann's (1989) system/environment distinction.

Carter and Charles (2018) advocate for reconceptualization of main sociological categories by taking into account that humans and animals are entangled in 'mutually constitutive social relations' (Carter & Charles, 2018, p. 80), which are often based on domination and exploitation. Current sociology very slowly copes with the 'animal challenge' (Carter & Charles, 2018, p. 79). Though anchored in a different account, this article supports attempts of entry of animals as indispensable subject matter of sociological research and aims to contribute in overcoming denoted epistemic gap primarily by sketching a sociology of pets, the sociological inquiry of widest social aspects of pets as inevitable social fact in societies (primarily western) of the 21st century.

In order to convey stated goal, the key point is to offer a convenient theoretical standpoint pertinent to provide set of proper conceptual explanation of the subject matter under consideration. In our view, social system theory developed by famous German sociologist of the 20th century Niklas Luhmann represent such reliable position at which our analyses could be anchored. Especially following aspects of this theoretical position are relevant for our discussion. (1) First is distinction between system and environment and in more narrow sense society/nature distinction as elaborated in 'Ecological Communication' with particular relevance of the concept of *resonance* (Luhmann, 1989). Animals in general and pets represent environment of social systems with relation to both: humans and societies. Hence, the crucial task is to provide theoretical explanation of relations within triangle: *pets–people–societies*. (2) Furthermore, theorem of functional differentiation of modern societies is relevant, as we will argue that pets, as a part of the systems' environment, have entered into operations of functional subsystems of contemporary societies. We will empirically demonstrate how this process has taken place nowadays or, that is, how pets are related to functional subsystems of societies. Among system thinkers, there is no consensus how many functional subsystems can be identified in contemporary societies. Indeed, this is not the pivotal question we strive to address as conducted empirical corroboration primarily exhibits heuristic purpose. With that regard, we follow suggestion of Roth and Schütz (2015) that 10 function systems[1] can be identified and even more important is our claim that pets are inevitably important to every single function system (though not equally), as pets contribute to reproduction to their specific binary codes, also new semantics[2] emerge surrounding them, correspond to programs of subsystems. By providing examples of relation of pets to single functional systems, simultaneously, we illustrate possible spectrum of topics under loop of sociology of pets.

However, not solely for the level of functional systems, pets exhibit social relevance also at organizational level (through organizations notably tailored for pets),

[1]Roth and Schütz (2015) provide convenient overview of the debate about the number of functional systems with some authors referring to five basic ones (law, economy, politics, science and religion) to those who go beyond 10 systems while mentioning also tourism, love, social movements, family, social work, and so forth. Roth and Schütz (2015, p. 13) are against 'inflation' of function systems and advocate for a clear definition in that regard. In any case, it is important to underline that according to Luhmann understanding of functional differentiation is not fixed or historically confined, but rather open-ended what means that the process continues and one can assume emergence of novel function systems.

[2]For a discussion on multifunctional semantic reservoir emergence in a complex polycentric environment, see Neisig (2017).

and also at interaction level what is easily ostensible in a dozens of everyday situations. At the end of the day, when looking in the mirror, a question appears how human treatment of pets that might be depicted as humanization of animals is related with human treatment of humans that sometimes takes a form of dehumanization. The question of relation of humans and pets with respect to the relation of both to society is supplemented by the (3) third important theoretical position discussed in the article—theory of interspecies communication. When discussion relations within *human–pets–societies* triangle some constraints of Luhmann's position, like assumption that communication about pets is never communicated by pets themselves, are unfolded which might be circumvented owing to theory of interspecies communication. Albeit advocating for application of social systems theory as a pertinent conceptual tool for introducing sociology of pets, in that regard also some other potentially fruitful approaches embracing diverse ontological and epistemological views are anticipated, as well.

The mentioned issues particularly in such order reflect composition of the paper. However, prior to tackle these questions, we need to make a condensed overview on relation of humans and animals in order to genealogically conceive the emergence of the concept of a pet.

2 | HUMANS AND ANIMALS—A JOINT BIOLOGICAL AND SOCIAL EVOLUTION

From the dawn of the species, humankind has always been in a fierce relation to animals from its immediate environment. Paintings in the caves of Altamira (up to 36 000 years ago) and Lascaux (20 000 years ago) clearly indicated that animals had highly relevant, even crucial, role for reproduction of early hunters' societies by performing central economic function. Besides, animals performed important religious function as having mystical meaning not solely to pre-historic communities but having considerable symbolic importance for various socio-cultural systems over space and time. In his classical book about rudimentary forms of religion, Durkheim (1995) on the example of totemism showed that totem often represents a holy animal, as the symbol of adoration, though background meaning is primarily maintaining social cohesion. Even today, in some societies, animals are given sacred status with an inevitable reference to cows in India. Alongside religious meaning, symbols of significant animals often took semantically coded communication with an aesthetic value. A pertinent example in that respect is statues of noblemen mounted on a horse, 'the iconography of power, embodies in the expression and understanding of leadership' (Clausen, 2024). Since the Roman times over long centuries, statues of mounted horses embodied imaginary of power and possess tremendous value as a medium of transfer of a royal memory, also expressing symbolic unity of man and horse (Clausen, 2024).[3]

A particular threshold in relation of humans and animals occurred during Neolithic revolution when nomadic type of life was substituted with emergence of permanent settlements and hunting with agricultural type of economy. Then, a process of *domestication* of wild animals marked beginning of the new era within which 'wild' animals were detached from 'environment' and integrated 'within' human communities and hence borderline between 'human societies' and 'domesticated animals' became blurred. Porcher (2014) argues that human societies would never develop in existing shape without experience of co-existence with domestic animals for 10 000 years and particularly without their *work* though regularly being profoundly undervalued. 'Domestication is above all the cooperative process of inserting animals into human society through work which involves, as Marx wrote, elements of exploitation and alienation, but also, and more particularly, the prospect of emancipation' (Porcher, 2014). With the rise of agriculture, economic function of animals transmuted as once target in the hunt become 'driving engine' of a plough or a reliable 'vehicle'. Alongside this, novel functions appeared such as being a 'home keeper' and/or 'man's best friend'. Especially important were horses, which through domestication became 'biotechnology', 'living machines' in a service of man, conducting broadest spectrum of duties ranging from war, transport, sport, and so forth (Greene in Carter & Charles, 2018, p. 84). A horse also had a major role in expansion of a colonial project and represents first driving engine of the rise of industrial capitalism (Greene in Carter & Charles, 2018, pp. 84, 86). Once technological advancement brought powerful mechanical vehicles, like automobiles in the first half of the 20th century (Greene in Carter & Charles, 2018, p. 86), horses were outpaced by ever-accelerating technological enhancement (Clausen, 2024) and lost their 'practical' and symbolic importance, which lasted for 5000 years of mutual co-existence. In brief, contribution of horses and other domestic animals is essential for shaping modern societies (Carter & Charles, 2018; Porcher, 2014) and with the victory of industrial modernity, domestic animals were expelled from society back to its natural environment and to greatest extent left out of

[3]Remnants of that glorious past are today observable on cities squares and museums, mainly as a part of commodified tourist products.

the loop of modern social sciences. After domestication, this is actually the second largest threshold in relation of animals and humans. Today, depending on the dynamics and intensity of industrialization process, it is likely that some still dominantly rural and agricultural areas of the world, especially in the global South, are much closer to the animals than this is the case in the post-industrialized North, which is 'progressively' detached from animals (with, probably not surprisingly, exception of pets). Rather than presenting a minute historical overview of relation of animals and man, the main focus of the paper is to examine position and functions of animals from immediate human environment in modern societies which are known under the label 'pets'. As geographers indicate, now, we are living in the epoch of Anthropocene marked by immense human impact on climate, ecological environment and the entire biosphere, that is, living world. A question how within such context humans configure relation with animals from their immediate environment inevitably appears.

2.1 | The notion of pet

In a lack of strict scientific definition, we are referring to the following conceiving 'A pet, or companion animal, is an animal kept primarily for a person's company or entertainment rather than as a working animal, livestock, or a laboratory animal' (Wikipedia, 2023), which is highly congruent with a common understanding of a pet. According to Brittanica dictionary, a pet is an 'animal (such as a dog, cat, bird, or fish) that people keep mainly for pleasure' (Brittanica, 2023). 'Companion animals can be horses, dogs, cats, or a range of other beings willing to make the leap to the biosociality of service dogs, family members, or team members in cross-species sports' (Haraway, 2003, p. 14). Apart from other animals from immediate human environment, pets have privileged status being considered as members of a family and very often their owners refer to themselves as pets' 'mom' or 'dad' (Grimm, 2015). Ninety per cent of Britons conceive their pets as family members, and sixteen per cent even included their pets into Census (McRobbie, 2017). Considerable number of British said that they are more emotionally attached to their pets than to their partners, children or best (human) friend (McRobbie, 2017). Population of pets worldwide is huge counting around 202 million of cats and followed by 171 million of dogs (Wikipedia, 2023). These figures are from 2010, and it is most likely that they are significantly bigger today taking into account dynamics of growth. For instance, in the United States, ownership of cats and dogs in ca. 50 years increased four times, and more households have cats and dogs than children nowadays (Grimm, 2015). Such numbers reinforce our starting premise on vast relevance of pets in contemporary societies. However, in order to understand real impact that pets have on humans and societies nowadays, we cannot remain on a purely descriptive level, but to immerse into topic much deeper theoretically. In this respect, social systems theory represents a robust adequate conceptual tool.

3 | DEVELOPING THE SOCIOLOGY OF PETS FROM SYSTEMS THEORY PERSPECTIVE

3.1 | Ecological communication—Resonance of pets within social systems

When reflecting upon ecological issues, rather than attempting to grasp unity of a social system and its environment (including nature) Luhmann's (1989, p. 7) approach is focused on 'the unity of the *difference* (emphasis ours) of the system of society and its environment'. Society is conceived as 'all-encompassing social system of mutually referring communications' (Luhmann, 1989, p. 7) whose autopoietic reproduction depends on continuous communicative acts (communication by communication) that differentiates it (communication) from the environment. According to Luhmann, such conceptualization cannot entail solution to ecological/environmental issues or adaptation of a social system to its ever more complex environment, but it rather enables recognition/reflection through communication of ecological/environmental issues (Luhmann, 1989). It should be stressed that 'ecological communication is concerned only with how a society reacts to environmental issues, and not with how a society should react to improve its relations with its environment' (Wahyuni, 2019, p. 14). In other words, communication about certain ecological risks, such as a water pollution, a nuclear waste disposal issue, a global warming, raise awareness that a particular ecological problem exists otherwise, without an issue being communicated, it would not be perceived as an issue. Only through ecological communication an ecological issue has been recognized as such. For Luhmann's apprehension of the ecological communication, the concept of *resonance* is crucial (Luhmann, 1989, pp. 15–21) by which interplay between a system and its environment is portrayed (Wahyuni, 2019, p. 13). The simplest explanation is that resonance refers to situations when a society (once again through communication) reacts on particular irritations, specific cases (Luhmann, 1989, p. 15), or disturbances from environment (Wahyuni, 2019, p. 14), then changes in environment attain resonance of a society (Luhmann, 1989, p. 16).

When applying above presented Luhmann's theoretical categories on the particular case of pets, we assume that pets, conceived as organic but also psychic systems, represent part of a natural environment of a society. However, pets' entry into a society (or a social system) by 'contributing' in performance of particular functional systems of society. As social systems should be conceived as systems of iterative self-referential communication, this entry has nothing to do about agency, but about *communication* about pets, specific *meanings*, *codes*, *semantics* emerging around them. Entry of pets into operations of functional systems of society might be also conceived as the example of a resonance, as elaborated above, of that particular part of environment into social systems, as pets attained resonance of a society. Moreover, entry of pets into functional systems allows for an empirical analysis which exact communicative patterns or semantics this may take, which is line of Luhmann's conceiving of ecological communication that 'important performances of the societal system are constantly executed by *subsystems* (emphasis in original)' (Luhmann, 1989, p. 19), thus presumes distinction between a society as autonomous autopoietic system and its environment.

3.2 | Entry of pets into functional systems of society

Unlike traditional societies characterized by low level of specialization of functions and easily detectable centres whether in concentrated political or religious power, according to Luhmann (1995) (Luhmann, 2012, see also Baraldi et al., 2021), modern societies are progressively functionally differentiated comprising several autonomous subsystems performing important social functions. It is relevant to emphasize that modern societies are polycentric (Roth et al., 2024), that is, that all subsystems are equally important. Each system that is autopoietic is a sense that it tends to automatically reproduce itself, and they primarily should be conceived as systems of communication of specific binary codes, logic, programs, semantics, and so forth. For instance, key code of economic system is payment/non-payment, of science true/untrue, of health system health/unhealthy and so forth. Luhmann theoretical position is primarily constructivistic, and not substantialistic, and hence, the key is in epistemology, not ontology, what means that there is no entirely objectivistic view on social phenomena and processes, but their conceiving depends on a perspective of observers: whether first order observation or the second order, scientific, one. Different systems are autonomous in a sense that other systems represent their environment through they get in touch with other whether through structural coupling or irritate each other, that is, produce tensions, but their boundaries remain clear. As for this discussion, it is not of narrow relevance; we will not step further in disputing inter-systemic relations. It is, however, important that observations might occur at organizational level where a particular organization, for example, a sport club might perform activities within sport systems, but while making payments, it also relates to a system of economy. Despite a specific organization has a core mission that might be subsumed under a specific function system, organizations are multi-functional striving to achieve functions attributed by different function systems. Moreover, from systems theory standpoint, it is also valuable to observe interaction level that comprises communication process among people (and as we will argue later—also between people and pets).

For further discussion, it is important to stress that a society is not conceived as neither consisting of people nor of other non-human animals, mechanical entities, or any type of entities possessing agency. It is a non-subject ontological position. A society as a special type of a system has a clear boundary with its environment. In other words, everything that is not a society is considered as its environment. Environment of a social system is multiple; it comprises ecological environment (nature), biological systems (different types of living organisms) and psychic systems (human consciousness in particular). Here, we come to the crucial point: both animals and humans represent environment of a social system. In order to develop sociology of pets from social systems theory viewpoint, we need to conceptualize relation between pets (as distinctive category of animals) and humans but also how both of these systems are interrelated to social systems.

3.3 | Systemic level

In this section, we will focus on the question how pets entry into social systems, that is, which functions pets, with regards to previously mentioned 10 social systems[4] (see Table 1), perform nowadays, having in mind codes, mediums and programs attributable for specific systems. It should be highlighted that we do not have ambition to provide a comprehensive analysis that would encompass all features of this vastly complex topic, but rather to address main questions relevant for each function

[4]If a *family* is to be considered as a specific function system, relevance of pets for it would be undeniable. However, there is no consensus on this matter and we find Roth and Schütz's (2015, p.19) arguments that family primarily should be conceived as a self-reflective (not function) system convincing. Besides, in our further discussion we refer to their recognition of 10 function systems, so we prefer to consistently apply denoted criterion.

TABLE 1 The function systems of society (Roth & Schütz, 2015, p. 24)

	System	Code	Medium	Program	Function
1	Political system	government/opposition	Power	Ideology	Limitation
2	Economy	payment/non-payment	Money	Price	Distribution
3	Science	true/untrue	Truth	Theory	Verification
4	Art	innovative/imitative	Style	Fashion	Creation
5	Religion	immanent/transcendent	Faith	Confession	Revelation
6	Legal system	lawful/unlawful	Norm	Law	Standardization
7	Sport	sccess/failure	Achievement	Goal	Mobilization
8	Health	ill/healthy	Illness	Diagnosis	Restoration
9	Education	placeable/unplaceable	Vita	Curriculum	Formation
10	Mass media	informative/non-informative	Medium	Topic	Multiplication

system. This will also corroborate scope of possible topics that urge for a detailed empirical scrutiny.

3.3.1 | Political system

In December 2022, a few days before New Year's eve, a decision of several city majors in Croatia not to prepare a traditional firework as part of public celebration for the sake of pets (notably dogs) benefit ignited a huge public dispute about rights of pets not to be distressed or of people to have a party. Proponents of latter standpoint argued that there they anyhow disturbed by dogs all over a year. Opinions concerning these matters were considerably polarized without clear conclusions. Without empirical research, we only can guess on relation between political profiles and sympathy (and empathy) towards pets if political affinity makes any difference with regards to that at all. But it is pretty evident that pets are subject matters of political and ideological debates, and their representation in political debates requires a more detailed analysis especially since ideological articulations and power games in political power system effect on a regulatory framework setting pets' rights.

Additionally, when focusing on a pet-human relation, there is obvious asymmetry of power in favour of human, indeed. Hence, a question whether animals are in certain sense misused and abused within framework of being a 'human companion' might be legitimately asked. However, this is more addressed to legal and moral issues.

3.3.2 | Economy

Relevance of pets for economic subsystem of economy is perhaps most easily to elaborate. This is mainly due to commodification and commercialization processes in the current neoliberal context. There is a growing industry emerging surrounding pets: special food, hotels for pets, entertaining features, different accessories, special television channels, party gathering pets, fashion clothes customized for them and dozens of imaginable (and unimaginable) things nearly everything that might be sold to humans. There is estimation that the British pet industry is worth 10.6 million of GBP, while Americans spent more than 66 million USD in the 2016 (McRobbie, 2017). Hence, the major economic code payment/non-payment is frequently on a daily basis applied for pets' benefit. Sociology of pets is thus interested for broadest scope of phenomena where economic code related to pets appear. Undoubtedly, there is enormous money (medium of system of economy) circulating around pets. Moreover, there is another important phenomenon that requires a detailed inspection comprised in the question how class position and social inequalities are projected in domain of pets. Not all people can afford to own particular pet since some species especially those owning certificates of origins are vastly expensive. Obviously, there are pets for rich and for poor people what transpose class division in the animal world and imply considerable differences in expenditure for pets in terms of purchasing and providing care for them what also affect size of corresponding industry. There are also cheaper and more expensive products, like food, for pets. How their overall well-being is connected to their 'class position', that is, class position of their owners (if there is any difference), is a valuable question that can be summarized as relation between general social and pets' inequality. Finally, some pets relate to economic system by becoming 'owners' of whether real-estate or money, but that it is the topic we will tackle in the legal system subsection.

3.3.3 | Science

Function system of science is centred around true/false or true/untrue codes; scientific knowledge is articulated in form of a theory and seeks for a truth as the outcome of verification of claims process. From depiction of such attributes, it is a quite obvious that pets do not have such vigour linkage with the science system. Still, some intersections exist. Namely, animals, likes mouses, traditionally had crucial roles in new drugs testing and being subject of diverse, mostly medical experiments or sheep as object of genetic experiments. Besides, well known examples of 'sacrifice' of animals due to knowledge advancement coming from pharmaceutical companies within testing of novel products were conducted on them. It is important to note that those animals from laboratory do not presumes personal relations or emotional attachment but are rather 'depersonalized' animals without connotations of being pets. On the other hand, it is reasonable assumption that there are scientific research aiming to elevate pets' well-being. Therefore, an interesting question would be how much companies coming from emerging pets' industries invest in research and development specially in domain of veterinary. But this aspect will be commented later when dealing with health system.

3.3.4 | Art

Central binary code of art functional system is innovative/imitative. Whereas animals traditionally were objects of portraying of human art, with the social rise of pets, there are also example of animals becoming artists. Probably, the most famous is pig painter of indicative name Pigcasso (please, see https://pigcasso.org/). Though there is indisputable that animals are intelligent beings, a capacity of their artistic creation and/or expression is relatively novel phenomenon. Without omitting into discussion on justification of any parallel between human and animal creativity, even less about aesthetic dimension of their work, it is worthy to examine pets' artistic capacity in the current social context. If the fashion is the program of art function system, it is also important to grasp phenomenon of fashion developed for pets. Not just clothes as also emerging industry but fashion pieces for beloved pets in particular. One could even imagine a rise of new fashion models stars.

3.3.5 | Religion

Bearing in mind aforementioned vast symbolic meaning of animals for religious thought and rituals in traditional societies especially in religious systems like animism, totemism and akin forms, as well as the one central roles religion once had, the preliminary thesis is that animals, and pets in particular, has lost their religious significance. However, there are certain exceptions to the rule as fore mentioned case of cows in India, which still managed to retain sacred status. Though religious function of animals has principally diminished nowadays, still, there is a linkage between pets and subsystem of religion that might span across multiple levels. For instance, for some pet owners, relation with pets is a kind of metaphysical experience, a type of substitution for religious experience in progressively secularized world, particularly if it includes a deep emotional attachment and unconditional love. A pet becomes a certain God. Simultaneously, it becomes a type of priest with whom most intimate personal secrets are shared, a priest to whom sins are confessed. At the other level, there is growing importance of moral issues connected to rights of animals comprising particular religious' connotations especially in terms of theological reconsiderations of relation of human and animals in natural environment. For example, leader of Catholic Church Pope Francis lately stated that 'choosing pets over kids is selfish' (BBC, 5 January 2022), the opinion that initiate vibrant public debate. While a part of public and citizens welcome such interpretation finding relation towards pets really exaggerating and prioritizing animals at the stake of having children, the other found themselves offended. Without having any attempt to judge about this debate, we would like to stress that position of pets in contemporary societies is a subject matter of discussion with religious implications, and also within religious communities reconsidering relation within our triangle pets–humans–society, but also with regards to the realm of transcendence.

3.3.6 | Legal system

Probably you have not heard for Gunther VI? No, it is not a king from an ancient monarchy, but German shepherd, richest animal in the world. The fortune of this dog is estimated on 500 million USD (Lau, 2022) due to inherited wealth and received investments. And this is not isolated case as the list of richest pets is impressive (Lau, 2022). The fact that a human may entail his legacy to an animal (and, of course, define a curator as a pet obviously cannot take care for itself or take any decision) is apparent evidence that legal framework with regard to animals' rights has been gradually shifting in linear direction of elevating their rights. Certainly, it is worthy to inspect how the rise of animals' rights have occurred, differences in national legal systems, is there any

international regulatory framework, and so forth. Furthermore, an inevitable question is how far scope of animals' right could be expanded: would it be possible to merry with a pet? What social implications of such tendencies are? On the other hand, there is an open ethical debate on morality to 'own' or keep an animal as a pet with more and more voices underlining contentious character of the entire concept (Briggs, 2022; McRobbie, 2017; My Assignment Help, 2022). Definitively, pets have obvious relation to legal system as normative framework defining rights of pets has been drastically reformulated and this is domain of sociology of pets that may provide most valuable insights. In that regard, some Luhmann (2004) might be theoretically instructive.

3.3.7 | Sport

Traditionally, animals from immediate human environment had important role in sports competitions, especially horses as being 'driving engines' in horse races or polo. Here, strict separation line between animal from immediate environment and category of 'pets' is not easy to draw as it before further research (both conceptual and empirical) remains blurred. However, there is apparent extension of sports competitions on diverse species, like races of squirrels or dogs. There are also competitions of dogs running through polygons. Interesting, one of the authors of this paper shares the hall for futsal as recreational activity with dogs running through the polygons. A narrow empirical observation uncovers blatant similarity with patterns of training as it is in case of any other human athletes. Thus, one might assume that pets are trained for a competition as, for instance, someone's children would be. Moreover, certain antropomorphozation is visible in manners of celebrating victory, that is, gaining success (key code of sport system). Finally, resemblance with human sports is present in aspect of possibility to bet on your favourite pet runner.

3.3.8 | Health system

Health aspects of relation humans–pets are highly interesting and relevant. Being a companion or a type of 'substitution' for a human friend yield tremendous benefits to health of people. They are source of an emotional support and assistance. Sometimes, it is demanding to draw strict demarcation line between a pet and an animal dressed to provide help, like assistance to blind persons or disabled people, as the professionally trained assistant becomes the pet. Pets are generally beneficial for psychological health, even more in case of single persons in situations of a traumatic experience. They definitively contribute to restoration of humans and so contribute to performance of main health subsystem's function.

From the other perspective, also, health of pets is a topic of ever growing relevance. There are numerous specialized veterinary (both public and private) ambulances and clinics taking care of pets' health. Moreover, it is a question of living conditions, quality of food provided, time to promenade pets, and so on. All those aspects are connected with social attributes of their owners and might be connected with a class background. With regard to living conditions, there is a feedback loop as humans and animals cohabitating within the same physical space may have harmful healthy effects like allergies or akin issues.

3.3.9 | Education

Relation of pets towards educational system of society is at least twofold: at one hand, pets may contribute in education process particularly in the case of people with special needs (similarly as just described with regard to the health system); on the other, pets are undergoing education too. The latter is connected with drilling pets in order to achieve particular patterns of preferred learned behaviour. It cannot be considered as education in narrow sense of the term when applying to education of humans, but still the parallel, as process of 'formation' (function of the education system) of a pet's behavioural traits, holds.

3.3.10 | Mass media

In the current digital media environment marked by enormous number of technological devices, nearly on every screen appears a cat, dog, rabbit, bird, snake, fish, monkey, crocodile or any other pet you can imagine. On social media, humans proudly upload images, videos, share posts, and multiply mems about their emotional companies. Pets have certainly become an indispensable topic of endless mass media horizons. This holds true not solely to newer digital media and Internet but also to more traditional media like television or specialized printed magazines, also, in the context of commodified society, pets often starring in advertisements. From the angle point of sociology of pets, there is a vast space for analyses of different aspects of their media appearance, messages their appearance carries and semantics they imply.

3.4 | Organizational level

When grasping theme of pets as social phenomenon from social systems theory perspective, it is important to stress that above depicted systemic level of analysis is just one piece of a puzzle, since there is also important to inspect a topic at organizational, as well as interaction level. There is a vast bulk of organizations within societies setting their own goals, mission, performing diverse types of action, taking different decision, ranging from international organizations of a global scale, over national governmental organizations to business enterprises to local NGO's. Many organizations at the spotlight of their activities have pets or, in more general sense, take care of animal welfare. Moreover, there are companies within pets' industry manufacturing and selling goods and provide services for pets. Also, activities of some organizations are partially dealing with pets, for instance legislative bodies formulating regulations addressed to position of animals, or stores which alongside other articles offers goods for beloved home animals. Of interest to sociology of pets would be to inspect how organizations' performance is shaped by social context with regard to pets and, on the other hand, how pets' social position, their function and conceiving has been reconfigured by action taken by organizations. Indeed, these are the most general questions and multiple more narrowly focused might be formulated, as relation of pets towards social system (and its organizations) is multi-layered, multi-facet, highly complex phenomenon that urges for proper scientific examination.

3.5 | Interaction level

Pets should also be observed at the interaction level. Indeed, for sociology is not interesting how animals (*pets-pets* relation) interact among themselves (though that might be of concern for some other disciplines), but rather, relation *humans–pets* is in focus, as well as relation *humans-humans* with respect to communication about pets. Human–pets relation might be grasped primarily by methods of observation whereas patterns of human communication about animals is more likely to be delineated with diverse types of discourse and narrative analysis approaches. Besides, with owners of pets, volunteers, workers within pets' industry, and other types of actors directly in touch pets, but also with general audience, interviews, focus groups, questionnaires could be conducted in order to grasp complexity of interaction with or towards pets, or about the pets. Yet uncharted map of that huge territory patiently waits to be filled in with numerous insights. Also, reflection about communication about pets could be enriched by referring to theory of interspecies communication and this is another important point we should emphasized as entails far-reaching consequences for tackling the theme from social systems theory perspective.

3.6 | Pets–humans–societies triangle: Interspecies communication

Even bacteria possess chemical systems providing them capacity to communicate within their own, but also with other species (Federle & Bassler, 2003). This quite fascinating discovery for one of the most rudimentary form of life is pretty indicative with regards of a bulk of other more complex organic systems inhabiting Earth. Traditionally, comprehension of relation of humans with all other living species was blatantly anthropocentric, emphasizing human exclusivism, 'hegemony' or 'exceptionalism' (Spiegelhofer, 2020, pp. 2–3), whereas other 'animals' were considered as 'voiceless', without capacity to speak (Spiegelhofer, 2020, p. 1); that is, language was regularly underlined as distinctive feature of humans (Kulick, 2017, p. 359). However, by the end of the 20th century different tendencies in rendering human-animal relation have emerged as a part of 'animal turn', which has lead towards emerging Anthrozoology or (Human-) Animal Studies field (Spiegelhofer, 2020, pp. 2–3). Within this hybrid highly interdisciplinary knowledge domain comprising natural and social sciences also related fields labelled as 'human-animal communication', 'cross-species communication' or 'trans-species dialogue' or 'interspecies communication' appeared (Spiegelhofer, 2020, p. 7). Kulick (2017) in overviewing developments in human–animal communication studies identifies six overlapping approaches: (1) cognitive connection related to early interest on a research of ape, dolphin and parrot language; (2) psychic connection based on premise that telepathic connection between human and animals is reachable[5]; (3) psychological connection literature anchored in assumption that animals, like humans, have subjectivity, sentiments and emotions; (4) interactional connection including mainly communication studies and conversation analysis dissecting attributes of communication comprising human narrations and sensible being not capable to provide discursive feedbacks; (5) ontological connection reframing human-animals relation through lenses of 'perspectivism', which leads towards reconsidering conceiving of nature or

[5]Within this a bit controversial and scientifically contentious camp also a concept of 'intuitive interspecies communication' can be included (Barrett et al., 2021).

biosphere; and (6) ethical connection as the most topical branch of research—'the main point of studying human–animal communication here is to explore and extend the grounds for respectful engagement with animals in ways that do not either reduce animals to anthropomorphic projections, or claim them to be fundamentally unknowable aliens whom we can continue to exploit because we can never know what, or even if, they think' (Kulick, 2017, 359). Thus, such standpoints mark upheaval with former anthropo-hegemonic position and reclaim worthiness of animals as 'significant others' (Haraway, 2003). Besides, this highly relevant contribution, the emerging field of human-animal communication also expands our understanding of language and communication beyond conventional definitions, stretches our conceiving of animals' capabilities and, so, opens a possibility of giving a voice to non-human animals (Kulick, 2017, pp. 372–373). Hence, inclusion of animals occurred in hybrid disciplinary field, and this task is still facing sociology.

Without omitting further in these vastly interesting debates within interspecies communication studies, we should render linkages with presented insights and main argumentation line developing here. In brief, humans and pets communicate and this communication mainly occur at *interaction level* in Luhmannian terms. The communication may take different forms, being a verbal (human utterances apparently) like imposing a direction to a pet through training process, non-verbal as a dog wagging a tail while being provided by (favourite) food, it may (or not) contain a semiotic content, it may (or not) carry emotional component, we can also allow an open space for the assumption that it has been performed at the intuitive level, and so on. In any case, the interspecies communication between people and pets occurs. It is important to stress anew that both humans and pets represent *environments* of a social system: humans as primarily psychic (though simultaneously biological) systems and pets primarily as biological (though as interspecies communication theory just suggested in a specific manner also psychic) systems. Additional emphasis is that pets' relation towards social systems is mainly mediated by humans, that is, pets entry into social systems indirectly only through communication of humans, and this important remark should be specially stressed.

Though pets, as humans, represent both organic and psychic systems, as a subject matter relevant to social systems, the core category is *communication* about them meant in terms of autopoietic operations of function systems, at level of organizations and at interaction level. Therefore, the key to understanding pets from Luhmann's perspective is in *meanings* and *semantics* emerging about pets. In this respect, it seems that there is a discrepancy between social systems theory and theory of interspecies communication. According to the latter, animals are capable to communicate among themselves and with humans with their own languages. However, as a socially relevant subject matter pets are present exclusively by mediation of human psychic systems,[6] that is, by semantically coded communication about them. Semantics such a loneliness, joy, empathy, support, happiness, fear, safety, and so forth emerging about pets are introduced in the social systems through coding of meaning of pets' reactions, emotional statuses, information[7] and messages we receive by human psychic systems. Hence, from viewpoint of theory of interspecies communication one can object that in Luhmann's approach entry of pets into society is biassed by anthropocentric mediation whereas authentic voice of animals remaining silent. This argument is rather convincing so it is worthy to seek for overcoming mentioned blind spots of social systems theoretical account of animals by combining it with theories of interspecies communication or with some other positions.

4 | MULTIPLICITY OF RESEARCH APPROACHES

We have unfolded huge box of social relevance of pets nowadays. In this line, we have elaborated, hopefully convincingly, on suitability of Luhmann's social systems theory approach. However, it would be misleading to hold that this is solely pertinent theoretical standpoint dealing with the subject matters as also other theoretical framework might convey valuable knowledge. For example, critical realism and analytical dualism in particular (Archer, 1995) could be instructive in explaining how individual patterns of interaction with and towards pets gradually re-shape structural conditions and cultural conceiving of animals. Certainly, this approach may explain such morphogenesis of overall elevating position of animals through the history. For the purpose of providing genealogical explanations, also, Elias' (2000) conceiving of civilizing process might be promising, as well. Moreover, conceptual approaches labelled as *relational*

[6]It should be reminded that, according to Luhmann, psychic systems (being self-reproduced by consciousness) are not part of social systems (being self-reproduced by communication) but can interact through mutual interpenetration (Bombaerts, 2023:31). The structural coupling of psychic and social systems occurs through medium of language (Maurer, 2010).

[7]Another reminding note is that for Luhmann, information is just one of the three, alongside utterance and understanding, key elements of communication (Maurer, 2010, p. 5). Thus, communication is always more than a simple transmission of information.

sociology (Donati, 2014) examining interlinkages within complex networks of diverse entities, particularly, might also be suitable.

Not solely *relational* approaches focused on interplays within complex networks, but also complementary 'non-human ontologies' could be promising in research of social position of pets. One stream of social sciences and humanities today has undergone non-human turn what means: 'nonhuman turn more generally, is engaged in decentring the human in favour of a turn toward and concern for the nonhuman, understood variously in terms of animals, affectivity, bodies, organic and geophysical systems, materiality, or technologies' (Grusin, 2015:vii). This type of 'flat ontologies' (Ash, 2020) neglecting privileged status of humans thus might be pertinent for sociology of pets' inquiries.

In the same line stands also proposal of Carter and Charles (2018, p. 87) who advocate development of 'a social ontology able to encompass humans and other animals, enabling us to get to grips with the complex forms of their entanglement' what requires a profound revision of the key sociological concepts such as, for instance 'society' and 'agency'. Regarding the former, the authors argue that notion of society cannot be privileged only for human, since some other species, such as higher primates, exhibit patterns of organized social life (Carter & Charles, 2018, p. 90). Concerning latter, animals could also be conceived as agential beings (Carter & Charles, 2018, p. 90).[8] Apparently, here is another example of relational and also flat ontology, which goes beyond the anthropocentrism of conventional sociologies.

With these regards, one approach seems to be especially propulsive: *actor-network (ANT) theory* of Bruno Latour (2005). The most advantageous feature of ANT is allowing that agency of not just humans, but also of non-human entities should be taken into account when explaining social phenomena. Therefore, rather about 'agent' in classical social theory sense, he talks about 'actants' within which alongside people, Latour subsumes technological devices, material objects, and so on. Such expansion in conceiving social agency perfectly fits with the idea that pets are actants and part of social networks consisting of humans despite not possessing the same type of capacity to act as latter do. However, ANT enables to go even step further if in a network robots-pets, that is, robotical emulation of pets, are incorporated. Technological advancement brings ever growing emergence of pets robots whether for entertaining or assistance purpose. This may imply question of relation pets/robots-pets, but omitting into that discussion would not be wise due to space constraints. Finally, technological environment as environment of social system (like animals, humans, etc.) becomes more complex as it comprises cyborgs, chabots, AI systems and akin phenomena. ANT theory exhibits potential to absorb these entities into more expanding network of actants. So, its heuristic potential is tremendous. It would be advisable to combine Luhmann's social systems theory and Latour's ANT theory as the *conceptual approach* that would enable for more adequate observation of relation of humans, pets and other non-humans and their complex interactions and interrelations in even more complex social systems within which borderlines between social systems, humans, animals, natural environment and technical environments have become ever vaguer.

5 | DISCUSSION AND CONCLUSION

In everything said so far, we have tried to advocate for introduction of sociology of pets as specific sociological sub-discipline as a response to apparent growing social importance of pets. In this attempt, we argued that social systems theory is the adequate approach in coping with that challenging complex subject matters and delineated broad scope of topics of potential interest to newly forging discipline. This was conducted by departing from Luhmann's conceiving of ecological communication based on system/environment distinction and their interplay conceptualized as the resonance, which we have identified in pets, as part of environment attained resonance within functional systems of society. In the following step, it was indicated that pets to lesser or greater extent are relevant to all social systems, or more precisely, contribute to their self-reproduction by being subject of intensive communication through which particular codes are reproduced, as well as novel semantics surrounding pets emerge. Moreover, it is important to inspect how meanings about pets is communicated and how interaction between humans and pets occur. At this point, there is perhaps a heuristic constrain of social systems theory, as we could never hear authentic voices of animals, but rather distorted semantic codes emerging from consciousness of human psychic systems and

[8]The authors use following argument in favour of such position: 'They (animals) are entangled and enfolded in all sorts of relations with humans (many of which are fatal for them) and thus will find that their agential conditions are modified involuntarily (sheep do not decide when they are to be slaughtered; chickens do not decide to live in cramped and insanitary battery cages; wolves and pheasants are unaware of the shooting season) and that their choices, when they are exercised, are already circumscribed (the caged chicken cannot walk freely and the pheasant cannot fly safely within range of armed humans)' (Carter & Charles, 2018, p. 90).

consequently structurally coupled with communication as medium of social systems. It is arguably helpful to refer to theory of interspecies communication in order to overcome denoted limits of Luhmann's approach. In any case, we do firmly believe that presented invocation to sociology was convincing and that there is no need for further elaboration for its urgency.

In fact, there are two additional arguments with that regard as they unveiled two important processes surrounding the rise of pets in the 21st century. (1) Observed phenomena lead towards conclusion that process of *humanization* of pets has been taking place, as very often they are treated as people. Hence, by such *anthro-morphosization*, pets are ascribed with certain agency, as 'agents' and their subjectivity are perceived of particular importance. However, very often there is a case that pets are given even 'more' privileged status than people especially in looking global distribution of wealth. Many pets in the West and North live in incomparable better conditions that millions of people at global East and South, in particular. One may argue that pets attained resonance within society merely because being anthromorphosized, or that their entry into functional systems is due to (re)gaining privileged position once domestic animals enjoyed. Posed question certainly requires more exhaustive theoretical elaboration. On reverse, (2) process of dehumanization/animalization of humans take place especially prior to and during war conflicts where 'enemies' are neglected of their humanity. It would not be accurate to assume causality between the two processes, but they are synchronic, that is, occur parallel. Without having ambition to moralize or express any type of normative judgements in this moment, there is definitively need to reconsider anew on relation between humans and humans in terms of establishing just society and to reflect on relation between humans and animals. Different types of strong arguments in any direction might be provided by sociology of pets. It is important to reflect about moral implications of the two simultaneous processes, as legal regulation not necessarily correspond to potential moral estimation. Having in mind Luhmann hesitation towards moralization as a rather harmful form of communication[9] (Luhmann, 1996, 2012), perhaps such discussion will go beyond social system theoretical standpoint.

In our view, it is indisputably relevant to put pets under the loop of social sciences, to introduce them into sociology in a general sense, even to develop special subfield in a form of sociology of pets. In this line, as demonstrated in the article, social systems theory offers a convenient theoretical tool. Certainly, there are multiple merits in relying on this theoretical toolkit when bringing back animals (at least pets) under lenses of sociological analysis. This does not mean that this approach is without flaws, indeed. It is also worthy attempt to supplement Luhmann's standpoints with other theoretical traditions striving to give voice to animals, to include animals and other non-human agents into fundamental categories of sociology. Reconsidering categories of conventional social science is perhaps preferable direction if contemporary societies possess a least good will to cope with multiple burning environmental challenges nowadays. A first leap into that direction is to remind ourselves that 'we—humans' are not alone in the social systems environment, and are not alone on this planet, though this in the age of Anthropocene is not easy to comprehend.

[9]Though, for a newer interpretation diverse to that usual conceiving, see Bombaerts (2023).

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DATA AVAILABILITY STATEMENT

We declare that this theoretical/conceptual research has not include any type of empirical inputs, data and/or analysis, so consequently, there is no data repository connected to the manuscript. On the other hand, all consulted bibliography units and referred on-line sources was listed in the literature, indeed.

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SYSTEMS and BEHAVIORAL RESEARCH SCIENCE

RESEARCH NOTE

Guiding Distinctions: Observed With Social Systems Theory: An Introduction

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ABSTRACT

This article serves as an introduction to the special issue *Guiding Distinctions: Observed with Social Systems Theory*, providing a conceptual framework for the contributions that follow. Drawing on Niklas Luhmann's theory, it examines the role of guiding distinctions in structuring social systems theory as well as discourses in the broader social sciences. Although distinctions such as economy/society, system/environment, structure/agency or interaction/society have shaped theoretical frameworks, their validity and utility remain subject to scrutiny. Drawing on the distinction between true and false distinctions, this article examines how social systems theory navigates fundamental conceptual tensions and applies its own principles to assess and refine its architecture. The article argues that false distinctions remain useful within analogue social theorising but become problematic when guiding programmes aimed at theorising digitally transforming societies. By situating the individual contributions of this special issue within this broader theoretical framework, the article highlights key tensions and opportunities for refining systems-theoretical approaches to contemporary social transformations.

1 | Introduction

The term 'guiding distinctions' refers to prominent distinctions—such as economy/society, bourgeoisie/proletariat, nature/culture, system/environment, structure/agency, theory of society/social technology or, more recently, analogue/digital—that have shaped theoretical frameworks, guided research, sparked debates and influenced discourses in the social sciences and humanities.

Whereas early thinkers in these fields often relied on singular, dichotomous categorisations, later generations of scholars have increasingly recognised the interconnections between these categories and their potential as tools for generating insight rather than merely categorising phenomena. For instance, the concept of intersectionality was introduced to examine how race, class and gender intersect to create and perpetuate complex social realities.

Drawing on foundational contributions by Spencer Brown (1979), von Foerster (1979) and Maturana and Varela (1980), Niklas Luhmann's social systems theory (Luhmann 1995a) posits that distinction is the fundamental operational mode of all organic, psychic and social systems, including his own theoretical framework: 'a system is the difference between system and environment' (Luhmann 2006, 44). This 'paradoxy of observing systems' (Luhmann 1995b) becomes even more intricate as systems must not only create distinctions to sustain themselves but also to observe and interpret other systems.

As a subsystem of society, which is considered the overarching social system, science is defined by the distinction between truth and untruth. Social sciences and humanities employ a wide array of theories and methods (Bendl et al. 2015, 54) to apply this distinction to various other distinctions that characterise life in its organic, psychic and social dimensions.

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Although social systems theory does not claim exclusive ownership of truth, it asserts its universality by claiming applicability across all social domains. Consequently, the theory is sufficiently self-confident to accept the challenge to not only identify but also parallel process the most relevant guiding distinctions of the social sciences and humanities.

From a systems-theoretical perspective, a focus on guiding distinctions is crucial for two reasons. First, it offers a mode of sceptical reflection on trends in our fields—past, present and future. Second, it is essential for addressing the challenges posed by the digital transformation of society and the disciplines tasked with studying it.

Information and communication technologies and the growing abundance of digital data are profoundly transforming research and knowledge production in the social sciences and humanities. Although the rapid pace of methodological innovation in fields like digital humanities and computational social sciences is remarkable, theory development has lagged behind (Ossewaarde 2019; Roth 2019). This imbalance is concerning, as digital methods not only enable the testing of existing theories with ever-bigger datasets but also encourage the creation of new forms of digital theorising (Kitchin 2014), which may involve translating traditional analogue distinctions into digital ones (Roth 2023, 2024; Roth et al. 2025a, 2025b; Watson 2023).

Against this backdrop, contributions to the Luhmann Conference 2024 at the Inter-University Centre Dubrovnik explored not only the most influential guiding distinctions in the history of theorising within the social sciences and humanities but also distinctions that hold particular relevance today or might emerge as guiding distinctions of the future (Baecker 2025; Fordahl 2025; Lien 2025a; Roth et al. 2025b, 2025d). Other contributions published in this special issue of *Systems Research and Behavioral Science* on the theme of 'Guiding distinctions: Observed with social systems theory', and elsewhere (Laflamme 2025; Roth et al. 2025b), examined the interplay or interaction of guiding distinctions or the opportunities and challenges of translating analogue guiding distinctions into universalist theoretical frameworks based on binary distinctions.

Against this background, the articles published in the present special issue contribute substantially to the ongoing and most pertinent discussions on whether historical or contemporary guiding distinctions remain relevant in the context of digital transformation.

2 | Guiding Distinctions of Social Systems Theory

The evolution of social systems theory in the tradition of Nikas Luhmann (1995a, 2012, 2013) is marked by significant shifts in attention to the 'guiding distinctions' (Luhmann 1995a, 32), 'guiding differences' (Luhmann 2008, 44f) or 'metadifferences' (Luhmann 2013, 25) that underpin its theoretical framework. These shifts reflect the theory's ongoing engagement with increasing societal complexity as well as efforts to refine systems theory as a tool for observing modern society. Three critical guiding distinctions—system/environment, form/medium and inclusion/exclusion—illustrate this evolution and provide insight into how social systems theory unfolds in response to self-inflicted irritations, and thus to its unique perspective on modern society.

As is well known, Luhmann (1995, XLVIII) insisted that social systems theory 'claims neither to reflect the complete reality of its object, nor to exhaust all the possibilities of knowing its object. But it does claim universality for its grasp of its object in the sense that it deals with everything social and not just sections'. This interplay between a universal claim and self-referentiality means that a theory must also apply to itself. As Luhmann states, 'theories that claim universality are easily recognized by the fact that they appear as their own object' (Luhmann 1995). By counting social systems among these universal 'supertheories', Luhmann (1995a, 6) implies that his theory also functions as method that can not only observe its designated object but also turn its observational framework back onto itself. More precisely, his theory must be regarded as a theory-method, as it is capable of treating itself as an object of observation, thereby revealing how its own observations are produced and can be systematically replicated.

In order for his theory-method to become operative, Luhmann (1990, 415) had to 'decide on a lie', as every method must—once—'take an untruth as truth, then things will work' (Luhmann 1990, own translation) just as in the (...) case of the binary number system invented by Gottfried Leibniz, where a false distinction is redefined into a true one as two natural numbers are taken out of the number range to entirely recode it (Roth 2024, 265f).

In the case of social systems theory, this 'first lie' consists in Luhmann's (1995a, 12) seminal assumption 'that there are systems', which translates into his as paradoxical as compelling definition that 'a system is the difference between system and environment' (Luhmann 2006, 44). The circumstance that Luhmann transformed his first lie into a truth implies that the system/environment distinction can be regarded as both a true and a false distinction, a fact captured rather than concealed by the paradoxical nature of his foundational definition.

As stated by Roth (2024, 263) (see also, Roth 2019), 'true distinctions split the entire frame of reference into two mutually exclusive and jointly exhaustive sides', whereas false distinctions fail to do so regarding either or both of these qualities. This distinction between true and false distinctions, including its own inherent paradox, is foundational for a supertheory of distinguishing systems, as both theories and methods represent programmes of the function system science, whose basic operation is the distinction between true and false or true and untrue, respectively.

Consequently, the distinction between true and false distinctions is well suited to guide observations of other guiding distinctions of social systems theory. The relationship between the distinctions of system/environment and form/medium is a case in point.

If it is true that the 'distinction between medium and form is always an *intra*systemic matter' (Luhmann 2012, 116), then this

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TABLE 1 | Eigen-complexity unfolded by the self-application of a true distinction (Roth 2019, 92).

	System	Environment
System	Systems	Environments in systems
Environment	Systems in environments	Environments

TABLE 2 | Result of a translation of one false into two true distinctions. The example of system/environment (Roth 2023, 454).

	System	Non-system
Environment	System in the environment Environment in system	Environment
Non-environment	System	World

TABLE 3 | The generative capacity of the system/environment distinction in creating the form/medium distinction.

	System	Non-system
Environment	Form	Environment
Non-environment	System	Medium

distinction must derive from a 're-entry' or self-application of the foundational system/environment distinction.

As demonstrated by Roth (2024, 263ff), the question of whether a distinction is true or false becomes particularly consequential in situations where a distinction is applied to itself. If we consider a distinction to be true, we may perform a re-entry to unfold it. If we consider it to be false, however, we imply that this distinction is actually a conglomerate of distinctions and therefore must be translated into true ones. The different outcomes of these two manoeuvres are illustrated in Tables 1 and 2.

Table 1 shows that a re-entry of the system/environment distinction results in the emergence of four observational options, namely, the observation of systems, environments, systems within environments and environments within systems. In the case of Table 2, however, the latter two options appear as two side of the same observational coins; we can now observe either systems or environments alongside with nested constellations of both system and environment, to which adds the option of referring to a realm associated with neither system nor environment, and hence 'the "unmarked state" of the world' (Luhmann 2012, 21), that is the elusive horizon of meaning, in brief: the ultimate medium (Luhmann 2012, 26; Luhmann 2023, 871f).

For the purpose of the present analysis of the relationship between the systems/environment and the form/medium distinction within social systems theory, Table 2 can therefore be translated into Table 3.

TABLE 4 | A re-entry of the form/media distinction (authors' own work).

	Form	Medium
Form	Form	Forms as media
Medium	Media forms	Medium

As shown in Table 3, by taking the system/environment distinction for a false distinction and translating it into two true ones, an observing system can now refer to either one side of the system/environment distinction or the other or to the form of the distinction itself. Moreover, the system can also infer the existence of a context, 'unmarked space' or medium in which the distinction is drawn.

If we then consider the newly obtained distinction between form and medium to be a true distinction and proceed to its re-entry, the outcome is as shown in Table 4.

Table 4 shows that a re-entry of the form/medium distinction expands the scope of observation beyond this distinction, now also including observations of the existence of different media forms as well as the circumstance that various forms can act as media. Consider the example of communication. As the overarching system of communication, as contrasted to psychic systems with which it shares meaning as a common medium, society clearly constitutes a case of a form in operation. At the same time, this form may be observed as a medium in which different forms of communication, such as interactions or organisations, draw their own distinctions. Thus, the form of society constitutes the ultimate medium of the social world, within which the emergence of various social forms may be observed—forms that, in turn, serve as media to one another. The function system economy, for example, represents a social form whose basic operation is the distinction between payment and non-payment and thus provides society with the symbolically generalised communication media we commonly refer to as money.

By facilitating observations of nested relationships of system/environment distinctions observed against the background of other system/environment distinctions, the form/media distinction simplifies observations of both the internal differentiation of systems and, consequently, also how these systems relate to their respective environments.

In translating the form/medium distinction into two binary distinctions in ways similar to the process described in and around Table 3, we may furthermore infer the existence of social forms that are considered as neither forms nor media by other social forms and may in this sense thought to be excluded from the latter.

Consequently, in some of his later works, Luhmann (2008, 45; 2013, 25) alluded to the possibility that inclusion/exclusion might become the super code or guiding distinction of the 21st century—a proposal widely discussed particularly in relation to challenges of modern functionally differentiated society, which, unlike its medieval predecessor, has replaced claims for total inclusion with a world of exit options and zones of indifference.

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Although it is the purpose of neither this section nor this article to rank particular guiding distinctions according to their prominence or importance, the fact that some guiding distinctions appear to be derivable from others seems to support the assumption that some guiding distinctions might be more central to social systems theory than others. At the same time, the perceived importance of our theoretical guiding distinctions is likely to fluctuate or otherwise resonate with the prominence that particular semantics have within the broader social sciences and other social domains.

It is against this background that the following 10 contributions to this special issue aim to explore some of the most prominent, pertinent or perplexing guiding distinctions in the social sciences and beyond—observed, of course, through the lens of social systems theory.

3 | Ten Systems-Theoretical Observations of and Based on Guiding Distinctions

Erik Aal's (2025) article '"The End User Takes the Final Decision". AI and Decision–Communication in Organisations' explores the intersections of artificial intelligence (AI) and organisational communication through the lens of Niklas Luhmann's social systems theory. It argues that organisations, as systems of decision–communication, are significantly impacted by the deployment of AI, which challenges traditional boundaries of decision autonomy and communication processes. The paper identifies several guiding distinctions that are central to its understanding of the influence AI exerts on organisations. These are, first, decisions versus decision premises, as AI contributes to the automation of decision premises, impacting how decisions are framed; second, system memory versus environmental orientation, as AI's capacity for data storage and pattern recognition reshapes how organisations interpret and respond to their environments, raising concerns about potential biases and forms of memory oversaturation; and third, organisation versus interaction, as AI introduces complexities in how organisational decisions interact with other social systems, potentially bypassing human interpretive processes. Aal's article highlights how AI's role extends beyond efficiency, rather embedding itself within organisational communication loops and generating unintended consequences as AI systems reinforce existing biases within decision processes, inadvertently narrowing an organisation's adaptive capabilities. To mitigate such risks, the article advocates for implementing reflection loops in decision processes that ensure that human actors retain oversight and ethical accountability. Aal underscores that although AI serves as a tool for managing societal complexity, its integration necessitates critical reflection on its systemic implications.

Brezovec et al.'s (2025) article 'Theory and Methodology in Sociology – Guiding Distinction' examines the interplay between theory and methodology in sociology, also using Niklas Luhmann's social systems theory as a conceptual framework. It focuses on how the two function as guiding distinctions in the discipline, thus shaping sociology's self-referentiality and its capacity for internal differentiation. The study investigates responses from 15 Croatian sociologists engaged in a hypothetical case study on the implications of generative artificial intelligence in labour markets. The results reveal an overreliance on methodological rigour at the expense of theoretical relevance, which the authors describe as a 'methodological imperative'. This bias reflects sociology's tendency to align with standardised, rule-based practices that ensure inclusion in the broader scientific discourse, even at the expense of theoretical creativity. Through their combined observation of the guiding distinctions of rigour versus relevance and theory versus method, the authors argue that their interplay supports sociology's differentiation as a subsystem of science, allowing it to address complex societal phenomena. However, they also caution that overemphasis on methodology may limit the discipline's conceptual and theoretical scope, which might result in conceptual stagnation.

In their article 'Reimagining Sociality in the Digital Age: Transcending the Interaction/Society Dichotomy', Cordeiro and Neri (2025) re-examine the traditional interaction/society dichotomy in sociological theory with a particular focus on how digital platforms, algorithmic systems and networked communication challenge this core sociological distinction. The authors integrate Niklas Luhmann's systems theory with digital sociology to provide a theoretical framework that addresses the complexities of digital social phenomena. The article begins with a case study of the George Floyd video, whose viral spread across digital platforms sparked global protests and demonstrated the convergence of individual, technological and societal scales of interaction. The authors argue that this phenomenon exemplifies how digital communication transcends traditional boundaries, simultaneously functioning at micro and macro levels. The article also introduces the concept of 'virtual double contingency', where algorithmic systems seemingly engage in communication-like processes as they respond to human inputs based on predefined criteria. This challenges old-European sociological notions such intentionality and agency, as digital systems apparently function without human cognition but still seem to shape societal interactions. By drawing on systems theory, Cordeiro and Neri argue that digital technologies necessitate a reconceptualisation of sociological frameworks. Instead of bridging micro/macro or structure/agency divides, they propose observing how autonomous systems interact and influence society all while positioning sociology as part of the scientific system, with the potential to generate new insights into digital phenomena and their societal implications.

Fritzsche and Bakrim's (2025) article 'Transformative Services and Systemic Well-Being – Towards a Better Understanding of Distinction in Service Design' explores the concept of well-being against the backdrop of advances in transformative services through the lens of systems theory. The authors argue for a systemic approach to well-being that moves beyond notions of individual intervention to examine the broader dynamics of service provision and its impact on social systems. Most notably, the paper critiques existing transformative service research for its narrow focus on customer-centric interventions, thus also highlighting the need for a more comprehensive understanding of how services contribute to the sustainability of social systems. The authors propose that well-being should be conceptualised as the ability of a system to maintain a floating equilibrium, a state of adaptability and resilience over time. In this context, distinction is identified as a fundamental operation in maintaining systemic boundaries and enabling evolution. In so doing, the

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authors categorise five forms of distinction in service design, each crucial for promoting well-being and adapting to systemic shifts. Thus, their contribution deepens the theoretical foundations of transformative service research, positioning it as a critical tool for addressing complex challenges such as sustainability, inequality and systemic resilience.

In his article 'Decolonising Special Educational Needs and Disabilities (SEND): A Systems Theoretical Framework for Global Inclusivity', Vincent Lien (2025b) critically examines the Special Educational Needs and Disabilities (SEND) paradigm through the lens of Niklas Luhmann's social systems theory, emphasising the need for a decolonial perspective in this context. The paper challenges the dominance of Eurocentric models in SEND, arguing for an epistemological shift that incorporates the experiences and needs of the Global South and indigenous communities. It highlights how existing frameworks often fail to address systemic inequalities and cultural diversity. Distinctions guiding Lien's argument include those of deviance versus norm, Global North versus Global South or education versus medicine. Based on these distinctions, he argues that SEND frameworks, while seemingly progressive, often reinforce the conservative traditions of differentiation and hierarchy in education systems. Consequently, Lien proposes a decolonial approach to SEND, grounded in systems theory, to address these challenges. This includes a dynamic re-entry process, enabling self-observation and reflection within SEND frameworks to identify and overcome blind spots. By prioritising global diversity and inclusivity, his article aims to create more equitable educational policies and practices.

Margit Neisig's (2025) article 'The Regenerative Semantics and Structural Change: Social Systems Using Nature as a Regenerative Medium' investigates how forms of regenerative semantics may be employed to irritate business systems to an extent that they facilitate their transition towards regenerative models. Grounded in Luhmann's social systems theory, the article introduces the concept of regenerative semantics as a guiding framework for aligning economic, social and environmental systems with sustainable practices. In this context, Neisig highlights the limitations of traditional sustainability paradigms and their predominant focus on harm mitigation. By contrast, she proposes a shift towards regenerative practices, understood as those that aim to actively restore and improve ecosystems. Guiding distinctions informing Neisig's work include semantic versus structure and regeneration versus sustainability. Based on these distinctions, her paper examines cases where businesses leverage recalibrated market mechanisms, such as payments for ecosystem services or digitally supported transparency, to operationalise regenerative models.

Roth et al.'s (2025a) article 'N-Factorial Scenarios: A Systems-Theoretical Approach to Scenario-Planning' aims to extend conventional scenario-planning methods, proposing an innovative systems-theoretical framework to address the limitations of traditional two-factor scenarios. Rooted in Niklas Luhmann's concept of functional differentiation, the authors introduce n-factorial scenarios, which account for multiple interrelated factors and their complexities, offering a more nuanced and comprehensive approach to navigating future uncertainties. More concretely, Roth et al.'s article challenges the dominant use of 2×2 scenario matrices, which reduce the complexity of futures to four predefined outcomes, thus often omitting crucial possibilities. In combining the distinction between distinction and indication with the distinction between true and false distinctions, the authors thus present an n-factorial approach leverages that leverage digital logic to simulate and visualise a wide array of possible futures, also incorporating interactions among numerous variables.

In their article 'Value Plurality and Multifunctional Commensuration in Organisation. A Systems-Theoretical Approach', Roth et al. (2025b) explore how organisations manage the coexistence and interplay of financial and non-financial metrics, also emphasising the concept of value plurality. The paper draws on Niklas Luhmann's systems theory to frame organisations as decision-making systems that must navigate and commensurate diverse value domains, such as economic, political, scientific and other values related to the different function systems of society. Thus, the authors challenge the prevailing economic bias in research on valuation and commensuration, which often prioritise financial metrics over other forms of valuation. They argue that this reductionist approach fails to account for the intrinsic complexity and diversity of value systems organisations encounter and need to commensurate. The draws on case studies, such as carbon rationing or coronavirus crisis mitigation strategies, to demonstrate how organisations can commensurate basically incommensurable values both with and without reference to financial metrics, which successfully navigate value plurality. The article concludes that future research must further explore non-economic forms of valuation and commensuration to address complex global challenges.

In 'Willing Unwillingness. A Luhmannian Perspective on Followership and Leadership in Organizations', Sales et al. (2025) analyse the dynamics of leadership and followership within organisations as they offer a systems-theoretical perspective inspired by Niklas Luhmann's work. The article introduces the paradox of willing unwillingness—a state in which individuals willingly engage in organisational roles while simultaneously resisting aspects of those roles. This paradox serves as a framework for analysing how emotional experiences and variable levels of psychic engagement shape organisational behaviour beyond hierarchical structures. Empirically, this qualitative study is based on interviews with Brazilian public servants, highlighting the complexities of membership and participation in formal organisations. In this context, the concept of willing unwillingness underscores the ambivalence inherent in organisational participation, where individuals simultaneously comply with and resist expectations. This ambivalence is seen as a critical factor in understanding the dynamics of organisational roles and decision-making processes. By linking Luhmann's systems theory with contemporary leadership versus followership literature, the authors propose an extended typology of organisational roles—leaders, followers, role shifters and outsiders—offering a novel lens for analysing role dynamics in modern organisations. This framework also contributes to the ongoing adaptation of Luhmann's theories to the complexities of contemporary organisations.

Jesper Tække's (2025) article 'Sociological Perspectives on AI, Intelligence, and Communication' examines the societal

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challenges posed by AI through the lens of Niklas Luhmann's social systems theory. Tække conceptualises AI as a distinct form of intelligence, separate from human cognition, that operates within computational frameworks and integrates into societal communication processes. Using the education system as an example, his article explores how AI seems to challenge functional differentiation and to disrupt traditional social structures. Along these lines, the article suggests that AI mediates communication processes across multiple societal sectors, including predictive policing, education and social media-based behaviour analysis. It argues that AI's integration often occurs latently, altering established structures without immediate recognition. These latent transformations disrupt functional differentiation, as AI reshapes the boundaries and operations of interaction, organisational and societal systems.

The 10 articles testify to the versatility of social systems theory in the tradition of Niklas Luhmann, as they apply it to diverse challenges across various forms of social differentiation (segments, strata and function systems), different levels of communication (interaction, organisation and society), and diverse types of autopoietic (social, psychic and organic) and allopoietic (e.g., technological) systems. They share a commitment to advancing systemic understanding and challenging conventional understandings of social phenomena, even as they differ in thematic focus, methodological approaches and proposed solutions. In so doing, they highlight the potential of guiding distinctions to bridge theoretical depth and empirical gaps while also addressing crucial societal issues.

4 | The Guiding Distinction of Theory

Although the collection of distinctions featuring in the above contributions to this special issue of *Systems Research and Behavioral Science* is a veritable demonstration of the conceptual scope of social systems theory, it also raised certain concerns pertaining to the quality of these distinctions, particularly with regard to their utility for the maintenance and further development of the theory's own architecture.

As outlined in Section 2 and demonstrated in greater detail by Roth (2019, 2024), constellations of true distinctions generate new distinctions, whereas constellations of false distinctions tend to abet observations of mixed types or middle grounds between what must be considered artificial dualisms rather than two sides of one distinction.

This means that some of the fundamental building blocks of social systems theory in the tradition of Niklas Luhmann consist of reasonably true distinctions such as system/environment, form/medium or inclusion/exclusion, including the distinction between theory and method (Roth 2024; Brezovec et al. 2025), whereas other systems-theoretical core distinctions, though prominent, must be qualified as false. Examples of such false distinctions include those between interaction/organisation or interaction/society as discussed by Roth (2025) and Cordeiro and Neri (2025), as their mere juxtaposition within the context of this special issue illustrates that neither of these two distinctions succeeds in dividing their frame of reference into both mutually exclusive and jointly exhaustive sides. Although in the case of interaction/organisation the distinction is mutually exclusive, the occurrence of the interaction/society distinction shows that the former is most likely not jointly exhaustive. Conversely, the interaction/society distinction is clearly not mutually exclusive, as interactions belong to or are aspects of the overarching communicative system we refer to as society.

Other problematic distinctions within social systems theory include the distinction between the three meaning dimensions factual, temporal and social, which clearly constitute a conglomerate of distinctions that might even be extended by first assuming that these dimensions resonate with the basic questions 'What?', 'When?' and 'Who?' and then asking further basic questions (Roth 2021).

Similar problems arise if we are confronted with first three (Luhmann's 1977, 32ff) and later four (Luhmann 2013, 12) basic forms social differentiation—unless these forms can be derived from true distinctions 'in a logically conclusive manner (e.g., by cross-tabulation)' (Luhmann 2013, 12), as recently demonstrated by Roth (2025). In the same vein, observations of the co-existence of 10 or more function systems of society raise the question of whether their emergence, evolutions and number can also be logically derived in a conclusive manner or whether we are confronted here with mere additive enumeration that suggests a lack of joint exhaustiveness. From the perspective of a *distinctionist* approach to Luhmann's distinctive theory, the prevalence of false distinctions may therefore indicate a need for further theoretical refinement.

With regard to its external references, the theory is moreover confronted with countless reiterations of traditional—and often false—distinctions. This is most evident in the contributions by Aal (2025) and Tække (2025) whose systems-theoretical approaches to the fashionable topic of AI engage with the underlying distinction between artificial and human intelligence, which can be regarded as false *if* we either assume the existence of intelligence that is neither artificial nor human (e.g., animal intelligence, including swarm intelligence) or recognise that artificial intelligence might not be non-human, as it constitutes a human invention. The contributions by Neisig (2025) and Roth, Sales et al. (2025), too, navigate sets of prominent false distinctions, including those between economic, social and environment factors or economic, social and governmental corporate performances (see also Roth et al. 2024, 2025d).

5 | Conclusions

The contributions to this special issue of *Systems Research and Behavioral Science* highlight a key tension within social systems theory in the tradition of Niklas Luhmann: Whereas the diverse distinctions they employ demonstrate the theory's conceptual breadth, concerns arise regarding their 'truthfulness' and theoretical utility. If theories are scientific programmes, then social systems theory—operating through and observing distinctions—must apply the fundamental scientific distinction between true and false (or untrue) to the distinctions it observes (Roth 2024, 2025d). A proper application of social systems theory therefore implies the distinction between true and false distinctions.

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In thus exploring the guiding distinctions of both social systems theory and the broader social sciences, it is crucial to recall that the distinction between true and false distinction constitutes a necessary condition for social systemic theorising, but not a tool for the production of apodictic truths or normative statements. As highlighted particularly in Roth (2024) and Roth, Watson et al. (2025), statements on the truth value of certain distinctions are results of conditional programmes and therefore highly observer-relative. Furthermore, there is no normative impetus either because true distinctions are not inherently superior to false ones, not least because the latter type of distinctions has often proved highly instrumental in sparking and sustaining controversial debates across various disciplines. In some cases, it is even entire fields that owe their existence to the prominence or persistence of certain false distinctions—for example, political economy or family business research.

When applied to the theory itself, the distinction between true and false distinction results in the insight that some of social systems theory's own distinctions appear as true (e.g., system/environment, form/medium), whereas others represent false distinctions that to split their entire frame of reference into both mutually exclusive and jointly exhaustive sides (e.g., interaction/organisation and interaction/society). The latter issue extends to fundamental social systems-theoretical concepts such as the meaning dimensions and the basic forms of social differentiation, raising questions about their logical derivation. Moreover, external references to the theory frequently often reproduce well-established but problematic distinctions, as seen in discussions of AI and corporate social or environmental performance, underscoring the need for further theoretical refinement of both social systems theory and the broader social science from a *distinctionist* perspective. In this context, Cordeiro and Neri (2025) of 'virtual double contingency' constitutes a particularly significant challenge to social systems theory, which relies on a still somewhat human-centred notion of 'double contingency'. Future research grounded in social systems theory may therefore seek to further explore the possibilities and limitations of double contingency not only at the human–machine interface (Saadallah et al. 2025) but also between machines themselves. One concrete example of the latter explorations could include research on whether or how self-driving cars are truly capable of solving the problem of double contingency without external control.

Against this background, it is evident that mastery of the distinction between true and false distinctions is crucial only if we are no longer content with producing analogue theories of both the analogue and digital world and hence if our goal is to develop genuinely digital theories capable of systematically observing and modelling digitally transforming societies. In this sense, the shift towards social theory based on true distinctions, or the translation of false distinctions into true ones, is not a matter of preference but one of necessity, yet only for those who seek to construct theories that align with the very logic of digital transformation.

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RESEARCH ARTICLE

'The end user takes the final decision'

AI and Decision–Communication in Organisations

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ABSTRACT

While social sciences are brimming with attention for the transformations brought about by AI and digital technology, the aspect of communication has received remarkably little attention. Niklas Luhmann's social system theory, which conceives social systems as constituted through ongoing communication, is particularly well equipped to make a relevant contribution. This paper investigates the Impact of AI on organisations as systems of decision-communications, along the lines of four distinctions: decision premise–decision, system memory–environment, organisation system–interaction system and structural coupling–loose coupling. The deployment of AI is a reaction to the growing societal differentiation and the resulting future-related contingency, and as such contributes to the viability of organisations as systems. Nevertheless, social systems theory explains how certain impacts of AI we witness, some of them potentially harmful to the viability of the organisation, are neither incidental nor temporal but are structurally related to the basic operations of organisations. A proposal is made how reflection loops can be introduced to counter some of these consequences.

1 | Introduction

Artificial intelligence, generally described as the computational learning and solving of problems that would normally require human intelligence, is becoming our closest species (Gümüsay, Bohné, and Davenport 2022), as AI is increasingly involved in the processes that organisations pertain (Iansiti and Lakhani 2020). Some authors point even to a development that technology is the organisation (Alaimo and Kallinikos 2021). AI can be divided into automation, that is, AI performs complete tasks without remaining human control, and augmentation, that is, AI is used to support human activity such as decision-making (Langer and Landers 2021). Or alternatively, into tool, that is, AI performs tasks that humans can do, and novelty, that is, AI does things beyond human capabilities (Leyer and Schneider 2021). A survey established that in 2023, 55% of organisations used AI, a figure that stood at 20% 6 years earlier (Maslej et al. 2024).

As a technological capacity, AI has been around since the 1950s. For over three decades, AI was a relatively marginal phenomenon, and its use was the domain of computer scientists, while its application was restricted to specific fields (Tien 2017). The surge in investment and interest in AI is often attributed to the breakthrough in AI technologies, like Large Language Models (LLMs) (Gruetzemacher 2023). While not disputing the role of LLMs in underpinning the potential, and hence attractivity of AI, it has contributed to a discourse that on the one hand likely exaggerates the effects and capabilities of automated technologies in general (Barbour et al. 2023; Rajagopal et al. 2022, 6), while on the other hand emphasising that AI is there to augment and enhance human capability and keeping humans ultimately in control (Davenport and Miller 2022). Meanwhile, the fact is that most of the AI deployed is generative AI (Gartner survey 2024). AI, even with its outstanding achievement is absorbed into normality, which is generally referred to as the 'AI-effect' (McCorduck).

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We can view the widespread adoption of AI as a paradigm change, where organisations revert to new ways of gathering information about their environment. This paradigm change can be put in the perspective of social systems theory, which argues that as the differentiated society advances, its decision-density increases. This causes the future to be evermore contingent, thus making again more decisions necessary (Luhmann 2019). The dominant role of organisations in societies is also cause-and-effect of the increasing contingency (Luhmann 2000a). Thus, the paradigm change is the reaction of organisations to cope with the increasing contingency, representing both opportunities and risks, to move to a new way of constructing their environment, that is, a new way of representing the environment in the organisation. In fact, it represents a radical digitalisation in the sense of Bateson/Wilden (Anton 2003; Wilden 1972), in the establishment of hetero-reference.

Parallel to the surge in adoption of AI in organisations and in society in general, there has been ample academic interest in the causes and effects of AI. However, the aspect of communication has so far received little attention. It is specifically in this regard, that social systems theory can contribute to this field. An important contribution to the discussion has been made by Esposito (Esposito 2017, 2022). Esposito essentially argues that AI-tools should be regarded as communicating, because AI-communications fulfil the criterium of double-contingency. The reasoning of Esposito cannot be extended into organisations though, as these are based on decision communication and a different frame of double contingency applies (Luhmann 2019).

Barbour et al. (2023) reviewed the work being done on AI from a communication perspective. This review reveals that so far there has been hardly any attention for how AI affects what we can call the communicative constitution of organisation (Laapotti and Raappana 2022), that is, how organisations plough their way forward and shape processual practice through communication.

In order to address this gap, in this paper the impact of AI on organisations is analysed with social systems theory (further referred to as SST). In this paper, I will demonstrate that SST provides unique and novel insights on the impact of AI on organisations. First, SST regards organisations as social systems that are based on and produce meaning through decision-communications. This unity of sense-making and decision-making enables an analysis that penetrates to the core of the impact of AI, which is crucial to and present on many levels of decision-making in organisations. Second, in SST there is specific interchange between structure and process. Structures channel the recursive communication process but are also produced and updated through the recursive communication process. This allows us to determine where AI is located and where its impact is located. In order to sharpen the analysis and capture a broad spectrum of AI impact, the analysis is constructed along four thematic areas, or, to use the preferred SST wording, four relevant distinctions.

- The distinction decision–decision premisses
- The distinction system memory–environment
- The distinction organisation system–interaction system
- The distinction structural coupling–loose coupling.

This paper is structured as follows. First an overview is given of how AI is currently applied in organisations, and how it will be implemented in the foreseeable future. In the following section, the above mentioned four distinctions are elaborated. In section four, it is reasoned for each of these distinctions how AI will impact on organisations and vice versa. In the fifth section, the views that emerge from SST-perspective are discussed against the results of relevant research that are currently available. The paper closes with a section of conclusions and proposes a research agenda.

2 | A Concise Overview of AI Developments in Organisations

Dörfler (2022) discriminates between three types of AI: symbolic reasoning systems, symbolic expert systems and artificial neural networks (ANNs), which is also referred to as sub-symbolic AI. The first AI that was developed was of the symbolic reasoning type. This type of AI in fact attempts to mimic the logic applied in human solving. Logical operators are applied to symbolic data rather than numeric data. Symbolic expert systems try to emulate the processes which human experts use to achieve outcomes, this is generally called knowledge engineering. The development of ANNs accelerated with the availability of larger and larger computing power; nowadays, ANNs are the most common form of AI and the basis of machine learning (ML). ANNs consist of several connected layers of artificial neurons. In each layer a computation is performed that is then propagated to the next layer. The result arriving to the output layer is compared to what was expected, and a new iteration is induced with a different set of computational weights. Due to their relative success, a lot of research has been put in further development of ANNs. Nowadays, apart from Recursive Neural Networks (RNNs), in which the layers operate sequentially, algorithms are based on Convolutional Neural Networks (CNNs), in which parallel computation occurs inside the layers, and most recently Transformer Neural Networks (TNNs), that work which attention models, which means that they can select features to be given special attention in the string of calculations.

Machine learning refers to computer programmes that are able to learn and adapt without human intervention. Deep Learning (DL) uses ANNs to simulate the brains functioning (Amiri et al. 2023). ANNs with many hidden layers are also called Deep Neural Networks (DNNs) (Hassija et al. 2024). DNNs can consist of thousands of layers. The term 'deep' also refers to the level of representational abstraction from the input data that can be achieved in DNNs (Amoore 2024).

ML algorithms can be categorised into four major types: supervised, unsupervised, semi-supervised and reinforcement learning (Sarker 2021). In supervised ML, the model is set up in a way that is fixed what it has to look for, that is, the programme performs a specific data-analysis task based on sample input–output pairs. In practice, supervised ML models are trained by feeding them with training data, and the model is iterated until a stable outcome is achieved. The model is then given a batch of test data, which it has not seen before, and if it performs

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well it is ready for use (LeCun, Bengio, and Hinton 2015). In the case of unsupervised ML, there are no pre-defined formats and the programme renders features, trends and groupings in data sets, based on performing an array of statistical operations iteratively. A classical example of unsupervised learning is the method of 'topic modelling' in which the algorithm (e.g., LDA) learns about the thematic structures of large text corpora without a human operator. Semi-supervised is a hybrid form of ML, which uses both labelled and unlabelled data. This type is used in cases where using labelled data alone would provide insufficient results. Reinforcement ML works with algorithms that take the effect of the generated outputs into account, in the form of a reward (positive contribution) or punishment (negative contribution); therefore, this can be seen as an environment-driven approach (Mohri, Rostamizadeh, and Talwalkar 2012).

ML learning capabilities have been significantly advanced through representation learning. Rather than humans providing data annotation, that is, the representations governing the raw data sets the ML-algorithms can operate on, in representation learning, also called deep-learning methods, machines can automatically discover the representations needed for detection or classification (LeCun, Bengio, and Hinton 2015). Strictly speaking, in case of highly extensive computations calculation capacity limitation comes into play, AI applications have to revert to heuristics, which generally produce good enough results, instead of algorithms which can compute the optimal outcome (Zweig 2023).

Shrestha, Ben-Menahem, and Von Krogh (2019) present three structural categories of combining human and AI decision-making. Full delegation to AI is appropriate in case of specific issues, large amount of data and fast decisions needed, generally with high replicability. A typical example is the application of recommender systems. Hybrid decision-making, that is, sequential decision-making of AI and humans. In this case there are two phases, where either AI or a human pre-structures the decision-making. Typical examples are hiring processes, where AI performs the initial selection of candidates (AI–human). In case human decision makers have high confidence in a small set of preferred alternatives, the sequence is reversed into human–AI. The final analysis and selection is then performed by an AI application. The third possible structure is aggregated decision-making. In this structure, both humans and an AI-based decision maker are members of a decision-making collective, in which the AI participation and the weight of its decision proposal can be bound to certain rules.

Singh (Singh 2023) elaborates that machine-learning has three phases: data-centric ML deals with acquiring data of sufficient quality and performing data annotation in order to create the optimal platform that serves as the basis for the second phase, the model-centric ML, which is concerned with training and retraining of the algorithms. The third stage is ML-operation (MLOps), which deals with the deployment, interpretability and monitoring of the performance of the ML models. MLOps is important because it provides crucial feedback to Stage 1, data-centric ML, about possible data drift and the consequential need to update the data sets.

Davenport and Ronanki (2023) discriminate between three types of AI, depending on the particular business process the application supports: process automation, cognitive insight and cognitive engagement. Process automation primarily occurs in administrative tasks. It is relatively inexpensive and easy to implement. Cognitive insight is related to processing of big data and generating tends and patterns out of these data. This type of AI application typically involves machine learning. Cognitive engagement involves natural language processing applications. This currently still a less common application that builds on the active interaction between humans and technology.

Gümüsay, Bohné, and Davenport (2022) classify AI according to the type of decision-making it affects. Structured decisions are decision that are made frequently, require a large amount of data and must be taken expediently. Machine learning models are suited to support or even replace human decision-making. Semi-structured decisions are typically less frequent and are based on diverse information. Because machine learning requires large amounts of training data, AI applications face limitations with regard to being involved in semi-structured decisions. Rule-based expert systems can be used here, that in first instance render recommendations. Generative AI can support semi-structured decisions with its capability of reviewing and analysing vast amounts of text. Unstructured decisions, for example strategic decisions, do not happen often and are highly contingent. Machine-learning based applications are not of much use here, as the underlying data are lacking. However machine learning applications can be applied to generative various future scenarios, which serve a base of strategic dialogues in the organisation. Also, generative AI can be used here to scan the environment and use the obtained information in strategic decision-making, for example, in strategic marketing (Rajagopal et al. 2022; Stone et al. 2020).

The table below (Table 1) summarises the characteristics of the main types of AI-application.

The spread and development of DNNs and associated DL give rise to the issues of transparency, explainability and interpretability of these algorithms and the results they produce (Minh et al. 2022). This has given rise to a distinct stream of praxis and research, called XAI (explainable AI), in which these issues are addresses and solution are developed. Various methods are used to tackle these issues, like model audits, counterfactual explanations and adversarial training (Bhatt et al. 2020). Esposito (Esposito 2023) argues that it is not a matter of intervening in the computational structure of the algorithms, but rather one of teaching the algorithms to communicate.

Concludingly, a variety of decision-making situations is affected by different types of AI, associated with their own dominant human-AI interaction. We need to understand how AI affects organisations as a whole if we want to steer the application of AI, to be able to decide in which cases to opt for changing computational structures, or revert to XAI approaches, or teach algorithms to communicate. This paper seeks to contribute to this understanding by making a broad assessment that is based on the very centrality of decision-making.

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TABLE 1 | Characteristics of typical AI applications in organisations.

	Type A	Type B	Type C
Business process	Process automation	Cognitive insight	Cognitive engagement
Decision-making	Structured	Semi-structured	Unstructured and semi-structured
Possible decision-making structure	Full delegation to hybrid structures	Hybrid structure	If any, aggregated structure
Type of AI	Mainly ANNs	Symbolic expert systems and ANNs	Symbolic reasoning systems and ANNs
Dominant orientation	Predictive ML	Predictive ML and Generative AI	Generative AI
Dominant learning	Supervised	Semi-supervised and unsupervised	LLMs
Most critical phase	MLOps	ML model	(ML) Data

3 | Relevant Distinctions of Social Systems Theory

Before commencing the outline of the distinctions, it is useful to provide a context by addressing some basic aspects of SST. In SST the distinction itself is at the core of its concept of organisations, as it defines systems as the difference between the system and its environment, hence the organisation as the difference between the organisation and the environment. This difference is produced and upheld as long as an organisation engages in its basic operation, which is recursive decision communication, that is, each decision communication has a recursor in a previous communication and is a precursor for the next. Organisations build up internal structures to guide and facilitate decision communication. Organisations are operationally closed as only their own communications and structures serve as the context for their operation. Operational closure enables organisations to relate and respond to their environment. Through framing a decision, that is, reducing the complexity of the environment to a number of alternatives out of which one is to be selected, meaning is established. In order communicate meaning, the selection has to be effectuated, this is the essence of decision communication. Through the selection itself, the decision communication, the organisation achieves two things. First, it absorbs uncertainty in the sense that an uncertainty is transformed into another uncertainty which is deemed more beneficial for the organisation at the particular moment in time. Second, given its operational closure, with decisions the organisation can vary its internal structures, in other words, vary its internal complexity.

3.1 | Decision and Decision-Premisses

SST emphasises that framing a decision necessarily implies making the selected alternative contingent; that is, a decision is a decision by stipulating that other alternatives would have been possible as well (Luhmann 2000a, 141ff). This makes any decision vulnerable to being rejected and poses a time and effort problem at each decision. Organisations need structures to efficiently tackle the issues of the self-referential connectivity and the contingent nature of a decision. This task is accomplished through decision premisses. Decision premisses are structural elements of an organisation that provide connectivity and redundancy, that is, patterns that enable the organisation to construct decisions with limited information and within limited time (Luhmann 2009, 227). There are three types of decision premisses defining the organisation:decision programmes, communication channels and persons. Decision programmes (Luhmann 2000a, 256–278) are rules, procedures, heuristic schedules that serve the factual evaluation of the inputs and outputs related to the decision. It is useful to distinguish between mainly input-oriented programmes and mainly output-oriented programmes. The input-oriented condition-programmes select a specific output to a set of specific inputs, these are basically if-then algorithms. The output-oriented purpose-programmes select a set of specific means to (achieve) a specific goal, and this schemata guides the information processing. Purpose-programmes are more open and have more intrinsic uncertainly than condition-programmes. Purpose-programmes therefore need more scrutiny in terms of monitoring whether they actually work as envisaged. Decision-programmes usually do not operate alone, but in combinations, often purpose-programmes are linked or trigger condition-programmes (Grothe-Hammer and Berthod 2017). They can only be invoked as communication and will therefore always be subject to some simplification. As no programme can possibly cover the contingencies of the situations it will be applied in, the consideration whether to apply the programme or not, or regarding the correctness of the application, will present itself to a lesser or larger degree (Luhmann 2000a, 258).

For a decision to be acknowledged as a decision-communication, specific communication channels need to be observed: Who is entitled to make a decision? Who should be consulted in advance? Who can communicate to external partners? What can be delegated to whom? and so on. Persons are also a form of decision-premisses because individuals are selected on their basis of assumed sufficient acumen to perform a specific position (pp. 225–226).

Decision premisses are typically merged into positions: A position is filled by a capable individual; it is a structural node in a communication network, and it is endowed with decision

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programmes. The phenomenon, that if a wrong decision is made, not only the involved programmes are questioned but also often communications and competencies are scrutinised, also illustrates that decision premisses do not operate in isolation (p. 259).

Luhmann regards organisation culture as a specific set of organisation-defining decision premisses, which are not based on decisions. This conceptualisation gives organisation culture a pluriform, possibly ambiguous and evolutionary character. Organisation culture principally eludes 'culture engineering' efforts. Organisation culture as a decision premise interferes with the decision-based decision premisses and may latently alter their rationality assumptions (pp. 240–249).

For the analysis of AI in organisations the distinction between decisions and decision-premisses is valuable, because it enables us to discriminate between the structural role of AI (through decision-premisses) and the operational role of AI (through decisions in the communication autopoiesis). Additionally, it allows us to investigate how AI affects the creating of meaning.

3.2 | System Memory and Environment

System memory is a social memory and thus constituted of past decision communications. It has a certain structure in the sense that it consists of general content and distributed content. The general content is given by self-descriptions, which are those contents of the memory that are related to the system as the unity of all its operations. Self-descriptions are vital for the organisation as they ensure that it can unambiguously refer to itself as the same invariant unity. In the self-description the system memory remembers itself (Luhmann 2000a, 420ff). Distributed content is the content that is more specific to a particular part of the organisation, on the one hand the decision-premisses that are usually more tightly coupled to certain types of decisions and on the other hand a more loosely coupled memory of past decision communications that is typically organised into themes.

The recursive decision communication process could not exist without this memory, and it necessarily engages in all decision-operations. It serves the coordination and sense-making between past and future in every actual situation (442). An important aspect is that the relation between the decision operation and system memory is one of double closure (Von Foerster 1984). The system memory moderates the decision operation, and the decision operation moderates the actualisations of system memory. The system memory running along with the ongoing decision communication does not imply that its content is constantly increasing, on the contrary, with every decision communication there is a selection of what should be kept and what can be forgotten. Only what has future-value is retained in the system memory and thus can be re-impregnated by follow-up decisions (114) and enables the transformation of decisions in decision-premisses (193).

We can now look more closely to the distinction system memory–environment. SST posits that a decision always involves self-reference and hetero-reference (referencing to the environment). As these mutually moderate each other, an oscillation between the two takes place that needs to be stabilised in order to form a decision. It was explained in the previous section that decision-premisses are designed to accomplish or facilitate this stabilisation, in a broader sense we can say that it is the system memory that is active here, through superimposing a past–future oscillation on the oscillation between self-reference and hetero-reference. While system memory refers always to the organisation's own states and not to actual factualities in its environment, it will contain hetero-references as substrates of past decision communication. These are present in the form of perceptions and assumptions and more fundamentally as cognitive routines, which are loosely coupled and therefore highly redundant constructs of the organisation regarding elements of its environment that have 'reality credit' assigned to them (Luhmann 2000a, 250–252). As a result, environmental references located in the system memory enter into the primary oscillation which may shortcut or crowd-out actual hetero-referencing. The extent to which organisations test these hetero-references in the system memory is closely related to SST's concept of rationality which I will discuss later in this paper.

There are some further aspects of system memory that are relevant for our analysis. Texts form the core of system memory either in written or in verbal form, with written texts being the strongest, such texts are a functional equivalent of observation (418). System memory has also directional elements in the form of motives that play a prominent role in moderating decision operation. Motives regulate the interrelation between past and future (95). Strategic motives contribute to the construction of self-descriptions as identity is created through distinguishing action (439). Because of the presence of such strategic or tactical motives, self-description are not fully objectively anchored, but the possibilities to 'design' self-descriptions are limited (439–440). System memory is highly streamlined as it extracted from decision communication. Thus, organisations will at times also be dependent on the much richer personal memory of its members. This personal memory can be valuable as it can fill in gaps of the system memory, but obviously its status is also more arbitrary.

The distinction system memory–environment allows us to analyse how AI can structurally influence the way how organisations perceive and relate to their environment.

3.3 | Organisation System and Interaction System

Particularly relevant for the study of AI in organisations with SST is the distinction between organisation systems (organisations) and interaction systems (interactions). Interaction systems are constantly forming and dissolving, self-referential social systems based on those present observing each other. Interaction systems can apply only limited structure and complexity and typically move sequentially from one theme to another (Luhmann 2019, 13–14). The distinction between interaction system and organisation system is different from the distinction between informal and formal organisation. Meetings, in person or online, highly formalised or loosely arranged, chats at the copier or in the coffee/tea kitchen are all interactions. There are various views amongst SST scholars on the exact nature of the relation between organisation

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and interaction (Grothe-Hammer 2022; Jäger and Coffin 2011; Kieserling 1994; Seidl 2006). The distinction organisation-interaction in observing organisational reality sets decision communications aside from interaction communications. This brings up the question which communications that involve members of the organisation are interaction communications and which ones are decision (organisation) communications, as well as how are the two possibly connected. A workable view is that interaction communication may get tagged as decision and routed into the organisation system. From that moment on this communication can only connect to other decision communications, and is subject to the structures of the organisation, which support, and hence also direct and limit the self-referential decision communication through providing redundancy and connectivity.

Apart from their practical functions, interactions system can also serve the organisation as a place to sort out issues that cannot be solved on the level of decision communication. Apart from that, they can be the source of transformational impulses for the organisation. Moreover, in interaction system trust can be built, which then can be coded into the system memory and affect decision communication, while trust does also to keep a wider range decidable possibilities open without significant time and information cost (Luhmann 2000b).

3.4 | Structural Coupling and Loose Coupling

We speak of coupling in the case of consequential interrelationships. SST uses the concept structural coupling to describe relations between systems, providing an answer to the question of how social systems can form their relations to their environment, despite being operationally closed, that is, their communications being confined in an internal recursive network (Luhmann 2021a, 100). Maturana, who proposed the concept, sees structural coupling as an evolutionary process, the 'dynamics of congruent structural changes that take place spontaneously between systems in recurrent (in fact recursive) interactions, as well as the coherent structural dynamics that result' (Maturana Romesín 2002, 17).

Generally, we can speak of structural coupling between social systems if the following applies.

a. When a system experiences an irritation/perturbance that is an event belonging to a structural coupling, then always a specific part of the structure of the system will be activated; important is that there is still redundancy; that is, the reaction of the system is contingent within the limitation.
b. Structural couplings arrange a degree of encoding to the irritation/perturbance, which the system can decode (the digitalisation of analogue relations).
c. Structural couplings are highly stable, have a high degree of non-conditional availability; a violation of structural couplings can have grave consequences for a system.
d. Structural couplings are identifiable as highly exclusive; that is, they allow only particular elements to function as irritators/perturbators (Luhmann 2021a, 100–103).

In SST, the primordial structural coupling is the one between social systems and psychic systems, which runs over the medium language. This is the structural coupling that is extensively and repeatedly discussed in Luhmann's works. SST argues that societies are differentiated into functional subsystems, that cover the various functional areas, thus there is, amongst others, a political system, a legal system, an economic system and a science system. The next level of structural couplings that stand out, also evolutionary, are those between these functional subsystems of society (e.g., legal–political system: constitution, economic–political system:taxation, economic–education system: diplomas and certificates) (Luhmann 2002, 2021b). These structural coupling provide integration between the functional subsystems. In addition, and importantly, there are the functional subsystems structurally coupled through organisations. This is possible because organisations, as decision-based social systems, operate with loose couplings, and this allows the nesting of functional subsystems in the organisations (Luhmann 2002, 391–401). Another structural coupling of evolutionary nature, that stands out, is the structural coupling between social systems and technology. This is a strong coupling that causes a structural drift in social systems which makes social systems increasingly operating on the presumptions of the present technology, that needs not to be questioned (Luhmann 1991, 108–110).

The concept of loose couplings is readily applicable to relations inside systems. If elements or parts of systems are loosely coupled, they operate relatively independent of each other, there are no or only weak ripple-effects inside the system. This in contract to tight couplings, which are characterised by dedicated responses. Couplings can be turned into loose coupling by inserting a decision, where a selection is made from various follow-up alternatives. Loose couplings require a memory function and must have higher redundancy. Loose couplings render higher response flexibility but are in their setup less efficient than tight couplings (Luhmann 2009; Orton and Weick 1990).

The line of investigation is to establish whether AI is associated with structural couplings, and, inside organisations, shows an inclination towards loose couplings or tight couplings.

4 | Social System Distinctions Applied to AI in Organisations

4.1 | Decision–Decision-Premisses

From an SST perspective, the primary role of AI is to substitute existing decision-premisses with AI-based decision-premisses. The main reasons being time gains, that is, time pressure relief, and increased uncertainty reduction, that is, more information involved in the decision that is not forwarded in the communication chain. AI is most suited to substitute existing decision–programmes, because these are repetitively used, often formalised or documented to a degree and transparent. Within decision–programmes the input-oriented conditional programmes can be fully replaced by AI, as well as the combined conditional-purpose programmes,

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as with these programmes the openness of the purpose–programmes is limited. Pure purpose–programmes are least suited to be replaced by AI, as they are to a much lesser extent based on past patterns.

AI also substitutes communication-channels as decision-premisses. The time-saving imperative will favour one-stop AI-applications that will combine multiple programmes and thus reduce the communication channels involved.

AI will put the concept of the position, in SST conceived as alloy of the three types of decision–premisses, under significant pressure. AI, as a matter of speaking, increases the decision–programme intensity of the decision-communication, and this will dilute the concept of role as we know it. New roles are created around the AI-residuals, that is, decision-premisses and decisions connected to humans. This does not follow the principles of organisation that are used to far.

On a principal level therefore, from the perspective of an organisation consisting of decision-communications, AI in organisations does not fundamentally change things. Decisions were already based on decision–premisses and still are just different ones. Nevertheless, there is an impact on the operational process, in the sense that is it being compacted, because the decision-premisses have become more powerful. In terms of loose vs tight coupling, one can say that the relation between premise and decision shifts towards the tight coupling end of the spectrum.

The decision-premise person is related to qualities like experience, creativity, quality of judgement under uncertainty, tacit knowledge or ability to take common-sense into account. AI can so far replace these to a limited extent only. In case AI replaces a complete position, this decision-premise will be lost. The consequences of this loss depend on the type of position. To prevent this loss, organisations may opt just to keep the position in place, but this is not a viable option, as the position itself has changed in terms of contributing decision–premisses.

A further matter concerns the decision about decision-premisses, and particularly keeping the decision–premisses communicable, that is, pull the decision-premisses back into the recursive decision-making of the organisation. I will deal with this aspect in Part 2 and Part 4 of this section too, as it is related to system memory and structural coupling, respectively. As for the communicative aspect, we can distinguish between communication about a concrete outcome, that is, questioning the decision–premise for a particular case, and communication about the decision–premise, that is, questioning the decision-premise in general. SST points to the aspects of connectivity and reduction of uncertainty in this regard. What appears as a good decision, that is, the informativeness of the XAI process that is performed depends on how it can fit into the existing communicative trail; secondly, questioning decision–premisses is a reversal of uncertainty absorption. Therefore, a substantial amount of distrust in the respective decision–premise is required to trigger this.

There is the fundamental issue whether AI in fact takes decisions, which after all is the dominant view in the discourse on AI. My view is, that within the framework of SST, AI cannot be said to take decisions. I will illustrate this with an example. Suppose a bank changes its fraud-detection AI system in such a way that, where previously a fraud-alert was flagged to an employee who then handled the case, in the new system the AI application is extended in such way that, certain parameters being met, accounts will be automatically blocked, and communications will be generated. In the current discourse, the language would be that AI has taken a decision that replaced a decision of a human. For clarity, while the latter part of this statement is true the first is not. Let us take a further example. In machining industry, producing components from steel bars, production operations are usually performed by so called CNC–machines, computer-controlled machining stations. These machines replaced many decisions from traditional workers using lathes, who would stop the machining at times, check the progression and decide how to continue. CNC–machines are still supervised by operators, because there may be odd factors the CNC–machine cannot take into account. This is why the latest generations of CNC–machines have AI built in, that can check for excessive wear of the cutting tool, or the off-behaviour of the steel being machined, which so far were the discretion and task of the operator. In these cases, are we inclined to say that the older and the newest CNC–machines make decisions? Probably not, as this is about materials and standardised physical processes. Perceived from a technological abstraction, however, there is no material difference between the fraud-detection and the CNC–AI.

When AI is about tangible data, language and communication we may lured into the anthropomorphic view that we are rather looking at 'decisions', whereas in the case of the CNC-workstation we conceive a piece of machinery programmed to do a job. Whatever the case may be, as far as SST is concerned AI does not make decisions, because the condition of double contingency is not met. Although the Luhmann position on contingency in organisations is somewhat problematic, as it is not sufficiently explanatory, once we conceive organisations as consisting of a network of recursive decision-communications. Still, it maintains its validity, as part of the explanation. As Luhmann argues, double contingency in organisations pertains to rules themselves being contingent and rules being contingent on whether they are being followed or not (Luhmann 2019). AI, and technology in general, does not meet the latter criterium. In fact a major reason for using technology is that it does not opt for not sticking to the rules (Jasanoff and Kim 2015). Even ML cannot be considered to be not sticking to the rules, because changes in its algorithms are applied according to rules. Not sticking to the rules would occur in the case that the application does not adjust weights of individual calculations while the algorithm commands that they should be adapted.

In SST, decisions resolve around oscillation between self-reference and hetero-reference. With wide applications of AI, the question comes up, what are the hetero-references available to a group of employees involved in making a decision. Luhmann uses the term 'adequate complexity' to point to an effective reconstruction of the environment in the system's operations (Luhmann 2000a, 314). This concept is closely related to system rationality. Groupthink is typically an example of establishing connectivity with low system rationality, as new information is not allowed in, that is, hetero-references are

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ignored and connectivity collapses to self-reference. SST sees groupthink as functionally solving the problem that connectivity is improbable, while time constraints pressure connectivity to progress to the next decision. AI may make hetero-references obscure or inaccessible, making AI-generated information vulnerable to being ignored or discarded in decision making, which consequently could lead to impoverished hetero-reference and induce a groupthink process.

As a concluding point, I would like to address the communicative bifurcation between rationality and motivation when communicating decisions. With a higher AI-component in decisions, it can be expected that the rationality path will dominate. At the same time communicating motivation is important for the engagement and the conduct of the employees (structural couplings between psychic systems). This brings up the issue how the employees (psychic systems) will contribute to the future that is created through these decisions (Luhmann 2019).

4.2 | System Memory–Environment

Two introductory remarks, before I discuss the role of AI. First, in a practical manner, the system memory is not simply equal to the total amount of data and information somehow stored in the organisation. The system memory concerns that part which is instantly available for communication. As an example, if an organisation would store minutes of past management meetings digitally or in hardcopy, this is not necessarily a part of system memory. We can say that, for the minutes of a management meeting of 5 years earlier to be a part of the system memory, it will have to be recognised as relevant in content and context, not only to the person who dug it up but also by the other people involved in the communication. If this is not the case ('yes, but that was five years ago, but since then we have moved on'), a (re)learning process is needed to bring it into system memory.

Second, we should be aware of the part of system memory that is not physically stored because it was only communicated verbally, that is, the establishing or recognition of common-sense (to the organisation) which is for that reason not recorded, and in meetings often does not meet more response than the nodding of some of those present (e.g., 'well, with the new manager now in place, it is clear that we all have to try harder' or 'it is clear, that it will be tough job to have this new process implemented'). Still, this part essentially contributes to shaping decision communications.

It is obvious that AI-capability has a profound impact on the system memory capacity. In that sense, the forgetting becomes less important as a there is a lesser need to free up capacity. It is also obvious that the quality of learning can be higher and occur in shorter cycles. The function of system memory in providing a base for constructing alternatives is vastly elevated. On the other hand, as elaborated earlier, system memory and the ongoing recursive communication are in an organic and dynamic relationship. Therefore, what functions as system memory is also influenced by the ongoing communication. The potential of AI in terms of providing system memory is restrained by what has proven itself as successful or has future-value, as well as by what is going on in other parts of the organisation.

As for the distinction system memory–environment, the presence of AI will add new and more complex cognitive routines (see Section 3.2) to the system memory. The significance of these AI-facilitated cognitive routines will increase as the whole purpose of implementing AI is to fight time pressure and react faster, to avoid making mistakes and to reduce uncertainty, that is, reduction and improved control of (perceived) risks. A significant part of the blessing and the curse of AI, seems to be related to this phenomenon. How much disappointment or controverse is needed to abandon a cognitive routine? If cognitive routines appears to mismatch, given their depth and the way they are constructed, it is not so easy to decide on what should be changed: Is the model algorithm wrong, or are the input data wrong, or is the annotation wrong, or is the learning algorithm wrong? Or, has the environment simply changed?

SST can provide valuable clues in these issues, because of the fact that it takes the oscillation between self-reference and hetero-reference as the basis for operations. It matters what ultimately functions as self-reference and what as hetero-reference. Moreover, for an organisation to keep its autopoiesis going the oscillation has to come to a point of resolution, or in more mathematical terms, move towards a point of relaxation, where an eigenvalue will appear. Principally this is the function of decision-premisses, but what counts as self-reference and as hetero-reference also plays a role. While AI is of great value for hetero-reference enabling more external data taken into account and identifying patterns, it can shortcut the oscillation in case of much reliance on AI-generated content and crowding out other channels of hetero-reference. Algorithms are just another way of representing the environment and ML refines and cultivates this representation but cannot immanently challenge it. which afterwards turns out to be productive or counterproductive. Also, it can lead to situations in which the triplet of decision-premise, self-reference and hetero-reference will not gravitate towards an eigenvalue. Particularly for more strategic decisions this can be case, when there is a lack communicative trail leading up to the strategic decision situation.

This last point brings us to the point of self-descriptions and the role AI can have here. This goes beyond AI making internal processes and employee performance measurable to an extend previously not possible, and thereby adding more defined and quantified information to the system memory to be used for future referencing. Self-descriptions are the condensed parts of the system memory, that make up the organisational identity. AI can be used to develop self-descriptions, that describe the organisation in a more articulated way to itself, which can be supportive particularly in the case of strategic decisions. However, there is still the element of the common-sensical verbal part of the system memory, which needs to be included to make self-descriptions coherent.

4.3 | Organisation System–Interaction System

As was stated earlier, we can conceive the communicative reality of an organisation as consisting of an ongoing recursive networking of recursive decision-communication in conjunction with sets of discrete interaction systems, which come and go, and are connected to the recursive decision-communication

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network to a higher or lesser degree. Closely connected interaction systems, for example, highly structured meetings, are called technified interaction systems (Kieserling 1999, 191). Luhmann regards interaction systems to have a major role in dealing with ambiguity around decision-premisses (Luhmann 2000a, 254). Interaction systems equip the organisation system with flexibility and adaptive capability. Issues that cannot be solved within the structural limitations of the organisation system can be transferred to interaction system (Kieserling 1994, 1999). They support the organisation in adapting its decision-premisses and contribute strongly to its transformative abilities (Jäger and Coffin 2011). Neither system can control the other and hence the flow of irritations/perturbances between the systems is delicate, particularly in case of the not so technified interaction systems.

While AI principally leaves this co-existence in place, it may nevertheless have an impact on the dynamic between the two systems. There are four major reasons why AI may lessen the role of interaction systems in the overall communicative configuration.

First, when AI integrates tasks there were previously performed by more people, provides information that previously was obtained from a colleague, reduces the need for consultation with supervisors or peers, as a result communication channels will be rendered superfluous and subsequently be eliminated. Such channels are often sided with interaction systems in the form of meetings, informative discussions or exchanges, which will disappear out of the communicative landscape. Second, related to the previous point, the depth of decision-premisses increases, because what was previously a decision-point is now incorporated in the decision-premise, thus, other things being equal, there are less decisions to be taken. Hence, less occasion for interaction systems to emerge around a decision. Third, I argued that the coupling between the premise and the decision increases. More tight coupling increased the specification and the prescriptiveness of the premise towards the decision. Hence, there is lesser precondition for discussion and argumentation around the decision, which would for that matter take place within an interaction system (more or less technified). Fourth, and this is an XAI aspect, the premise may simply not be open for argumentation, as it is a black box. Moreover, with regard to explainability, it is not only about explaining an outcome to an individual, but about explaining it to the organisation, in other words, communicating about it.

I would like to shortly address organisational culture, as the set of decision-premisses not originating from decisions (Luhmann 2000a, pp. 239–248). While AI and organisational culture will have reciprocal influence on each other, it is too contingent to make general statements about it, apart from the one that it will make unexpected things occur. A point that I would like to make is that arguably a fair amount of the impact that organisational culture can have on the organisation, runs over interactions system. So, if we argue that AI, other things being equal, cause the contribution of interaction systems to diminish, the same will be true for the role of organisational culture, independently of whether that will have a positive, neutral or negative effect on the (adequate rationality of) the organisation.

What I argued above, refers to the expectable effects of AI on interactions systems. This does not imply organisational determinism though, as organisations can freely decide to schedule meetings, gatherings or exchanges, possibly also in response to the tendencies I laid out above.

4.4 | Structural Coupling–Loose Coupling

Below the tighter coupling between decision-premise and decision as effectuated by AI, there is the more fundamental structural coupling between technology and social systems. As a structural coupling, the presence of technology is orthogonal to the communication (both in the organisation and interaction system). As Luhmann has extensively pointed out (Luhmann 1991, 2000a), this structural coupling will assign a taken-for-granted status to technology in social systems like organisations. This implies a great dependency and will make organisations vulnerable to disruptions. Loose couplings can be inserted in processes to contain these risks and provide redundancy. The structural coupling with technology as an evolutionary dynamic will exert its own influence on establishing unquestioned AI-based routines, a force that is opposite to striving to loose couplings, particularly when AI has become bread-and-butter technology, which is not far away. This structural coupling can be seen as a drone dynamic on which the other developments I sketched so far are superimposed.

The aspect of couplings is of relevance for the societal role organisations. As mentioned earlier societies are differentiated into functional subsystems, which are, as social systems, operationally closed with their internal networks of recursive communication. SST argues for various reasons that this limits the possibilities of public governance, a vital element in achieving some level of coordination and possibly even steering between the functional subsystems are the structural couplings between organisations belonging to different functional subsystems. These structural couplings are possible because of the presence of loose couplings in organisations: They provide flexibility in orientation, enable to take information into account out of a wider context, make it possible to insert intermediary exchange and/or decision points. For example, a business organisation is dominantly oriented towards the logic of the economic subsystem but has interfaces with other systems too. Its loose couplings enable it to signal and respond to impulses that originate in these other subsystems. While structural coupling of technology is by no means a new phenomenon, AI differs from traditional technologies in that it directly affects decision-support and decision-making (Leyer and Schneider 2021). If AI indeed reduces loose couplings in organisations, and particularly in those structures of the organisation which are triggered by the structural couplings, this would imply a loss of steering and coordination potential between functional subsystems. Given the understanding that differentiation of society continues, such a loss may have significant consequences for societal development.

5 | Research on AI in Organisations–Discussion in the Light of the Applied SST Distinctions

In this chapter, I will discuss recent relevant literature relating to each of the four distinctions. Mostly, the results of empirical studies are presented, but also some important conceptual

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research contributions are included. A particular useful study is that of Davenport and Miller (Davenport and Miller 2022) that gives an excellent insight in how AI is implemented in various types of organisations. The study contains reports on 29 case studies, that offer rich accounts of how AI is used. The limitation of this study is the lack of a rigorous methodology, adoption of a management-oriented narrative and the lack of a deeper analysis of consequences (Duke 2022).

Still for the purpose of this paper it is a very useful publication, and 26 case study reports contained findings that can be related to the analysis of this paper. In the next sections I will repeatedly refer to this study, the results of which have been summarised in Table A1.

5.1 | Decision–Decision-Premise

In 20 case studies of the Davenport/Miller report, the account points to the decision-premisses transferred to AI. Mostly this concerns decision-programmes, but to a lesser extent also communication channels and persons are eliminated (Table A1). A review of the literature by Lei and Kim confirms this picture (Lei and Kim 2024). The authors highlight the frustration caused by users not being able to override the AI-based assessments. Lower situational awareness is connected to a higher propensity of managers to delegate decisions to AI (Schneider and Leyer 2019).

A case study concerning the implementation of AI in a call centre (Bader and Kaiser 2019) concluded that algorithmic decision-making led to spatial and temporal separation and rational distancing, as well as increased reliance on algorithmic decisions. The attachment to AI-outcomes resulted in deferred decisions, workarounds and manipulation when they could not be reconciled with human judgement. This points to the tight coupling of the decision-premisses that are difficult to question because of their depth and relative opacity. Similar findings are reported in a literature review concerning the effects of decision automation and augmentation (Langer and Landers 2021).

A classical study into the usage of decision support systems showed that such systems were mainly used ways that facilitated reduced problem-solving effort rather than achieving a higher quality result (Todd and Benbasat 1991). Langer and Landers (Langer and Landers 2021) conclude in their literature review that there is a general scholarly consensus that AI is reductionist in the sense that it neglects unique decisions, qualitative information and cannot not effectively take contexts into account.

A qualitative research into the implementation of an AI loan-granting application in a financial institution (Strich, Mayer, and Fiedler 2021) showed how the transfer of decision-premisses to AI effected role identities of employees. The new system equalised the jobs of loan consultants and loan assistants. The loan consultants lost the decision-premise person and defined their new role as data entrants. On the contrary, the loan-assistant were equipped with decision-premisses that enabled them to interact with customers which was experienced as a job upgrade. The assimilation of high-skill and low-skill workers is confirmed by other studies (Brynjolfsson, Li, and Raymond 2023). These results confirm the pressure on the concept of the position as pointed out in Section 4.1.

5.2 | System Memory–Environment

The Davenport/Miller study (Table A1) shows that AI can cause significant changes into system memory and the working of system memory. Generally, it enhances the system memory, makes it more unequivocal and offers increased possibilities for retrieval. Still, not all information AI applications are accessible. The criterium for system memory content is that it is engageable in communication. Therefore, certain types of AI only create locked-down system memory. For example in the earlier mentioned study of Strich et al. (Strich, Mayer, and Fiedler 2021), there was no interaction possible with the AI system, it is therefore not communicatively accessible. In such a case we can argue that we cannot speak about decision-premisses as part of the system memory, but we are dealing with routines as elements of a technical system.

AI brings up issues with regard to the hetero-reference that is available for the organisation. A study of how well LLM model can predict risk-related choices, demonstrated that, while LLMs outputs aligned well with consumer decisions on an aggregate level, their accuracy at the individual was relatively low (Qiu, Singh, and Srinivasan 2023). This connects to the earlier evidence that AI does not perform well when contexts have to be taken into consideration. The study further showed that LLMs exhibit inconsistent risk preferences, often showing aversion to select extreme options.

AI can radically change the parts of system memory that are important for the recursive communication going on. In a case study concerning the implementation of an AI sales application, Pachidi et al. (2021) showed how the introduction of the AI-system made parts of the system memory redundant, and replaced it with new system memory. An interesting feature was that these parts were connected to different groups within the organisation, the salespeople and the data science people. Ultimately, with the redundancy of that part of system memory also the salespeople were made redundant and their function in the process was taken over by the data department.

Azzam and Beckmann (Azzam and Beckmann 2024) present a valuable and innovative approach on how AI can make enhance system memory and make it communicable. Their model, which is based on experience in a research organisation, uses text mining on the organisation's corpus to represent what is of the organisation's interest or what is a sphere of (potential) competence. These representations can then be used to scan the environment with LLM or DL applications. The authors propose to structure this information into a knowledge graph, which can be related to the internal fields of interest and competence. The knowledge is routed to a dedicated company platform and strategic network, whose task it is to enact the communicative circulation. Effectively, this process is an oscillation between self-reference and hetero-reference which is guided and informed through AI. The authors particularly recommend this approach for strategy development.

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A qualitative research of Alaimo and Kallinikos (2021) showed how the use of algorithms reconfigures organisations and their environments as a data order, the underlying process of categorisation is considerably hardwired to technologies and technological operations.

5.3 | Organisation System–Interaction System

The Miller/Davenport report (Table A1) enables several observations. AI facilitates remote work, which consequently reduces the occurrence of interactions systems at the workplace. AI facilitates that employee receive instructions directly from AI, which reduces the need for meetings or one-on-ones with supervisors. AI facilitates the standardisation of communication. Other studies appear to confirm this trend of standardisation (Brynjolfsson, Li, and Raymond 2023). Endacott and Leonardi calls this the emergence of algorithmic isomorphisms (Endacott and Leonardi 2024). Kellogg, Valentine, and Christin (2020) found that AI can restrict employees by preventing them from communicating with managers and with one another.

Several research contributions establish that AI, particular AI that operates more autonomous or is opaque, can give rise to experience of unfairness, resentment and disengagement (De Cremer and McGuire 2022; Lei and Kim 2024; Lichtenthaler 2019). Although the actual impact on communication practice is not research in detail, I believe it is a reasonable assumption that under these conditions communication in organisation will suffer in general. If employees have no emotional relation with AI, they will be less inclined to talk about it in interaction systems in a constructive and reflective way, which prohibits possible improvement through interactions systems.

5.4 | Structural Coupling–Loose Coupling

The Davenport/Miller study does only for a few cases provide information regarding this issue. In those cases though, it points to an increasing reliance on AI, particularly expressed by the phenomenon that the task of humans is to deal with 'exceptions' (Table A1). A study conducted into the effect of AI usage by students (Ahmad et al. 2023) confirms this. The authors found that the taken-for-granted reliance on AI led to increased laziness and loss of decision-making power. An indication for taken-for-granted of AI emerges also from a study concerning the delegation of strategic decision-making to AI, in which Leyer and Schneider (2021) observed that those who had delegated to AI were less elated when experiencing positive outcomes and less angry when hearing about negative outcomes than those who had delegated to a colleague. This points to the structural coupling with technology. In a similar vein, Endacott found in a research concerning AI-scheduling applications that users legitimised the applications' authority to allocate resources, while in fact a structure of machine agency was possible to opt for (Endacott 2024). On the other hand, it appears there is the opportunity of people actually choosing how to relate to AI applications. In their study, Dell'Acqua et al. found two strategies of how individuals relate to AI (Dell'Acqua et al. 2023). Cyborgs integrate AI and human capabilities at a granular, sub-task level, while centaurs strategically delegate between human and AI sub-tasks. It is clear that the best approaches to using AI are not fully understood and need to be more deeply examined by scholars and practitioners.

5.5 | Overview

The table below (Table 2) summarises the main concepts and propositions of SST that relevant in analysing the impact of AI in organisations, as well as the possible consequences that can be inferred from the theoretical framework of SST. Those impacts, for which indications have been found in research, are presented in bold.

6 | Conclusions

'The end user makes the final decision' is a recurring theme in the current narrative advocating AI, which makes sense as serving the protection of the myth of the decision-maker. It is indeed fully correct to say that the (end) users always make the final decision for the plain reason that AI does not and cannot make decisions. At the same time of course, precisely that makes this frame for addressing the possible impact on AI mostly irrelevant. The relevant issue is how AI acts on the structural and operational aspects of decision-communication in organisations.

In this paper, I have analysed these possible effects of AI from an SST perspective. SST contributes to the understanding of the impact that AI can have on organisations. This contribution is found in the fact that SST explains that certain effects we witness are not incidental nor should they be considered as temporal, as SST shows that they are structurally related to the basic operations of organisations.

AI is a natural reaction to the growing societal differentiation and the resulting future-related contingency. The number of decisions increases and organisations need the decision-premisses and information to deal with that. Hence, we can see AI as contributing to viability of the organisation and structural adaption to keep the autopoiesis going. Nevertheless, there is an argument for worry, which is the combined effect of general trend towards less questionable, deeper AI-based decision-premisses, the cultivation of system memory by AI-algorithms leading to hetero-reference being replaced by opaque algorithmic outcomes, the reduction of interaction systems as an ambiguity solving and possible transcendental force for the organisation and the creeping advance of structural coupling to AI, manifesting itself in a taken-for-granted attitude and increasing reliance. The generation of alternatives is at the core of all this. To repeat, it was argued that organisations establish meaning by framing decisions, that is, by creating a set of alternatives for the purpose of selection, that appears as valid in the self-hetero and the past-future oscillation. AI, in the way it is dominantly used in organisations, may increasingly limit the generation of alternatives, and consequently the crafting of meaning and sense-making. First, AI evaluates a huge number of alternatives, but these are 'hidden' in the decision-premise function of AI. Although

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TABLE 2 | Main concepts and impacts of AI from SST perspective.

Distinction	Main SST concepts	AI impact
Decision | Decision-premise	Decision as a construct of alternatives for selection Decision programmes: conditional and purpose type Communication channels, persons as decision-premise Position as alloy of premisses Rationality versus motivation anchoring of decisions	**AI is decision-premise not decision-maker** **Transfer of all types of decision-premisses to AI** **Tight coupling to AI-based decision-premisses with decision more premise-dense** **Limitation with regard to decisions on decision-premisses** **Role incompatibilities** **Increase of rationality anchoring**
System | Environment	Capacity of system memory–learning/forgetting Self-descriptions Self-reference and hetero-reference Cognitive routines	**Vast extension of system memory but communicative accessibility may be problematic** **Variety of hetero-referential issues may occur** Loss of verbal and common-sense content of system memory
Organisation | Interaction	Decision communications Interaction communications Routing of interaction communications into organisation system	**Decrease of interaction communication** **Standardisation of communication** **Interaction systems may suffer from emotional disengagement** Lesser scope for interaction systems to act as source of correction/transformation/trust
Loose coupling | Structural coupling	Structural coupling between technology and social systems Loose couplings in organisations enabling structural coupling between functional subsystems Loose couplings have decision moment inserted	**Taken-for-granted attitudes** **Indications for tight/structural coupling, loss of loose couplings in decision-making** **People can choose how to relate to AI** Possible limitation of scope of public governance

this represents an exceptional uncertainty absorption, it simultaneously tapers the decision communication. The structural/tight coupling to AI as a decision-premise may prevent the questioning or active testing of premises, which may impede the generation of alternatives. Interaction systems can positively contribute to framing decisions as they build trust and give impulses for change and reflection. Therefore, a loss or lesser role of interaction systems is likely to have a detrimental impact. As the system memory of organisations grows through AI capability, they will show a tendency to rely on self-referential components rather than hetero-referential ones. Since organisations are constituted by decisions taken in face of an unknown future, a decision represents in principle an occasion for reviewing existing premisses and perceptions, which keeps the orientation towards an easily assumed reality, the 'taking for granted' in check. AI may make organisations less inclined to engage in such reviews.

Currently the knowledge and productivity gains that can be achieved with AI may outweigh its disadvantages. Gains in knowledge and productivity will flatten out over time, while the impact of decision communication of less viability will increase over time. Knowledge can positively support decision-making, but they are not the same thing. What can be said for certain is that organisations should use AI not only to reduce alternatives but also to generate alternatives. This is how AI is often used in innovation and R&D (Rammer, Fernández, and Czarnitzki 2022; Verganti, Vendraminelli, and Iansiti 2020; Viberg and Eslami 2020).

Approaching this from an SST perspective, it seems important that organisation should deal more intensively with planning, that is, deal more intensively with deciding on decision-premisses. This in fact implies a reversal and reset of established managerial mindset that has become habitual in cutting so-called non-productive staff. What's more, in the further future this non-productive might be the only staff that is truly productive. In order to mitigate or even avoid the potential detrimental effects and pitfalls of more evasive presence of AI, organisations need to engage in second-order observations and build reflective loops.

Teodorescu et al. proposed a typology for addressing the issue of fairness of AI outcomes (Teodorescu et al. 2021), which can be given a wider application. Teodorescu et al. propose a typology of four quadrants, that is given by the locus of decision, AI or human, and the difficulty of the fairness issue (low/high). For each of the quadrants they suggest a particular approach to check for fairness and possible ways to intervene. The reach of this matrix can be extended if we substitute fairness with the concept of 'adequate complexity'. Adequate complexity is in my view the concept that can be used to manage the fundamental issues that AI poses to the organisation. Adequate complexity points to an effective reconstruction of the environment in

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the system's operations (Luhmann 2000a, 314). This concept is closely related to system rationality. This reconstruction is not a static mapping as the system can never be certain about its environment. Rationality also implies the ability to set aside rules and be guided be by situational contexts (318). This results in the following matrix (Figure 1).

The lower left quadrant refers to situations in which AI applications operate autonomously, and a limited number of factors is involved in assessing adequate complexity. In this case regular checks are made for the various factors assigned to comprehend the adequate complexity. In case the checks render results that are deemed problematic, interventions in the AI application are made. In the upper left quadrant, we also have the operation of an autonomous AI application, but in this case any assessment of adequate complexity involves a higher number of factors that can also be interrelated. Here as well, there are regular checks, but these involve a wider variety of staff. Apart from data science, non-technical staff from the respective business areas is also involved. In the lower right quadrant, we have the situation of an AI application that makes recommendations which pend on a decision of a human, in the context of relatively few variables comprising the assessment of adequate complexity. The essence of the informed reliance approach is that the involved decision-makers keep a critical attitude, that is, keep the taken-for-granted status at arm's length. Within the organisation respective staff is incentivised to enact this attitude, and regular meetings are held to communicate about this. The respective decision-makers ought to have a certain level of understanding regarding how the application gets to its recommendations. In the upper right quadrant, we have the situation in which humans act as decision-maker augmented by AI applications and there is a less straightforward way to assess adequate complexity. Here supervised reliance is the approach, the essence of which is that the decision-makers regularly subjected to extensive reviews, in which series of decisions are analysed in-depth. On such reviews the AI-human partnership is given a 360° assessment.

The building of these reflective loops will be essential to prevent drift of organisations, that can adversely affect its success and even lead to its collapse. The AI-based socio-technical support system proposed by Azzam and Beckmann (Azzam and Beckmann 2024), which was discussed in Section 5.2, can be helpful guiding the selection of adequate complexity factors for various business processes and be of value in its assessment along the typology elaborated above. The approach the authors suggest gives insight into for which elements and aspect of the environment the organisation has stronger or weaker representations, and at the same time reveals potentially salient developments in the environment.

I believe the arguments presented in this paper along the lines of the four distinctions, promote some clear topics for future research. I will give a few examples.

As for the distinction decision-premise–decision, interesting research questions can be crafted around the preserving of the alternative or alternativity in general in decision-communication. The essential difference between the decision-premise and the decision is that a decision by nature communicates alternativity, whereas decision-premisses do not. We can argue that the sustenance of alternativity enables an organisation to keep options open or to review decisions at a later point in time. The shift towards decision-premisses as I argued in this paper, can expected to be associated with a decrease in presence of alternativity in decision-communication.

With regard to the distinction system memory–environment, the formation of new cognitive routines is a key research topic. Bias as a result of AI is already frequently researched. Research into the formation of cognitive routines is more fundamental though and goes well beyond the bias phenomenon. The communicative availability of system memory is a relevant research topic. Here for example, comparative research can be conducted into organisations that dominantly work with non-addressable AI-applications and organisations in which AI-applications are dominantly available for explanations. This research can shed light on the impact of AI on the learning-forgetting process which is a core function of the system memory.

As for the distinction organisation system–interaction system, it appears from the literature that the impact of AI on the conduct of meetings and meeting culture in general is highly under-researched. Specially we can think of tendencies towards groupthink, or the changes in the anchoring of decision-communications in rationality or motivation.

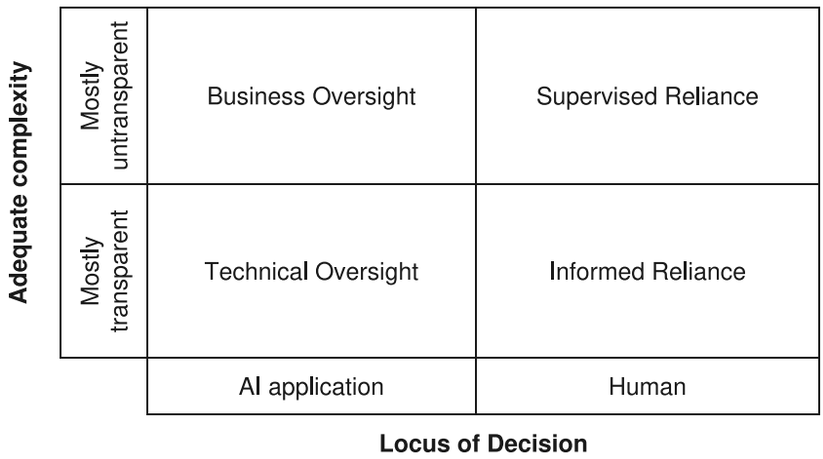


FIGURE 1 | Typology for assuring adequate complexity (after Teodorescu et al. 2021).

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Finally, and this would be more a task for sociologists primarily concerned with societal issues, a relevant topic for a research agenda concerns the issue of indirect possible impact of AI on public governance and steering capacities between the functional subsystems of society, by inhibiting their intermediate structural coupling through loss of loose coupling in organisations (see Section 4.4). Particularly, if we add to this the possibility that AI will lead to a sharp concentration of decision-making and power (Brynjolfsson and Ng 2023), this poses a serious concern. Such a research could for example address how organisations in the economic subsystem react to communications from the political or educational system. A potential setup could be to involve firms in the economic with dominant AI as one group and compare to firms with less dominant AI as another group.

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Appendix A

TABLE A1 | The Davenport/Miller study.

Organisation	Business area	AI application	Decision/decision premisses	System memory/ environment	Organisation/ interaction	Structural/loose coupling
Morgan Stanley	Investment Banking	Platform communication and engagement with clients and commander engine for personalised investment and wealth management	Transfer of decision-programmes; AI generates alternatives, employee decides	AI is essentially information providing and automating outbound written communication; use is highly individual; intensify customer engagement		
ChowNow	Online ordering app for restaurants	Communications platform and an analysis tool for sales		AI is essentially providing convert-support information for the salespeople; records and evaluates are salespeople communications, and general sales-tactic information for the supervisor		
Stitch Fix	Online personal styling service	Recommender for clothing, shoes or accessories	AI basically takes decisions, which are highly individual for each stylist; no incentive to override AI algorithm;	Stylist is essentially the human contact to the client, 'humanising' the offered fix.	Stylist are mostly working remote, low level of interaction	
Arkansas State University	Higher education	Facilitate fundraising process		AI is essentially an information and convert-support tool used on individual basis		
Shopee	E-commerce platform	Market analysis, product recommendations, sales and customer behaviours analysis	AI is clear decision premise for marketing decisions; impact is pervasive, while 'decisions' will still be enacted by staff, based on AI-premisses;	Relation to external environment is totally digitalised.		Clearly trends towards AI-based business model

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TABLE A1 | (Continued)

Organisation	Business area	AI application	Decision/decision premisses	System memory/ environment	Organisation/ interaction	Structural/loose coupling
Haven Life	Life insurance	Analysis of applications and third party data	AI effectively makes decisions, whether to approve or revert to underwriter reviewer; underwriter reviewer works 100% on premisses provided by AI.		Underwriters mostly work remote; weekly meetings, with other underwriters and data science team	
Radius	Mortgage banking	CRM, robotic automation of mortgage processing, extract data from mortgage documents	Basic decision programmes are replaced by AI; also communication channels in case of complete sections of workflows;	System memory is contained in AI, and actually can be changed as a formal process, in that sense the learning and forgetting is in fact an planned intervention; on the other hand, in the case of self-learning this is obviously not the case; the human accessible, communicative part of system memory appears to contain more and more information about human performance		
DBS Bank	Financial services	Transaction surveillance	Clear case of shifting decision programmes into AI; the so called decision by the analysts is in essence following the decision-premise; in the past the decision-premise information had to be assembled by the analyst, now this is done by AI			

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TABLE A1 | (Continued)

Organisation	Business area	AI application	Decision/decision premisses	System memory/ environment	Organisation/ interaction	Structural/loose coupling
Outsourcing medial coding	Health care	Coding of diagnoses and treatment	Decision programmes are shifted to AI; work is individualised; there is the element of parasiting the existing human knowledge, while AI is not adding to that knowledge (the disappearance of entry level jobs issue)		Coders mostly work remote	
Dentzu	Advertisement	Robotic automation of high-frequency, labour-intensive processes	Decision-programmes are shifted to AI, basically the rule-based ones; exception management is an issue as AI follows instructions very precisely; humans have the ability to add information to the evaluation which AI cannot (common sense).			Citizen developer points to relying increasingly on AI at grassroots levels
84.51°	Retail data analytics and data science	Market and sales analysis	Significant shifting of decision programmes to AI, as well as persons as decision premise; person is still a decision premise as to support the alternatives generated by AI;	AI is knowingly used in black-box manner as well; 'insight specialist' communicate and sell the outcome AI provided	Communication seems to shift to training, thereafter mainly individual work methods	AutoML indicates move towards structural coupling
Mandiant	Cybersecurity	Cyberthreat assessment	Decision-programmes are transferred to AI; communication channels and person are eliminated; on the other hand new person roles as decision-premisses created			

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TABLE A1 | (Continued)

Organisation	Business area	AI application	Decision/decision premisses	System memory/ environment	Organisation/ interaction	Structural/loose coupling
DBS Digibank India	Financial services	Monitoring and prediction of customer behaviour		AI created ability to constantly update system memory; relation with environment is fully digitalised		
Intuit	Financial software for small business and individuals	Text generation			AI standardises written internal and external communication	
Lilt	Translation platform	Translation	AI resulted in reduction of number of communication channels; creation of spider in the web role (project managers) while translators appear to communicate solely to the project managers and the project managers are the sole channel to the customer			
Salesforce	CRM software apps			AI results in standardisation of system memory, it appears to become increasingly normative and become extremely compliant to these norms; what happens to second-order observation? the reflection on the norms?		
Good Doctor Technology	Health care	Tele-medicine platform	AI acts as a strong filtering decision premise	AI embodies system memory	AI standardises communication	

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TABLE A1 | (Continued)

Organisation	Business area	AI application	Decision/decision premisses	System memory/ environment	Organisation/ interaction	Structural/loose coupling
Osler Works	Legal services	Text analysis, text generation	AI acting as decision premise for persons and partially decision programmes			
PBC Linear	Engineering, bearing and component manufacture	Knowledge capture, training modules for machinists using AR-technology		AI has profound impact on system memory; unequivocal and retrievable		
Seagate	Micro-electronics	Quality inspection	AI shifted decision premisses from programmes and persons to AI	Unequivocal system memory, though by itself not retrievable		
Stanford Health Care	Health care	Robotic automation of pharmacy	Reduction in communication channels	AI created a transparent and unequivocal system memory	Communication (between staff) seems to become more and more limited to communication about exceptions, out of the ordinary (as very often defined by AI)	
Wilmington PD	Police	Predictive policing	Shift from person decision-premise to AI			
Certis	Security services	Image analysis, response recommendation, patrol scheduling			AI eliminated the need for meetings and communication, operating staff receives instructions directly from AI	Increasing reliance on AI as handling the 'normal', humans handling 'novel situations'
Southern California Edison	Utilities	Risk analysis, maintenance activity planning	Decision premisses on work planning and risk-assessment shift to AI, are then taken as given			

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TABLE A1 | (Continued)

Organisation	Business area	AI application	Decision/decision premisses	System memory/ environment	Organisation/ interaction	Structural/loose coupling
Massachusetts Bay Transportation Authority	Public transportation	ML-based data analysis of engine oils	AI as decision-premise for maintenance decisions (programme)			
Singapore Land Transportation Authority	Public transportation	Incidence response management	Strong shift from personal and programme types of premisses to AI; staff involved in putting data into system memory without being involved in who the decision premisses will be changed based on that.			

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Theory and Methodology in Sociology–Guiding Distinction

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ABSTRACT

This study analyses how theory and methodology function as guiding distinctions in sociology, drawing upon Niklas Luhmann's social systems theory. By examining fifteen Croatian sociologists who engaged with a hypothetical case study on generative artificial intelligence in labour markets, we analysed their theoretical and methodological approaches. The findings reveal a distinct 'methodological imperative,' as participants tended to align more around structured rules and data-gathering procedures rather than around theoretical frameworks. This suggests that methodology, with its standardised forms, provides a clearer path for inclusion in scientific communication, whereas theory remains conceptually broader yet comparatively less structured. Consequently, the study underscores the interplay between these two programmes in shaping sociology's collective knowledge, illustrating how their co-existence supports the discipline's ongoing capacity for self-differentiation.

1 | Introduction

Sociology is a scientific discipline with low consensus on principles, methodology, and approaches to studying social phenomena (Gurvitch 1966; Schwemmer and Wieczorek 2020). This lack of agreement spans the entire discipline, from basic epistemological premises to theoretical frameworks and research methodologies. As a result, sociology can be described as a multiparadigmatic science. According to Ritzer (1975), this multiparadigmatic nature stems from the competition among paradigms for dominance both within the discipline as a whole and within its subfields (Ritzer 1975: 158). However, this issue is not unique to sociology. The broader social sciences also face multiparadigmacy as a way of resolving the 'paradigm wars' that arose in the latter half of the 20th century due to tensions between positivism and constructivism (Melosik 2021). These conflicts were part of a larger crisis in academia, often called the "science wars," which highlighted tensions between the objectivity and rigour associated with positivism and the more humanistic approaches that challenged these criteria. While the science wars quietly resolved (Grossmann 2021), they left several questions, including the relationship between theory and methodology in understanding the social world. Thus, tension between theoretical and methodological (some may claim empirical even) is a silent distinction inside sociology which requires investigation and both theoretical and empirical descriptions. Many scholars, including Elias (Baur and Ernst 2011); Coleman, Merton (Hedstrom 2005), etc. have highlighted the challenges of integrating theory and empirical research, often noting a disconnect between theoretical development and the use of methodology (Merton 1945; Swedberg 2012). Some key obstacles include the lack of training in theorising (Swedberg 2012), still unclear or inconsistent definitions of 'theory' (Abend 2008; Baur and Ernst 2011); and overreliance on conventional methods. Some of proposed solutions for bridging this gap include fostering process-oriented methodologies (Baur and Ernst 2011), utilising advanced methods like agent-based models (Hedstrom 2005) and fuzzy-set analysis (Mahoney 2001), but also bridging micro-and macro-level sociological insights (Elias 2009; Hedstrom 2005). The above examples are claimed to help bridge the gap between theory and methodology in the sense that such procedures and related results can help in the development of theory.

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All of these debates are trying to emphasise closer connection of methodology and theory. However, these argumentations are coming from the humanistic perspective. They focus on the connection of theory and methodology from the viewpoint of action (practice of doing sociology) rather than from systematic perspective–how to, by doing sociology they connect theory and methodology. On the level of system however, connection of theory and methodology is made by treating them (theory and methodology) as separate programmes which contribute to the self-referentiality of sociology as a subsystem of science. So, there lies a paradox–these programmes are separate yet togeather in the function of creating the necessary conditions for (re)production of knowledge. It is a trait of modern science where *... producing 'scientific knowledge' became a more specialized and demanding activity, in which knowledge was only considered valid if produced according to certain methodological constraints of research's own making. In Luhmann's terms, science became an 'autopoietic' system, in which scientific statements could only come about within the science system and under the rules and conditions of the system itself.* (Verschraegen 2023: 77).

In that sense, by using Niklas Luhmann's social system approach, this article explores how theory and methodology serve as guiding distinctions in sociology as a science. These types of distinctions function as inclusive factors, enabling structural coupling between individuals and the scientific system. Guiding distinctions allow for further differentiation by reducing individuals to the role of sociologists whose practice is shaped by one of these (theory or methodology), contributing to the overall autopoiesis of sociology. But as this guiding distinction may be inclusive, it also excludes. Therefore, if we are engaged with theory, it is hard to imagine ourselves entirely able to focus on methodology or vice versa. These kinds of distinctions, have led to the specific development of sociology in the contemporary world where there is a lot of indications of so called methodological imperative.

To elaborate our main goal of exploration of theory and methodology as guiding distinctions inside sociology, we also proposed two main questions: Can we say that methodology in sociology is dominant programme of inclusion? In other words, is methodology programme more inclusive than the theoretical one, and if so, on what grounds and why?

Second question is: how this distinction allows sociology to function as a scientific system. If methodology indeed is system with more inclusive communication, is sociology stuck in the methodological fetishism? The first question is addressed through empirical investigation involving 15 sociologists' responses to a hypothetical case study, while the second question is explored through social system theory, analysing how these guiding distinctions support the discipline's functioning by adopting antihumanistic perspective on social systems–sociology as science.

2 | Theoretical Framework–Social System Theory and Guiding Distinctions

Sociology is the science of social systems. With this statement, we have already made a distinction from what sociology is not. It belongs to the sphere of science, which distinguishes it from what is not science. Therefore, in its scientific nature, sociology is not non-science. However, we need to define this distinction more precisely. If sociology is a science, what distinguishes it from non-science? What guides us in understanding sociology as a science? If we follow Niklas Luhmann's systems theory, we could say that the scientific nature of sociology arises from its internal, operational closure, characterised by observation directed at the distinction between truth/untruth about social systems (see Luhmann 1989). In other words, sociology is a science whose primary goal is to assess the criteria of truthfulness of social phenomena within the domain of scientific knowledge.

Every science does this through a series of programmes within its own closed system, by which it observes the surrounding world but does not allow it to 'enter'. This brings us to the fundamental paradox of social systems themselves, which are operationally closed (they process everything within their boundaries) but observationally open (they observe the environment and define it based on their own closedness) (Luhmann 1995; Watson and Romic 2024). Therefore, all observation happens through programmes within the system itself, with the ultimate goal of distinguishing truth from non-truth, as well as what is truly untrue and untruly true (see Roth 2024). The processes of arriving at truth are internal to the system of science. Science produces knowledge, which is directed through concepts and programmes that differentiate this knowledge from non-knowledge or non-truth. However, it is accumulated over the flow of time (Luhmann 2001). This means that scientific knowledge cannot be reduced to the individual, nor even to individual observations. Scientific knowledge is characterised by a processual nature and the condensation of past knowledge to enable the emergence of new knowledge. Thus, scientific knowledge depends on the temporal continuity of the functionality of the system's basic operations and programmes (Luhmann 2001; 65). The programmes within science itself, therefore, assist in the process of condensing and confirming certain knowledge–by enabling communication. For Luhmann, only communication can communicate (Luhmann 1996: 261). Communication is the unity of information, message and understanding (Leydesdorff 2000; 276).

Also, communication is not inherently the property of the individual. While individuals do engage in communication, its possibility does not depend on them. Instead, communication occurs and is made possible within specific social systems. In the context of sociology, for example, using sociological terminology does not make it my own property. Rather, communication is something I embrace, but it does not belong to me, nor can I radically alter it when communicating within or about sociology as a scientific system. I adapt to a set of rules that transcend my individual role, and I am merely a participant in this communication. Therefore, to talk about communication inside the system means also to investigate the programmes which enable this communication.

As sociology is a science, it also possesses its own programmatic guidelines for determining truth. These are, above all, like in the case of other sciences—theory and methodology. Niklas Luhmann considers theory and methodology as the two fundamental programmes in the functioning of science (1989). Theories represent openness, whereas methodologies represent closure within the system; their distinction has an exclusively internal meaning for the system, referring only to its operations (Luhmann 1989:

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79). The scientific system separates theory and methodology by developing distinct communication patterns for each. Theory is concerned with developing conceptual frameworks that explain social phenomena, providing lenses through which sociological questions are framed and explained. Methodology, on the other hand, focuses on techniques and processes that enable empirical data collection and validation, ensuring that data can systematically validate or reject theoretical assumptions. This separation is necessary due to the functional differentiation that emerges as scientific disciplines grow and specialise.

Thus, both theory and methodology are the practical foundation for the construction of scientific knowledge, the distinction between truth and non-truth. However, since this foundation is defined as a programme (or programmes), it is necessary to define the concept of a programme and how this concept is used in this work.

For Luhmann (1995), programmes regulate operations and communication within the system. They are, therefore, regulatory mechanisms. These can be viewed from two fundamental perspectives. First, programmes enable the autopoiesis of the system. The programmes of science allow for the processing of observations of the environment. The environment is neither absorbed nor adopted as part of the system. Social systems are operationally closed, and the basic programmatic forms make this possible. Thus, we can say that programmes enable self-creation—internal creation through the system's own resources based on observed environmental information. Programs within the system also ensure the reduction of the complexity of the environment that is being observed. For example, in the case of methodology and theory, and based on concepts (which Luhmann 2001, considers key in the process of engaging with science), we undertake second-order observation—that is, we observe the observation of other systems, but based on specific guidelines. We distinguish between distinctions. In this way, certain phenomena of the social world (e.g., the issue of marriage) receive a new distinction, which the scientific system—in our case, sociology—implements. The reduced complexity is further reduced, and theory and methodology are crucial guides in this process. Following Luhmann (1994), these programmes also specify the fundamental code of science—namely the distinction between truth and untruth—in concrete operational terms. In other words, within scholarly activities, true/not true translates into what is scientifically proven or unproven. Methodology and theory thereby define and apply the very procedures through which a statement becomes accepted or rejected as scientifically valid. By virtue of these programmes, science can mark which observations or interpretations align with or deviate from the discipline's understanding of truth, thus sustaining the system's operational closure while simultaneously refining its capacity for second-order observation. So, programmes mentioned here are specifying the code of the scientific system–true/not true.

Secondly, the programmes of theory and methodology can be seen as a way of including individuals in the communication process within the system of sociology as a science. Although communication does not depend on individuals—thus taking a position of radical antihumanism—individuals participate in communication processes in a reduced manner. This means that the individual is reduced in their comprehensiveness in the processes of sociality and communication. Communication directs the individual towards only certain possibilities—in our case, the scientist is a role that is communicatively defined. The individual participates in this role but only through inclusion in communication processes. Thus, speaking in Schutzian terms (1967), we do not refer to the 'Umwelt' of the individual but to the 'Mitwelt'—the realm of indirectly experienced social reality, the reality of communication, or the reality of social systems. The scientist communicates science within the frameworks of the scientific world. Of course, the individual scientist can also have other social roles, but within the temporally defined communication, they are reduced in their complexity of personality to just communication. The authenticity of the individual is, therefore, only a potential irritation for the communication system, which is resolved by the programmes of science.

If we follow this second point, programmes within the scientific system could be referred to as guiding distinctions—distinctions made within the system itself to establish communication, reduce the complexity of individuals entering the communication, and ultimately, to include individuals in the communication of a particular system. Guiding distinctions are therefore inclusive elements of the system, manifesting in their reductive, programmatic nature. This means that guiding distinctions are a characteristic of the social system, which reduces the complexity of individuals participating in scientific communication. According to Luhmann, social systems address individuals by assigning them specific roles or positions within the system's ongoing communication processes (Luhmann 1995; 2012). This address is not a deliberate action by individuals or groups, but rather an outcome of how the system differentiates and organises its own operations. In the scientific system, for example, individuals are addressed as either theorists or methodologist (empirical researcher), depending on how their communication aligns with the system's guiding distinctions.

To elaborate this in the example of scientific system, no individual can know everything. When the scientific system 'addresses' someone as a theorist, certain forms of communication (e.g., conceptual, philosophical, more abstract dialogues) become open to them, while other forms (e.g., specialized methodological discussions) might be less prominent in their domain. Just as, being 'addressed' as an empirical researcher or methodologist opens different forms of communication, centred on techniques, data, and formal procedures for validation. These different addresses thus create different pathways for 'inclusion' (and also potential exclusion) within sociology. A researcher might find it easier to be 'included' through methodological competencies—where standardised rules are clearer—than through theoretical work, which can appear more ambiguous from the standpoint of the discipline's communication.

In this way, the system's guiding distinctions (theory vs. methodology) operate also as addresses that position and include individuals differently within sociological communication.

Therefore, through theory and/or methodology, we focus on specific aspects of the search for truth. This truth of ours is not truly objective until it is fully separated, alienated from ourselves–throughout the procedures of science (see Luhmann 1992). Only then does the scientific system produce a dehumanised, objective truth. The programmes of methodology and theory are thus guiding distinctions enable major systemic distinctions. They

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are points in time (enabling structural coupling and inclusion of psychic systems into the communication of sociology), that enable the continuity and condensation of knowledge over a longer period.

Guiding distinctions help incorporate psychic systems into the communication of systems like science. However, stepping away from a humanistic approach, this does not mean that individuals are fully integrated into the system; rather, they participate, in their reduced form, in communication specific to this system. For this to occur, psychic systems, in order to participate in communication, must be guided by certain programmatic guidelines. In this pairing, the scientific system both reduces and is reduced by the individual. On one hand, to be included in communication processes, the individual is reduced to a 'scientist' through the operations of theory or methodology; on the other hand, that same science is reduced by the individual to become meaningful to them.

Guiding distinctions, in addition to helping the autopoiesis process, facilitate the structural coupling of two systems. In the case of science, guiding distinctions couple two autopoietic systems (allowing each to continue its own autopoiesis) and reduce the complexity of each within the boundaries of the available guiding distinctions—programs. Thus, programmes like theory or methodology are viewed from both perspectives as what creates meaning within a broader whole—one that is inaccessible to the individual for complete comprehension.

In other words, it is difficult to be an all-encompassing scientist. Even in a field like sociology, an individual cannot equally and effectively participate in both theoretical and methodological communication.

2.1 | Theory and Methodology in Sociology

In the introductory lecture, when we enrol in to the academic study of sociology, we are told that there is theory and methodology. We are also told that these two are inseparable parts of sociological understanding of society or alteast some fragment of society. Thus, throughout our professional socialisation, we are taught sociological theories (critical theory, structural functionalism, functional structuralism, symbolic interactionism etc.) and methodologies in sociology (qualitative, quantitative, mixed methodology, etc.). It follows us up until postgraduate level where we need to prove the capability of connection those on some topic relevant to sociology.

However, as much these connection of theory and methodology is desirable, it is hard to find a true connection. The reason for that is the independant development of both theory and methodology even from the birth of sociology. Namely, geathering of facts throughout certain social science methodology is older than some basic presumptions of sociological theory (Lazarsfeld 1961; Bulmer 1977)–for example the one of Durkheim 1982. We might even say that theory and methodology developed as closed programmes in which one became only an irritation to other. This problem is even more challanging for the social sciences with the domination of positivist paradigm throughout the development of social sciences. Thus, some authors argue that social sciences reified methodologies of natural sciences and with it, limited their own unique approaches to certain aspects of social reality (Aronowitz and Ausch 2000).

In that sense, incporporation of theories which deals with social structure, social relations or social action is at best, challanging for empirical study of society (Bulmer 1977). Also, trying to theoretically understand some empirical data sets us on some philosophical endevours which might distance us from the same data we are investigating. Closure of those programmes inside of sociology might be the one to blame. These programmes had independant development, which becamne evident throughout certain critique of sociological development. In that manner, Mills (1959) expressed this critique by separating grand theory and abstract empiricism. He argued that abstract empiricism, which focused heavily on data collection and statistical analysis, neglected the broader theoretical frameworks necessary for meaningful interpretation, leading to a narrow understanding of social phenomena. He criticised this trend for its overemphasis on methodology, which prioritises technical rigour at the expense of substantive inquiry, and for its disconnection from real-world issues, as it often overlooks the broader social and historical forces that should be central to sociological research. On the other hand, Mills also made a critique of grand theory for its tendency to create overly general and abstract concepts that are detached from empirical reality, resulting in theories that are difficult to apply to specific social situations and that often lack practical relevance.

However, irritation from the outside of the sociology as a closed system, presented itself with a new challanges regarding the methodology and theory. As society has been speeding up (Rosa 2013), and there has been big emphasise on structural coupling between science and economy or science and politics, methodology became something that provided visible outcomes of sociological inquiry. To put it differently, methodology became something usefull for these couplings because it could be measured, it was percieved as objective (Ratner 2011), it could be presented as an outcome of certain project. Even qualitative methodologies, which embrace subjectivity, are defined by strict rules and forms that guide the empirical endeavours of sociologists (see for example, Creswell 2013). In other words, we could say that theory and methodology, as programmes within sociology, operate differently when viewed through the temporal dimension. Theory, in all its complexity, operates at a slower pace compared to methodology.

Therefore, to be successful in publishing and doing sociology, methodology became the imperative. Methodological imperative (Collins, 1983: 215; Danziger 1985: 3) therefore, as a way of overemphasising, uncritical privileging of research methods, which can result in the neglect of other aspects of research, such as ontological, epistemological, practical, and political considerations related to a research topic (Ratner 2011: 1176 in Ježovita 2021) has become *mainstream* in sociology. Some research even called that metholatry (Janesick 1994: 215), as almost religious zealotism of research methods over theory.

Theory in that sense is way too complex, requires too much time spent on reading and thinking, rather than apply certain methodological guidliness in the praxis of sociological investigation. This might be challenged by the current developments in the

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structural modelling where there is emphasised strong connection between methodology and theory (Pearl 1998). However, if we have in mind the principle of closure, we can say that this development is perceived through the programmes of methodology, autopoetically respond to the irritation from theory. So, theoretical engagement in SEM reduces the complexity of theory and can fall to the methodology rather than to theoretical in a full sense of word.

This development lead Peter Berger to question the purpose of sociology in today's world. In his essay 'Whatever Happened to Sociology?' Berger (2002) made a critique of the trend of empiricism in sociology, expressing concern about the direction the discipline had taken by emphasising empirical research at the expense of broader theoretical investigations. Berger thought that sociology had become overly focused on methodological rigour, with many sociologists dedicating their work to refining research techniques, statistical methods, and empirical data collection. He believed that this focus often came at the expense of asking meaningful sociological questions and developing deep theoretical insights into social phenomena.

According to all said, we could draw two main arguments about theory and methodology as the programmes in sociology today. First, methodology has a more strict form then theory. Even in the face of qualitative research and more subjective approach, compared to theoretical programmes, methodology is a systematised set of rules which is applied during the empirical investigation of phenomena. Thus we could speak of qualitative methodology (with different approaches and techniques of which all have certain rules), quantitative methodology (with all the mathematical laws applied), mixed methodology (with some new rules, although some might find them a bit problematic–Adu et al. 2022). Although, certain debates and distinctions exist in the methodological area (Byrne 2012), it is still area which is drawn by positivistic principle, rather than philosophical one. Methodological programme, in that manner of speaking, consists of strict rules, and guides that reduce complexity in more easily than theoretical programmes, and therefore, enable communication in more efficient manner.

In comparison, theory, although systematised, it possesses the internal mess. Therefore, we might say that what we see as critical theory is not unique. Even the 'critical theory' would be critical on some other critical theory. Symbolic interactionism remains problematic as well as one might say that Goffman is a nice example of symbolic interactionism while he himself would not exactly call himself symbolic interactionist (Verhoeven 1993). After all, one of his main sociological role-models was Emile Durkheim, who majority might see as functionalist and structuralism, macro-sociologist. However, his enrolment and fascination with American pragmatism would put this label under question mark (see Durkheim 2010). The point of this is to prove that sociological theory does not possess internal unity and structure as methodology does. Therefore, we could say that inclusion in sociological communication is way easier by focusing on methodology than on the theory.

The second argument of the article deals with the problem of functionality of this programmatic dichotomy in sociology. Programmes of theory and methodology are necessary components of scientific system of sociology. Even if we take into consideration that it serves as guiding distinction which enables inclusion of reduced individuals (sociologists) into the system itself, it is still internal component of scientific system. These programmes are functional for the scientific system's autopoietic processes. In that sense, we should question the critique of methodological determinism as something that is presented mostly through human-centred argument in which, we are presenting ourselves as a judge of rationality of one social system.

The first argument will be illustrated through exploratory research on how Croatian sociologists approach specific research subjects. The development of Croatian sociology, including the adoption of research and methodological practices, occurred under the influence of Stalinist dogmatism. In this context, new approaches were often dismissed as bourgeois anti-Marxist subversion (Kuvačić 1972). Simultaneously, the theoretical development of sociology was shaped by the Yugoslav setting and Marxist ideology, where sociologists were frequently labelled as leftists and revolutionaries (Županov and Šporer 1984). As a result, sociological research during that time faced significant challenges. On one hand, there was an overproduction of theoretical debates that lacked practical value for empirical research. On the other hand, many empirical studies were conducted without a solid theoretical foundation (Sekulić 1979). More recently, Croatian sociologists have explored reasons for the discipline's lag behind global sociology. Some factors identified include a lack of robust theoretical frameworks, insufficient empirical research (Štulhofer and Murati 1993), and inadequate science funding, which has left certain topics unexplored (Lalić and Mustapić 2007). This early development of sociology in Croatia provides the groundwork for understanding the persistent gap between theory and empirical research, which continues into the present day. This article builds on these earlier challenges, examining where Croatian sociologists currently stand in integrating theory and methodology, while reflecting on the legacy of past developments.

This research will serve as a basis for further theoretical discussion on how the distinction between research programmes and their operations makes sociology as a science possible.

3 | Research Aim

Starting from the previously presented considerations, this research aims to explore the various approaches used by Croatian sociologists and scientists in the theoretical and methodological design of studies. To do so, it uses a hypothetical example that examines the impact of generative artificial intelligence on the labour market, with a particular focus on sectors like marketing, media, and technology.

In this work, we are presenting two main questions:

1. Is methodology structured and more formal in comparison to theory in developing certain sociological explanations?
2. How can this guiding distinction be explained as a formative and constructive part of sociology as science?

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4 | Methodology

4.1 | Population and Sample

The target population for this research included all sociologists who held a PhD or higher and were employed at a university or scientific institute in the Republic of Croatia. To identify this population, the contact details of sociologists working at the following institutions were collected: (1) Catholic University of Croatia; (2) Faculty of Humanities and Social Sciences; (3) The Institute for Migration and Ethnic Studies; (4) The Institute for Social Research in Zagreb; (5) The Institute of Social Sciences Ivo Pilar–from Gospić, Split, and Zagreb; (6) University of Split; and (7) University of Zagreb Faculty of Croatian Studies. The population of interest consisted of 88 individuals, 55.7% of whom were women, while men accounted for 44.3%.

An invitation to participate in the research was sent to all members of the described population, but the response rate was only 17%, meaning 15 individuals took part in the study. As a result, this can be considered a convenience sample. The average age of participants was 43.9 years (SD = 10.7). Regarding their employment, 93.3% were working at a university or faculty at the time of the study, with an average of 16.1 years of work experience (SD = 9.8). In terms of academic titles, the largest proportion of participants held the title of associate professor (senior research associate) (40%), followed by assistant professors (research associate) at 26.7%. Full professors (scientific advisers) made up the smallest group, with 13.3%, while participants with a PhD made up 20% of the sample.

4.2 | Research Instrument

For the purposes of the study, a survey questionnaire was used, consisting of two main blocks of questions. The first block contained two open-ended questions in which participants were asked to theoretically and methodologically define a hypothetical research scenario, described as follows:'a research problem that investigates the impact of generative artificial intelligence on the labour market, particularly in sectors such as marketing, media, and technology. The second block contained closed-ended questions. One question asked participants to select the primary focus of their research work from three categories: (1) primarily leans towards theory and theoretical explanations of phenomena; (2) primarily leans towards methodology and empirical research; or (3) tries to complement theory and methodology in his work. The final block included socio-demographic questions such as age, work experience, institution, and current academic title.

4.3 | Data Analysis

The data obtained were analysed using both qualitative and quantitative content analysis for the first set of questions. The remaining data were analysed using descriptive statistics and the SPSS statistical software. The results are presented in diagrams and bar charts created with Microsoft Excel from the Microsoft 365 suite.

5 | Results

5.1 | Theoretical Explanation of the Hypothetical Problem

In the conducted survey, three sets of questions were included. In the first set, respondents were asked to theoretically define a hypothetical problem that was presented to them. The goal was to gain insight into the various approaches that Croatian sociologists and scientists would apply if they were to address this hypothetical problem in their work. Out of 15 respondents, 12 provided a response, while three of those who responded mentioned that they did not currently know the answer or that it was outside their area of expertise. An analysis of the answers

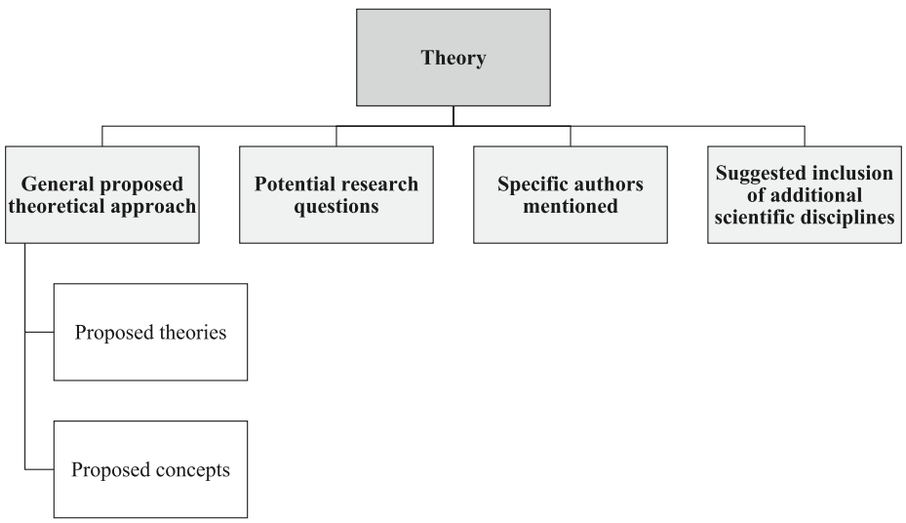


FIGURE 1 | Types of information gathered from question about the theoretical definition of the hypothetical problem.

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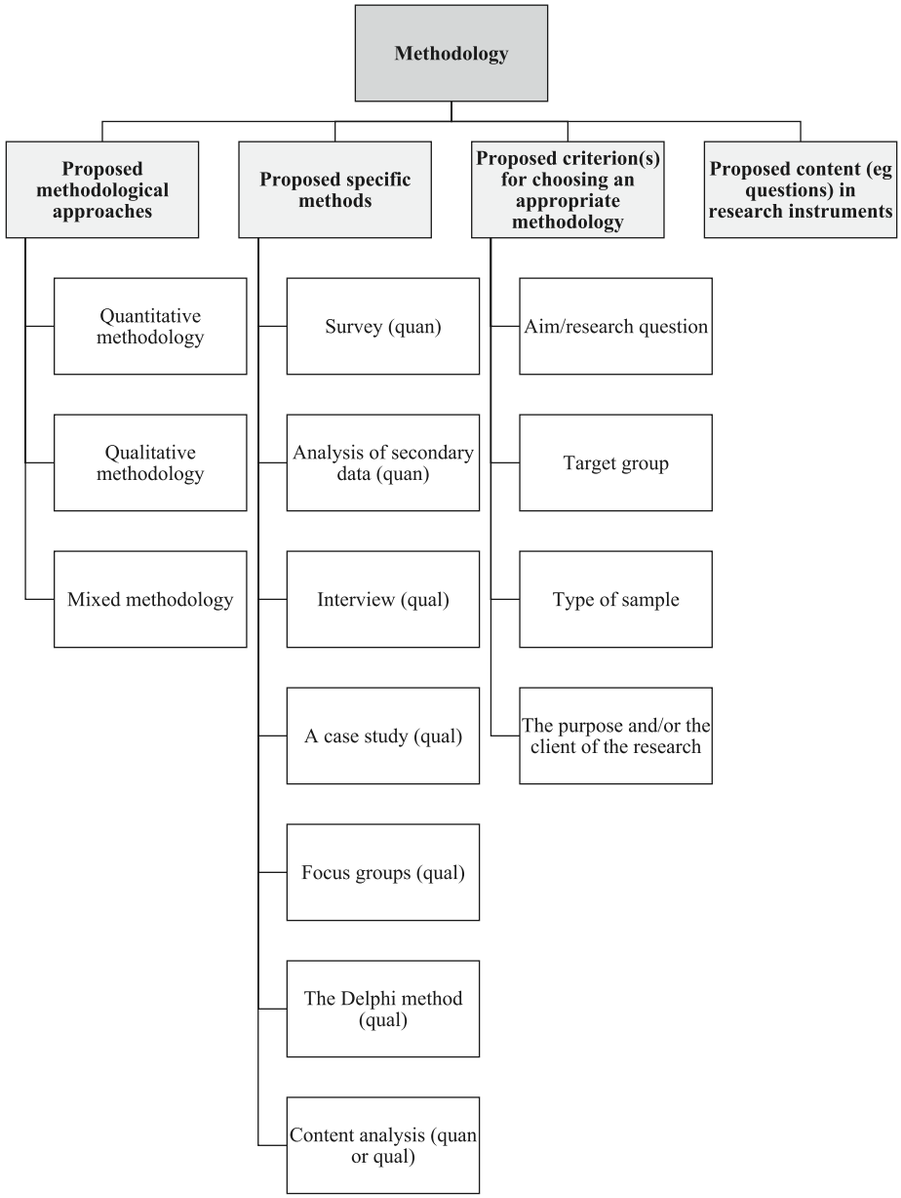


FIGURE 2 | Types of information gathered from question about the methodological definition of the hypothetical problem.

of the remaining nine respondents, it became clear that the information could be categorised into several types (Figure 1).

Qualitative content analysis revealed that all the proposed solutions could be grouped under the critical approach to examining the hypothetical problem. Additionally, the following specific theories were suggested for use: (1) Technological dispersion of labour; (2) Social Capital Theory; (3) Cultural lag theory; (4) Theory of alienation; (5) Sociological theories about inequalities and networked society; Conflict Theory; (6) Relational inequality theory; and (7) Theory of labour insecurity.

Seven out of the nine participants provided more detailed information that should be considered when conceptualising the research. We will present this information here in the form of research questions. Some examples of these questions include: (1) Is AI reducing the need for labour?; (2) Are workers protected from potential discrimination based on their AI skills?; (3) Is there a growing gap between those who have access to digital resources and those who do not?; (4) What are the sources of inequality (including economic factors, social status, and skills such as AI proficiency)?; and (5) Are social norms, institutions, and values able to keep up with rapid technological changes? It can be concluded that the common theme in most of these questions is the social and economic impact of technology, including AI, on the workforce and the creation of divisions or inequalities.

The other types of information presented in Figure 1 were largely absent from most participants' responses. For example, only one participant suggested using the concept of 'cultural capital,' linking it to the theory of labour insecurity. Similarly, only four participants mentioned specific authors worth considering: Randall Collins, Ralf Dahrendorf, and Pierre Bourdieu, who was mentioned twice. Interestingly, though somewhat expected, only one participant suggested that the hypothetical

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problem should be examined from a multidisciplinary perspective, for instance, social ethics.

5.2 | Methodological Explanation of the Hypothetical Problem

In addition to asking participants to theoretically define how they would research the hypothetical problem, they were also asked to suggest the methodological approach they would use in their research. Out of 15 participants, 12 responded. After conducting both quantitative and qualitative content analysis, it became evident that the responses can be divided into four main categories, along with their subcategories, as shown in Figure 2.

Specifically, when it comes to methodological approaches, none of the participants suggested using only a quantitative methodology. The majority (58.3% of the 12 respondents) proposed using a mixed methodology, and only a quarter of them recommended using exclusively qualitative methods. The most commonly suggested methods were surveys, interviews, and case studies. Each of these methods was mentioned by 25% of participants, though typically in the context of combining them with other methods. Other methods were proposed by a smaller number of participants: secondary data analysis (16.7%), focus groups, content analysis, and the Delphi method (each suggested by 8% of participants). It can be seen that there was much greater agreement among participants regarding the general choice of methodological approach, whereas there was less consensus on the specific methods that could be used.

An interesting result emerged from the participants' responses, regarding the criteria they proposed for determining the most appropriate methodological approach for the hypothetical example. In 25% of all responses, it was noted that researchers should always choose the method based on the research goal and question. The same proportion of responses highlighted the importance of considering the target group, suggesting that the most suitable approach should be tailored to the specific characteristics of the groups being studied. Other criteria mentioned, though only by one participant each, included the type of sample used and the overall research objective, taking into account the interests of the party commissioning the research (e.g., if it is market research).

Finally, content analysis revealed an additional category of information: the proposed content to be included in research instruments, regardless of their type (Figure 2). Participants primarily suggested focusing on the habits, attitudes, and skills related to artificial intelligence. More specific propositions included the application of AI in various sectors, such as education, creative industries, and market sectors.

5.3 | Reflection on One's Own Scientific Work

To better understand the context of the previously obtained responses, participants were asked to reflect on their scientific work and categorise themselves into a specific group. Initially, participants could indicate whether their work leans more towards methodology, theory, or a combination of both. Not surprisingly, out of 15 participants, 66.7% reported that they attempt to integrate theory and methodology (see Figure 3). Additionally, all participants who answered the previous questions made an effort to provide theoretical and methodological suggestions for researching a hypothetical problem.

6 | Discussion

The presented research results can serve as a demonstration that theory and methodology in sociology function as closed, independent programmes. As noted in the literature, these programmes are essential to the scientific system's autopoietic processes, enabling communication within the system while maintaining their distinct boundaries. Theory, characterised by conceptual openness, provides a framework for interpreting and understanding social phenomena. In contrast, methodology offers structured, rule-based approaches to gathering empirical data. Responses from the Croatian sociologists who participated in this study illustrate this distinction. While a majority (66.7%) reported a need to integrate theory and methodology, the empirical data suggest a methodological imperative, particularly in how participants approached the hypothetical problem of generative AI's impact on the labour market.

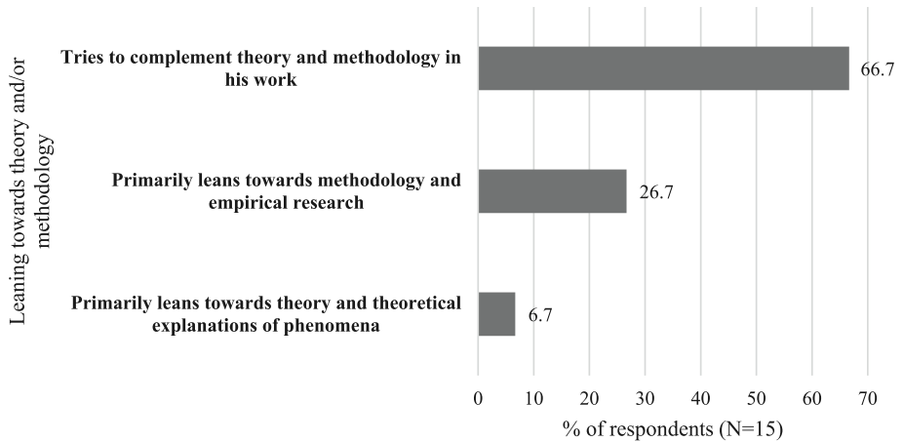


FIGURE 3 | Leaning towards theory and/or methodology in one's own scientific work.

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Both theory and methodology in sociology show a degree of structure, but the organisation is clearer in methodology. While theory operates as a more open conceptual framework, methodology has formal rules and techniques that ensure its structured application in empirical research. It is the formalised, rule-based nature of methodology that provides clearer guidance in research processes. In contrast, theory, though essential, operates in a more flexible domain, less defined by concrete rules, making it harder to formalise. Reflecting on Luhmann's theory of communication, it becomes evident that communication through methodology is often more efficient for the inclusion of psychic systems. Luhmann described communication as the core mechanism through which social systems, including science, maintain their autopoiesis—the ability to reproduce themselves (Luhmann 1995). Methodology facilitates this by producing measurable and empirically validated results, which fit more easily into the ongoing communication of the scientific system. The more abstract nature of theory, while necessary for framing and understanding phenomena, does not lend itself to such straightforward communication. This is why inclusion in sociology is often easier via methodological programmes, as they provide a structured framework for the researcher's contributions. The efficiency of methodological communication supports Luhmann's view that social systems thrive on effective communication patterns, where methodology plays a key role in enabling clear interaction within the scientific system.

Moreover, in our study, respondents valued both theoretical and methodological aspects in their work. However, their responses were much more detailed when discussing methodology, particularly in relation to mixed methods. This suggests that, despite the common narrative of synthesising theory and methodology, in practice, methodology tends to dominate. This is especially evident in the case of mixed methodologies, which have gained paradigmatic dominance due to their ability to combine different research techniques. In contrast, theory's paradigmatic dominance, although harder to reduce to one framework, might be attributed to critical theory. However, should we then aim towards some form of terminological unification (see Bailey 2001) in theory, given its lack of compact structure?

If science is viewed as a process of obtaining valid and reliable knowledge about the observable world through systematic research methods, testing, and critical reflection on various theories (Giddens and Sutton 2014), it is not surprising that many researchers exploring scientific production emphasise the synergy between theory and methodology. In the Croatian context, Sekulić (1979) analyzed articles published in the Croatian sociological journal 'Revija za sociologiju'and observed that theoretical frameworks often did not serve as adequate guides for empirical research. Simultaneously, empirical research frequently remained at a merely descriptive level. This example illustrates a persistent gap between theory and empiricism in Croatian sociology. On the one hand, the insistence of some researchers on prioritising methodology resulted in sociological studies with limited capacity to draw conclusions about complex realities (Mežnarić 1990). On the other hand, some Croatian sociological works were grounded in theories that could not be empirically tested. Similarly, Prpić (1996) and Lalić and Mustapić (2007) concluded that part of Croatian sociological production suffered from both theoretical and methodological limitations.

By stepping away from a human-centred perspective, we might argue that this development, while seemingly problematic, reflects the reality of these programmes. Attempting to formalise theory would strip it of its basic programmatic nature—operational openness, which serves the development of the discipline. Even if this means inclusion is easier through methodology than theory, we could assert that sociology needs more methodologists than theorists to enable broader participation.

Despite the common narrative of theoretical-methodological synthesis in sociology, significant challenges arise from the independent and closed development of both programmes. This synthesis is only possible if we embrace an anti-humanistic approach to explanation. By removing the focus on human agency, we can observe how these two distinct and closed programmes work towards a joint communicative goal: coding specific forms of sociological truth. Therefore, even with their closure and distinction, these programmes are functional for sociology in the long term, contributing to the aggregation of sociological knowledge. Critiques of this distinction between theory and methodology often stem from a human-centric orientation, which, although appealing, does not reflect the real development of sociology as a science.

From a theoretical standpoint, the separation between theory and methodology, while seen as problematic, is crucial to sociology's autopoiesis. Luhmann's systems theory explains how sociology, as a scientific system, maintains internal closure to sustain its autonomy. The distinction between theory and methodology allows the system to reduce complexity, guiding researchers into specialized roles. This reduction of complexity enables individual sociologists to focus on either theory or methodology without needing to engage with the entire programmatic aspect of the discipline. The result is a system where each contribution, while limited in scope, supports the larger project of sociological knowledge production.

This guiding distinction reduces the complexity of sociological inquiry, making it easier for individual researchers to participate in the system.

7 | Conclusion

From a systemic perspective, we must clarify that while theory and methodology, as guiding distinctions, are closed in their inclusive potential, they remain integral parts of sociology as a system. By distancing ourselves from a humanistic approach to sociological communication, we can observe that even with this closure, theory and methodology are still connected within the systemic rationality of the sociology of science. This anti-humanistic view of theory and methodology should not be understood through the practices of individual sociologists, but through the aggregation of knowledge that belongs not to the scientist, but to the social system itself.

Our example shows that while there is a prevailing narrative connecting theory and methodology in sociology, sociologists,

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in their social roles, tend to focus on one of these programmes. These programmes then serve as the guiding distinctions for the functioning of the systemic distinction. Guiding distinctions, therefore, can be understood as an inclusive force that reduces the complexity of individuals entering the scientific system—sociology. Sociologists are thus guided by systematic communication, reduced in their complexity so they could be able to participate in communication. Although this reduction may seem irrational to a temporary observer, it is rational for the system of science (sociology) as it produces accumulated sociological knowledge.

With this article, we suggest that in order to observe sociology as a science, sociologists must remove themselves from a human-centred stance and explore how sociology has developed its own closed rationality. This exploration reveals how the aggregation of knowledge has produced functional programmes that enable sociology's self-referential nature—allowing it to generate the improbable probability of functioning within the uncertain environment of the social world; producing scientific truth. After all, that is why, sociology can be considered as a science.

8 | Methodological Limitations and Recommendations for Future Research

The obtained sample is not representative in nature, and the analysis used does not aim to draw conclusions about the entire population of sociologists in Croatia. The presented results are merely of a demonstrative nature, addressing the research problem of this study.

Future research should explore new ways to reach a larger number of respondents and aim for a more representative sample. Additionally, for future studies, it is suggested to apply different hypothetical issues to the respondents in order to control for the influence of this factor on the results.

Ethics Statement

Ethical approval for the research was obtained from the Ethics Committee of the Faculty of Croatian Studies at the University of Zagreb. The research itself was conducted from May to July 2024 using method of survey on the Google Forms platform.

Data Availability Statement

Data is available to the interested audience.

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RESEARCH ARTICLE

Reimagining Sociality in the Digital Age: Transcending the Interaction/Society Dichotomy

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ABSTRACT

This paper argues that digital technologies have not merely transformed social life but have made visible society's fundamental nature as operating through distinct but interconnected systems of communication. The long-standing interaction/society dichotomy in sociological theory has constrained our understanding of social phenomena, as revealed by digital platforms, algorithmic systems and networked communications. Building on Luhmann's systems theory while engaging with contemporary digital sociology, we develop a theoretical synthesis that reconceptualizes how society operates through autonomous but structurally coupled systems of communication. This framework explains phenomena that resist traditional sociological analysis, from content moderation controversies to algorithmic bias, by showing how different systems process the same events according to distinct operational criteria while remaining interconnected. By moving beyond attempts to bridge micro/macro divisions or reconcile structure/agency dualities, we offer a more fundamental understanding of how society operates in both digital and non-digital contexts, positioning sociology as part of the scientific system developing productive resonances with other social systems.

1 | Introduction

On 25 May 2020, a video capturing the murder of George Floyd by a Minneapolis police officer was posted on Facebook. Within hours, the footage spread across social media platforms globally, catalysing what would become one of the largest social movements in recent history (Buchanan, Bui, and Patel 2020). The Black Lives Matter protests that followed transcended national boundaries, with demonstrations erupting in over 60 countries (Kirby 2020). This global phenomenon, ignited by a single video shared on social media, exemplifies the complex interplay between individual action, technological mediation and large-scale social change in our digital era. It raises profound questions for sociologists: How do we conceptualize this phenomenon that seamlessly bridges the local and the global, the individual and the collective? Is it merely an instance of social interaction amplified by technology? Or is it a manifestation of broader societal structures and processes? The reality, it seems, defies such neat categorization and exposes limitations of many sociological theories.

The unprecedented nature of such phenomena demands a more sophisticated theoretical vocabulary. What we observe here is how digital platforms enable new forms of connection—where a single communication (the video) simultaneously resonates across multiple domains: legal (evidence of police misconduct), media (news coverage) and political (protest mobilization). The video's viral spread demonstrates how digital communications generate recursive patterns that create new meanings and actions across interconnected spheres, transcending traditional

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social boundaries. This transformation challenges us to reconsider fundamental assumptions about how social life operates (Castells 2010; Lupton 2015).

This paper contends that one of sociology's fundamental frameworks—the distinction between social interaction and broader social structures—struggles to capture the complexities of contemporary digital phenomena (Latour 2005; Marres 2017). Digital platforms, algorithmic systems and networked communications have transformed how social processes operate, creating patterns of connection and influence that transcend traditional analytical boundaries (van Dijck, Poell, and de Waal 2018). These new social configurations demand theoretical vocabularies capable of explaining how digital platforms can simultaneously maintain their distinctive characteristics while participating in broader patterns of social change. To fully appreciate the magnitude of this transformation, we must examine how sociological thought has historically approached the relationship between immediate social interactions and larger social processes, tracing how different generations of theorists have wrestled with this fundamental challenge (Marres 2017; Couldry and Hepp 2017). This examination will reveal both the persistent appeal of separating micro and macro levels of analysis and the growing difficulty of maintaining such distinctions in our increasingly digital world (Jurgenson 2012).

2 | The Digital Revolution and Social Systems

The rapid advancement of digital technologies in recent decades has posed significant challenges to traditional sociological frameworks, particularly the long-standing interaction/society dichotomy. These developments have introduced new complexities that demand a reconsideration of our theoretical approaches to understanding social life.

One of the most profound challenges comes from the pervasive influence of algorithms in mediating social interactions. As Gillespie (2014) and Pasquale (2015) have compellingly argued, algorithmic systems now exercise considerable power in shaping social realities. From personalized news feeds to recommendation systems, these hidden technical actors play a crucial role in generating and reproducing patterns of communication that shape our digital experiences and, by extension, our social world (Esposito 2017). This algorithmic mediation introduces a new layer of complexity to social analysis, necessitating theoretical frameworks that can account for the agency of non-human actors in social processes.

Furthermore, digital phenomena have increasingly blurred traditional sociological distinctions between micro and macro, public and private, virtual and material. Boyd's (2010) concept of 'context collapse' illuminates how digital platforms conflate multiple social contexts, complicating our understanding of social roles and identity performance. Similarly, Jurgenson's (2012) critique of 'digital dualism' challenges us to reject the false dichotomy between online and offline realities, instead recognizing the increasing interpenetration of digital and physical aspects of social life. These insights underscore the need for more nuanced theoretical frameworks capable of capturing the hybrid nature of contemporary sociality.

The complexity of digital networks presents another significant challenge to existing sociological tools, revealing both methodological and theoretical limitations. Although network theories have long been part of the sociological toolkit, their fundamental assumptions about social connectivity often conflict with a systems theoretical understanding of society. Wellman and Rainie's (2012) concept of 'networked individualism', for instance, retains an individualistic premise that sits uncomfortably with the understanding of society as a system of communications rather than a network of individuals (Luhmann 1995). Their emphasis on person-based networks, while descriptively useful, risks obscuring how digital platforms operate as self-referential communication systems that process meaning according to their own internal logics (Luhmann 2012). Similarly, although the work of scholars like Barabási (2002) and Watts (2003) on complex networks provides valuable mathematical insights into network structures, their models cannot fully capture the autopoietic nature of social systems or the way digital platforms generate and maintain their own operational boundaries. The emergence of platform-specific dynamics and algorithmic governance suggests we need theoretical approaches that can move beyond network metaphors to understand how digital systems produce and reproduce themselves through recursive communications.

The rapid pace of technological change and emergence of new digital phenomena might appear to demand entirely new theoretical frameworks. However, as scholars like Nassehi (2019) and Esposito (2017) have demonstrated, existing approaches that emphasize communication over individual action, particularly those addressing self-referential system operations and intersystem relationships, provide sophisticated tools for understanding these dynamics. Such frameworks help explain how digital platforms can rapidly emerge, evolve and sometimes dissolve while maintaining their operational coherence through selective communication patterns. Moving forward, the task for sociologists is not to develop entirely new theoretical tools, but to carefully extend and apply frameworks that have already moved beyond traditional sociological dichotomies, ensuring our discipline remains capable of illuminating the intricate realities of social life in the digital age.

3 | Canon's Hardcore

The interaction/society dichotomy, deeply entrenched in sociological thought, finds its roots in the works of our discipline's founding figures. This dichotomy represents a spectrum of sociological analysis, with micro-level interactions on one end and macro-level societal structures on the other. To understand both the historical development and limitations of this perspective, let us examine two influential thinkers who represent opposite ends of this spectrum. Georg Simmel (1908/1950), with his keen eye for the minutiae of social life, sought to understand society through the lens of patterned interactions. His work on social forms—be it conflict, exchange or subordination—illuminated how the architecture of human encounters shapes our social world. Simmel's dyads and triads offered a framework for understanding how the very nature of interaction shifts as participant numbers grow. Although this approach revealed important insights about social forms, it primarily focused on human agency

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and consciousness, leaving unexplored the possibility that society might operate through communications rather than through human interactions per se. When we transpose Simmel's ideas onto the digital landscape, these limitations become more apparent. In the virtual realm, a dyadic exchange can transform into a global phenomenon at breathtaking speed (Castells 2010), suggesting that what we observe might be better understood as communications circulating through different social systems rather than merely as scaled-up interactions. The boundaries of interaction, once clearly delineated in Simmel's work, become fluid and permeable online. Moreover, the forms of interaction in digital spaces are not merely human-to-human, but are mediated and shaped by algorithms, platform architectures and networked dynamics that Simmel could scarcely have imagined (van Dijck, Poell, and de Waal 2018).

At the other end of the spectrum, we find Talcott Parsons' (1951) grand systemic view of society. Though Parsons made important strides in conceptualizing society as a system, his particular vision of system dynamics focused heavily on stability and integration. His AGIL schema provided a framework for understanding how societies adapt, achieve goals, integrate their parts and maintain their value patterns over time. However, when we attempt to apply Parsons' ideas to the digital age, we encounter significant limitations. The stability and coherence assumed in Parsonian systems theory seems at odds with the rapid, often disruptive changes wrought by digital technologies (Urry 2003). The functional integration Parsons described is challenged by the way digital platforms operate as distinct systems with their own operational logics, simultaneously acting as communication tools, marketplaces and political arenas (Gillespie 2010). What Parsons' approach missed, and what becomes especially evident in the digital age, is how social systems can maintain their distinct operations while remaining interconnected through ongoing communications.

As we reflect on these limitations, we find that they are not unique to Simmel and Parsons, but are emblematic of broader challenges in applying classical sociological thought to digital phenomena. Whether we look to Marx's class-based analysis, Weber's theory of social action or Durkheim's collective consciousness, we find theories that, while profound in their insights, were primarily focused on human-centred aspects of society rather than understanding it as a system of communications. These approaches were developed in and for a world where the pace, scale and nature of social interactions were fundamentally different (Lupton 2015). Marx's focus on material production and class struggle, for instance, requires significant rethinking in an age where immaterial labour and digital capital play increasingly central roles (Fuchs 2014). Although his analysis of capitalism revealed crucial insights about economic relations, it did not anticipate how digital systems would develop their own operational logics independent of class consciousness. The means of production in the digital age are often intangible, and class relations are complicated by new forms of digital labour and ownership that operate through distinct communicative processes (Srnicek 2017). Similarly, Durkheim's (1912/1995) concept of collective consciousness, while groundbreaking in its recognition of society as something beyond the sum of individual actions, takes on new dimensions in the context of global digital networks. Here, we find not a single, unified collective consciousness, but multiple, overlapping and sometimes conflicting systems of communication that evolve and reproduce themselves according to their own internal logics (Couldry and Hepp 2017). What becomes apparent is that these classical theories, despite their tremendous insights, were working with a model of society that privileged human agency and consciousness over the self-referential operations of social systems.

Weber's (1922/1978) contributions, particularly his theory of social action and his analysis of social relations, offer valuable insights but also face fundamental challenges in the digital context. His typology of social action provides a nuanced framework for understanding human behaviour by categorizing actions based on their subjective meaning to individuals. However, when we examine digital environments through a systems theoretical lens, we see that what Weber conceived as purely human decision-making actually emerges from complex system operations that transcend individual consciousness. For instance, what appears as instrumentally rational action in Weber's framework reveals itself as something quite different—the product of algorithmic systems operating according to their own internal logic, creating feedback loops that shape user behaviour in ways that bypass conscious deliberation (Yeung 2017). These algorithmic systems do not simply influence human decision-making from the outside; rather, they form their own self-referential systems of communication that operate independently of, yet intersect with, human consciousness. What behavioural psychology identifies as cognitive biases being exploited by algorithmic nudges can be better understood as the coupling between psychological systems and digital communication systems, each operating according to their own distinct logics. This systematic coupling produces what appears on the surface as rational decision-making but is actually an emergent property of multiple intersecting systems: digital, psychological and social. This observation not only challenges Weber's distinct categories of social action but fundamentally reframes how we understand the relationship between individual agency and social systems in digital contexts.

Moving beyond the canon's hardcore, consider the contributions of George Herbert Mead (1934) and the American pragmatists. Mead's concept of the 'generalized other' and his emphasis on symbolic interaction provided valuable insights into the social nature of the self and the role of communication in shaping social reality. Although Mead recognized communication's centrality to social life, his framework still privileged human consciousness and interaction as the primary drivers of social reality. In the digital age, we see that the 'generalized other' emerges not primarily from human interactions, but from the self-referential operations of digital systems. What appears as a 'generalized other' is actually the product of multiple intersecting communication systems—recommendation algorithms, content moderation systems and platform architectures—each operating according to its own internal logic (Gillespie 2018). Similarly, Gabriel Tarde's emphasis on imitation as a fundamental social process offers intriguing possibilities for understanding viral phenomena in digital contexts, though from a systems theoretical perspective, what appears as imitation might better be understood as the self-reproduction of communications within and across different social systems. Bruno Latour (2009), in his efforts to rethink social theory for the contemporary

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world, has played a crucial role in reviving and reconceptualizing Tarde's work. Although Latour correctly identifies Tarde's proto-network thinking as prescient for the digital age, a systems theoretical perspective would suggest that what Tarde observed as micro-social imitation processes can be more comprehensively understood as the autopoietic operations of communication systems, where each communication generates the conditions for subsequent communications according to system-specific logics.

This historical review illuminates a crucial point: Although classical and even more recent sociological theories provide valuable starting points, they fundamentally conceive of society through the lens of human action, consciousness or networks rather than as systems of communication. What becomes clear through examining digital sociality is not just that these theories need updating but that they may have missed the essential nature of society all along (Marres 2017). The digital age makes visible what was always true but perhaps less apparent: that society operates primarily through systems of communication rather than through human interactions or structural determinations. Although classical theories provide invaluable conceptual tools, they also reveal their own limitations in grasping how social systems actually operate through self-referential communications (Floridi 2014). This recognition necessitates not just an application of these theories to new contexts, but a fundamental reorientation towards understanding society as composed of distinct but interconnected communication systems (Lupton 2015). What appears as the rapid scaling of micro-interactions to macro-phenomena in digital contexts is better understood as the autopoietic operation of communication systems, each reproducing itself according to its own internal logic while remaining structurally coupled to other systems (Castells 2010; Latour 2005). What network theory describes as network effects—where the value and impact of interactions depend on network size and structure—can be more comprehensively understood as the self-reinforcing operations of communication systems, where each communication creates the conditions for subsequent communications (Barabási 2002). What appears as hybridity in digital phenomena, seemingly combining interpersonal and large-scale processes, actually reveals the fundamental nature of social systems: They operate through communications that simultaneously maintain system boundaries while enabling structural couplings across systems (Jurgenson 2012).

As we grapple with these historical limitations, we are compelled to recognize a fundamental insight: Although our sociological forebears provided us with powerful tools for understanding the social world of their time, their human-centred conception of society may have obscured its fundamental nature as a system of communications (Orton-Johnson and Prior 2013). The interaction/society dichotomy, emerging from an analogue age's focus on human agency and structure, increasingly appears not just inadequate for understanding digital sociality, but as having always missed the essential character of social systems. This recognition, however, does not diminish the value of classical sociological insights. Rather, it invites us to reinterpret these enduring ideas through the lens of systems theory, seeing how what appeared as interactions or structures might better be understood as different manifestations of system operations (Savage and Burrows 2007). Our task, then, is not to discard our rich theoretical heritage, but to recognize how its insights can be reframed within a more fundamental understanding of society as composed of distinct but interconnected communication systems. This approach allows us to better grasp what appears as fluid, hybrid and technologically mediated social life, but is actually the normal operation of social systems in their digital manifestation (Boellstorff 2016). As we trace how the interaction/society dichotomy shaped sociological thought throughout the 20th century, we find increasingly sophisticated attempts to overcome its limitations. Yet, as we shall see, even these more recent theoretical developments, by retaining aspects of this fundamental dichotomy, struggle to fully grasp how society operates through the autopoietic reproduction of communications across different system types (Lupton 2015; Marres 2017).

4 | 1950s–1960s: The Emergence of Micro-Sociology

The 1950s and 1960s witnessed a significant shift in sociological thought towards micro-level analysis, partly as a reaction to the grand theories of figures like Parsons. This 'micro turn' sought to understand social order and meaning-making processes through the lens of everyday interactions, challenging the dominance of macro-structural approaches (Fine 1993). Although this shift provided valuable insights, it ultimately reinforced rather than resolved the interaction/society dichotomy by privileging face-to-face encounters over systemic communications. Erving Goffman's dramaturgical approach, articulated in 'The Presentation of Self in Everyday Life' (Goffman 1959), exemplifies both the strengths and limitations of this micro-sociological perspective. Goffman's theatre metaphor offered a compelling framework for understanding face-to-face interactions, conceptualizing social life as a series of performances. His concepts of front stage and back stage performances, impression management and face-work provided nuanced tools for analysing the intricacies of social encounters. However, by focusing primarily on conscious human performance and interaction, his framework did not recognize that what appears as human performance is actually generated by an underlying reality of self-referential communication systems that operate independently of human consciousness or intention. These systems produce and reproduce communications according to their own internal logic, creating what we observe as social situations, roles and performances.

In the context of digital sociality, this limitation becomes particularly apparent. What appears as online identity management, where individuals curate their digital personas across platforms (Hogan 2010), can be better understood as the operation of multiple communication systems, each with its own logic of selection and reproduction. The supposed blurring of front and back stages in digital contexts (Marwick and Boyd 2011) reveals not just a complication of Goffman's framework, but the fundamental nature of social systems operating through communications rather than through human performance. When a private message is screenshot and shared publicly, or when public posts are restricted to select audiences, we are witnessing not just complex performance management but the autonomous operations of different communication systems as they process and reproduce information according to their own internal logics. The *asynchronous nature of digital interactions*, which seems to challenge

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Goffman's focus on co-present encounters, actually *reveals how* communication systems operate *independently of human presence or intention*. In digital spaces, what appears as carefully crafted and curated self-presentation over time (Ellison, Heino, and Gibbs 2006) is better understood as the autopoietic operation of communication systems, where each communication creates conditions for subsequent communications. The persistence and replicability of digital content (Boyd 2010) is not merely a challenge to impression management but demonstrates how communication systems maintain their operations through continuous reproduction and recirculation of communications.

Harold Garfinkel's ethnomethodology, developed in the 1960s, offered another crucial perspective in micro-sociology that, like Goffman's work, revealed both important insights and fundamental limitations in understanding social reality. Garfinkel (1967) emphasized the methods people use to make sense of their everyday world, focusing on how social order appears to be produced through mundane interactions. His concept of 'background expectancies'—the taken-for-granted knowledge that people use to interpret and respond to social situations—represented his understanding of how social reality is constructed and maintained. However, what Garfinkel interpreted as human methods for creating social order can be more fundamentally understood as the visible traces of underlying communication systems that operate independently of human sense-making activities. When we examine the digital realm, this becomes particularly apparent. What appears as unclear or rapidly changing 'background expectancies' across digital platforms (Knorr Cetina 2009) is actually the observable manifestation of distinct communication systems operating according to their own internal logics. The seemingly varying norms and expectations across different digital platforms are not primarily products of human sense-making but emerge from the self-referential operations of different platform systems, each processing and reproducing communications according to its own distinct criteria. What Garfinkel's human-centred approach saw as people's methods for constructing social reality is revealed in digital contexts as the autonomous operations of communication systems that generate what humans then attempt to make sense of. The presence of algorithms, bots and AI (Latour 2005) does not simply complicate human sense-making—it makes visible how social reality has always been produced by systems of communication rather than by human interpretive practices. These technological actors do not just shape interactions in ways hidden from human participants (Gillespie 2014); they demonstrate how communication systems have always operated independently of human consciousness, generating the social phenomena that ethnomethodology interpreted as products of human sense-making methods.

The micro-sociological approaches of Goffman and Garfinkel, while developed for face-to-face interactions, reveal both the power and limitations of analysing social life through the lens of human experience. Their detailed observations provide valuable descriptions of how humans encounter and interpret social reality but ultimately mistake the surface phenomena for the underlying reality. What appears as uniquely 'digital' characteristics—mediated interaction, blurred boundaries, non-human actors and complex temporalities (Marres 2017)—actually reveals something more fundamental: that social reality has always been constituted by self-referential systems of communication rather than by human interaction. Digital sociality thus does not merely present new challenges; it makes visible the systemic nature of social reality that was always present but less apparent in face-to-face contexts.

5 | 1970s: The Rise of Critical and Feminist Perspectives

The 1970s marked a significant shift in sociological thought as theorists recognized the limitations of both macro-structural and micro-interactionist approaches. Although this period saw the emergence of critical perspectives challenging power structures and dominant paradigms (Calhoun 1995), these new approaches still conceived of power and inequality primarily in human-centric terms. What they did not fully grasp was how these phenomena emerge from the autonomous operations of different social systems—economic, political and educational—each reproducing their own forms of communication according to their internal logics.

5.1 | Jürgen Habermas

Habermas' work on communicative action and the public sphere represents a significant theoretical advancement by recognizing communication as central to social life. Although his theory moves beyond purely structural or interactionist approaches, Habermas' (1962/1989) vision still conceived of communication primarily in terms of human rational dialogue and consensus-building. His concept of the public sphere—as an arena for free discussion and problem identification—reveals both insight and limitation: While correctly identifying communication's importance, it remains anchored in human-centric assumptions about rational discourse. In digital contexts, what appears as fragmentation into filter bubbles and echo chambers (Sunstein 2017) actually reveals how communication systems operate according to their own internal logics, independent of human rational discourse. Social media platforms demonstrate not just the failure of Habermas's normative ideal, but how different systems—technological, economic and political—process and reproduce communications according to their distinct operational criteria (Pariser 2011; Gillespie 2014). What Habermas saw as the colonization of the lifeworld by systemic imperatives can be more fundamentally understood as the normal operation of intersecting communication systems, each maintaining its own boundaries while remaining structurally coupled to others (Couldry and Mejias 2019).

5.2 | Feminist Scholars

Parallel to these developments, feminist scholars mounted a powerful critique of sociology's male-centric nature, revealing important insights while still operating within a human-centred framework. Dorothy Smith (1987) and other feminist theorists challenged mainstream sociology's claims to objectivity, arguing that all knowledge is situated in specific experiences, particularly those of marginalized groups. Although this critique importantly highlighted sociology's limitations,

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from a systems theoretical perspective, what appears as situated knowledge can be understood as the product of different social systems processing communications according to their distinct logics. When Smith proposed starting from women's everyday experiences, she identified important phenomena but interpreted them primarily through human consciousness rather than seeing them as manifestations of intersecting communication systems. Patricia Hill Collins' (1990) concept of intersectionality marked another crucial development, identifying how multiple systems of oppression shape experience. While typically understood in terms of human identity categories, intersectionality can be reframed through systems theory as describing how different social systems—economic, political, educational and gender—couple and interact, each processing communications according to its own logic while remaining structurally connected to others. This reframing helps explain why digital contexts reveal such complex patterns of inequality and exclusion.

When we examine digital sociality through this lens, several key insights emerge. What appears as differential access and use patterns (Wajcman 2004) reveals how technical systems couple with other social systems to reproduce communications that maintain system boundaries. Digital embodiment and identity performance (van Doorn 2011) demonstrate not just human agency but how communication systems generate and maintain distinctions that humans then interpret through available cultural schemas. Platform power dynamics (Massanari 2017) show how different systems—technical, economic and political—process and reproduce communications according to their own criteria while remaining structurally coupled. The limitations feminist theories face in digital contexts—struggling with identity fluidity, non-human actors and global networks—point towards the need for understanding how social systems operate independently of human consciousness or intention. What appears as identity fluidity or the challenge of non-human actors actually reveals how communication systems have always operated autonomously, generating phenomena that humans interpret through available cultural frameworks. The rapid pace of technological change (Lupton 2015) and the complex interplay between online and offline experiences (Marwick 2013) demonstrate not just theoretical limitations but how different social systems maintain their boundaries while remaining interconnected through ongoing communications.

This systems theoretical reframing does not negate feminist insights but repositions them within a more fundamental understanding of how society operates through distinct but coupled systems of communication. It helps explain both the emancipatory and oppressive potentials of digital platforms (Papacharissi 2010) as emerging from the autonomous operations of different social systems rather than from human intention or structural determination alone.

6 | 1980s: Structuration and Practice Theories

The 1980s saw the development of theoretical approaches that sought to overcome the long-standing divide between agency and structure in sociological thought.

6.1 | Anthony Giddens

Giddens' structuration theory, while influential in sociological thought of the 1980s, exemplifies the limitations of attempting to reconcile the interaction/society dichotomy while maintaining a fundamentally humanist perspective. His concept of the 'duality of structure' posits social structures as both medium and outcome of social practices, with knowledgeable actors reflexively reproducing and transforming these structures through their actions. This approach, however, reveals its inadequacy when confronted with digital sociality's systemic nature. Although Giddens' concept of time–space distanciation appears relevant to our digitally connected world, it remains anchored in an understanding of social systems as products of human agency rather than self-referential communications. The application of structuration theory to digital contexts particularly highlights these theoretical limitations. Consider how algorithmic systems operate in contemporary digital platforms. Unlike Giddens' model of knowledgeable actors intentionally reproducing social structures, algorithmic systems process communications according to their own operational logics, independent of user understanding or intention. As Esposito (2017) demonstrates, digital platforms function as autopoietic systems that reproduce themselves through recursive communications, with user actions serving as environmental stimuli rather than direct structural inputs. The relationship between users and platforms is not one of structuration but of structural coupling between distinct systems operating according to different logics.

This becomes especially clear when examining social media platforms. Although Giddens might suggest that users actively shape these digital environments through their practices, the reality is more complex. Platforms operate as self-referential systems, processing user behaviours as communications according to their own internal codes and programs (Nassehi 2019). The algorithmic mediation of these processes, as van Dijck, Poell, and de Waal (2018) note, follows corporate logics and technical protocols that users neither shape nor fully comprehend. Moreover, the opacity of algorithmic operations and the speed of technological change reveal the limitations of conceptualizing digital structures as products of knowledgeable human agency. Instead, as Luhmann's theory anticipates, we see the emergence of autonomous.

6.2 | Pierre Bourdieu

Bourdieu's theory of practice, while representing an ambitious attempt to overcome the agency–structure divide in late 20th-century sociology, ultimately remains within a human-centred framework despite its sophisticated conceptual apparatus. His theoretical triad of habitus, field and capital offers valuable empirical insights into social phenomena but can be fundamentally reinterpreted through systems theory to reveal more basic operational principles. The concept of habitus—which Bourdieu presents as durable, transposable dispositions shaping perception and action—can be understood more fundamentally as the way psychological systems process and respond to communications from various social systems. What appears as individual disposition is actually the product of structural coupling between consciousness and communication systems (Bourdieu 1977, 1990).

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Similarly, what Bourdieu conceptualizes as fields—structured spaces with their own rules and forms of capital—can be reframed as distinct social systems operating according to their own communication codes. The apparent competition for position within fields reveals how different systems process and reproduce communications according to their specific criteria. His multi-dimensional concept of capital (economic, cultural, social and symbolic) inadvertently points towards how different social systems develop their own media of communication, though he interprets these primarily as resources for human action rather than as system operations (Bourdieu 1986).

When we examine digital contexts through this lens, what appears as 'digital habitus' (Papacharissi and Easton 2013) actually reveals how psychological systems adapt to processing communications from new digital systems. The notion of 'digital fields' (Ignatow and Robinson 2017) can be reframed as describing how digital platforms operate as distinct communication systems, each with its own reproductive logic. What seems like 'digital capital'—from meme literacy to follower counts—demonstrates how these systems generate their own success media for processing communications (Ragnedda 2018).

The limitations Bourdieu's framework encounters in digital contexts actually point towards the more fundamental reality of system operations. The rapid evolution of digital platforms does not simply challenge the stability of fields; it reveals how communication systems continuously reproduce themselves through ongoing operations. The apparent fragmentation of habitus in digital spaces (Couldry 2012) and the role of algorithmic mediation (Beer 2017) demonstrate not the limitations of Bourdieu's theory but the reality that social phenomena emerge from autonomous system operations rather than from human dispositions or field positions.

7 | 1990s: Globalization and Network Theories

The 1990s marked a pivotal moment in sociological theory, characterized by attempts to grapple with the accelerating processes of globalization and the rising prominence of digital technologies. This period saw the emergence of theoretical frameworks that sought to capture the increasingly networked nature of social life, the changing dynamics of time and space and the growing importance of information flows in shaping social structures and processes (Castells 1996; Urry 2000).

7.1 | Manuel Castells

Manuel Castells' trilogy 'The Information Age' (1996–1998) represents one of the most ambitious attempts to theorize digital transformations of society, though his network-centred approach ultimately maintains a focus on connectivity rather than system operations. Although Castells identifies important phenomena through his concept of the 'network society', from a systems theoretical perspective, what he describes as networks can be more fundamentally understood as the visible manifestations of interconnected communication systems, each operating according to its own internal logic. His observation of a shift from hierarchical structures to networks inadvertently points towards how different social systems maintain their autonomy while remaining structurally coupled through communications.

Castells' key concepts, while insightful, can be reframed to reveal more fundamental systemic operations. His 'space of flows' - describing how social organization transcends physical place through flows of capital, information and symbolic interaction - can be understood as revealing how communication systems operate independently of spatial constraints while remaining interconnected through structural coupling. Similarly, his concept of 'timeless time' does not simply describe temporal compression but shows how different social systems create their own temporal horizons through their recursive operations. What Castells terms 'real virtuality'—the immersion of reality in virtual settings—actually demonstrates how communication systems generate their own realities through their self-referential operations, independent of traditional distinctions between virtual and physical.

His concept of 'informationalism' comes closest to recognizing the fundamental nature of social systems yet remains focused on technology and human agency rather than understanding how society operates through communications. Although Castells sees information processing as a new mode of development, systems theory reveals it as the basic operation of all social systems, now made more visible by digital technologies. The criticisms of Castells' work—its potential technological determinism (Van Dijk 1999), overlooked gender dimensions (Sassen 2002) and insufficient attention to local variations (Couldry 2012)—point towards the limitations of network-based analysis. What appears as technological determination or local resistance actually reveals how different social systems (technical, economic, political and cultural) maintain their distinct operations while remaining structurally coupled. The persistence of hierarchies alongside networks, noted by Thompson (2003), demonstrates not the limits of network logic but how different systems develop their own forms of internal organization while maintaining external connections.

7.2 | Bruno Latour

Bruno Latour's actor–network theory (ANT) represents a significant step towards recognizing the limitations of human-centred sociology, though it ultimately remains focused on tracing connections rather than understanding system operations. Although ANT's insistence on treating human and non-human entities symmetrically marks an important break from conventional approaches, from a systems theoretical perspective, this symmetry principle can be more fundamentally understood as recognizing how different types of systems—social, technical and psychological—operate according to their own logics while remaining structurally coupled. What ANT describes as networks of actors can be reframed as the visible manifestations of multiple intersecting systems of communication.

ANT's rejection of the micro/macro distinction, while valuable, approaches this issue through the lens of network connections rather than system operations. Where ANT sees networks of actors collectively producing social phenomena, systems theory reveals how different communication systems maintain

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their autonomy while generating what appears as social reality through their recursive operations. The scaling of digital phenomena from local to global is not simply a matter of network effects but demonstrates how communication systems reproduce themselves independently of spatial constraints.

Latour's concepts of translation and enrolment inadvertently point towards what systems theory identifies as structural coupling—how different systems interact while maintaining their operational closure. What appears as users being 'drawn into' digital platforms actually reveals how psychological and social systems develop mutual irritations and resonances while remaining operationally distinct. Similarly, his critique of the nature/culture divide, while important, can be more fundamentally understood through systems theory's recognition that different types of systems (biological, psychological and social) operate according to their own distinct logics while remaining environmentally interdependent.

The challenges ANT faces with digital phenomena—difficulties tracing vast networks or penetrating algorithmic 'black boxes'—actually reveal the limitations of network-based analysis. What appears as methodological difficulty points towards the fundamental nature of social systems as self-referential operations that generate their own complexity independently of human observation or understanding. The opacity of digital systems is not simply a practical challenge but demonstrates how communication systems operate autonomously from human consciousness or intention.

7.3 | Other Significant Contributions

Although Castells and Latour were particularly influential, other 1990s theorists also offered important insights that can be reframed through systems theory. Appadurai's (1996) concept of 'scapes' reveals how different social systems maintain distinct operational logics while remaining coupled across global contexts. Sassen's (1991, 2001) analysis of global cities demonstrates how urban systems develop new forms of structural coupling with global economic and technological systems. Lash and Urry's (1994) work on 'economies of signs and space' shows how economic systems increasingly process communications through symbolic media, whereas Beck's (1992) 'risk society' theory reveals how different social systems reproduce communications about risk according to their own internal logics. These contributions, while valuable, ultimately point towards the more fundamental understanding that society operates through distinct but interconnected communication systems.

8 | Reflections on Contemporary Theory and Digital Sociality

The late 20th and early 21st centuries' attempts to theorize digital social life, while increasingly sophisticated, reveal both progress and persistent limitations in understanding society's fundamental nature. What appears as theoretical innovation often maintains human-centric assumptions that systems theory helps us move beyond. Each emerging theoretical perspective inadvertently points towards the more fundamental reality of society as operating through distinct but coupled systems of communication.

Digital materialism (Lupton 2015; Pink, Ardèvol, and Lanzeni 2016; Pink et al. 2016), in emphasizing technology's material dimension, reveals how different types of systems—technical, social and physical—maintain their operational autonomy while remaining structurally coupled. Platform studies (van Dijck and Poell 2013) approach understanding how digital platforms operate as distinct communication systems, though it often maintains a focus on human agency rather than recognizing platforms' autonomous system operations. Critical algorithm studies (Noble 2018; Eubanks 2018) reveal how algorithmic systems process communications according to their own internal logics, though it typically interprets this through the lens of human power relations rather than system operations.

Digital labour theories (Terranova 2000; Fuchs 2014) show how economic systems adapt their operations to new forms of value creation, though they often maintain traditional Marxist assumptions about human labour rather than recognizing how different systems process value according to their own criteria. Theories of digital subjectivity (Turkle 2011; Nakamura 2008) demonstrate how psychological systems couple with digital communication systems, though they typically maintain focus on human identity rather than understanding how different systems generate what appears as subjectivity through their operations.

These theoretical developments, while valuable, ultimately point towards the need for understanding how society fundamentally operates through distinct but interconnected communication systems. The apparent challenges these approaches face—keeping pace with technological change, accounting for algorithmic opacity, bridging online/offline divisions—actually reveal the limitations of human-centred analysis. Moving forward requires recognizing that what appears as uniquely 'digital' phenomena actually makes visible the systemic nature of social reality that was always present but less apparent in pre-digital contexts.

This understanding does not negate the value of contemporary theoretical insights but repositions them within a more fundamental grasp of how society operates through autonomous but coupled systems of communication. The goal is not merely to develop theory relevant to the digital age, but to recognize how digital contexts reveal society's essential nature as a complex of distinct but interconnected communication systems.

9 | Flat Ontology and Object-Oriented Ontology

The emergence of flat ontology, object-oriented ontology (OOO) and new materialisms marks a crucial theoretical convergence with systems theoretical insights, though each arrives at similar conclusions through different paths. Where systems theory begins with communication as the fundamental element of social reality, these newer approaches start by questioning ontological hierarchies. Together, they provide complementary perspectives that enrich our understanding of digital sociality.

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Consider how systems theory's emphasis on operational closure and autopoiesis aligns with flat ontology's rejection of hierarchical levels of reality. When DeLanda argues that no level of reality is more 'real' than others, he approaches from an ontological angle what Luhmann demonstrated through his analysis of how different systems maintain their autonomous operations. Both perspectives help us understand, for instance, how social media platforms function neither as mere tools nor as deterministic forces, but as distinct systems operating according to their own internal logics while remaining coupled with other systems.

The material turn similarly complements systems theoretical insights by grounding abstract communications in concrete infrastructures and embodied practices. When scholars like Barad and Bennett emphasize matter's active role in social life, they provide a material correlate to Luhmann's emphasis on how systems process information according to their specific operational codes. Take the example of algorithmic content moderation: Systems theory shows how these operations maintain their autonomy through self-referential communications, whereas new materialism reveals how this autonomy is enacted through specific material arrangements of servers, databases and processing units.

OOO's insistence on objects' withdrawal from complete knowability aligns with systems theory's understanding of operational closure. Just as OOO argues that objects always exceed our ability to fully grasp them, systems theory shows how each system operates according to its own internal logic, inaccessible to other systems except through structural coupling. This theoretical convergence helps explain, for instance, why algorithmic systems often produce unexpected outcomes despite human attempts to control them—both approaches recognize the fundamental autonomy of different types of entities or systems.

These theoretical approaches also help address apparent limitations in each other's frameworks. Where systems theory might seem overly abstract in its focus on communications, new materialism grounds these processes in concrete assemblages of human and non-human elements. Conversely, where flat ontology might seem to risk losing sight of systematic operations in its emphasis on horizontal relations, systems theory provides a framework for understanding how different entities maintain their distinct operational logics while remaining interconnected.

The convergence becomes particularly apparent when examining digital phenomena. Consider a social media influencer's livestream: Systems theory reveals how this event operates simultaneously within multiple communication systems (economic, entertainment and technical), each processing the event according to its own code. Flat ontology shows how various elements (human performer, platform infrastructure, audience devices and algorithmic recommendations) contribute equally to the reality of the event. New materialism demonstrates how these elements come together in specific material-semiotic arrangements. Together, these perspectives provide a richer understanding than any single approach alone could offer.

Moreover, these approaches help resolve common critiques of each other. Where critics worry that flat ontology might obscure power differentials, systems theory shows how different systems can maintain their autonomy while generating what appears as power concentration through their structural coupling. Where systems theory might seem to minimize human agency, new materialism shows how human intentions and actions emerge through specific material-semiotic arrangements while remaining within systems' operational closure.

This theoretical convergence suggests new directions for empirical research. Rather than choosing between focusing on communications, relations or materiality, researchers can examine how these different aspects come together in specific digital phenomena. For instance, studying platform governance would involve analysing both the autonomous operations of different social systems and the specific material arrangements through which these operations are enacted.

Moving forward, the challenge is not to choose between these theoretical approaches but to leverage their complementary insights. Systems theory provides the fundamental framework for understanding how society operates through distinct but coupled systems of communication. Flat ontology and OOO remind us that these systems exist alongside other types of entities in non-hierarchical arrangements. New materialism shows how these operations are always grounded in specific material configurations. Together, they offer a powerful toolkit for understanding digital sociality in all its complexity.

This theoretical synthesis helps resolve the apparent tension between material and virtual aspects of digital life, between human and algorithmic agency or between micro and macro levels of analysis. It suggests that these dichotomies themselves arise from failing to recognize how different systems and entities maintain their autonomy while remaining fundamentally interconnected through both communicative and material relations.

10 | The Digital Sociological Imagination: A Systems Theoretical Reconceptualization

The profound transformation of society through digital technologies demands not just new theoretical tools but a fundamental reconceptualization of how we understand social reality. Whereas C. Wright Mills' (1959) sociological imagination helped us grasp the connection between personal troubles and social issues, today we need what we might call a 'Digital Sociological Imagination'—one that recognizes society as operating through distinct but interconnected systems of communication.

This systems theoretical reconceptualization fundamentally transforms our understanding of core sociological concepts. Consider community, traditionally understood through human interaction and geographical proximity. What appears as 'networked individualism' (Wellman and Rainie 2012) can be more fundamentally understood as the operation of multiple communication systems, each processing information according to its own logic while remaining structurally coupled. Hashtag communities, for instance, do not simply represent temporary human gatherings but demonstrate how communication systems can rapidly generate and dissolve specific forms of communication processing. The layered nature of digital communities reveals how different social systems can simultaneously process

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the same communications according to their distinct operational codes.

Our understanding of identity similarly requires radical rethinking. Although Goffman's dramaturgical approach provides valuable insights, from a systems theoretical perspective, what appears as multiple digital identities actually reveals how different communication systems generate distinct ways of processing personal communications. When we observe individuals adapting their self-presentation across platforms, we are witnessing not just strategic performance but how different digital systems process identity-related communications according to their specific operational logics. The apparent co-construction of digital selves through human interaction, algorithmic processing and AI manipulation demonstrates how psychological and various social systems remain operationally closed while developing complex forms of structural coupling.

Power in digital contexts similarly reveals its systemic nature. Rather than seeing algorithmic power or platform control as new forms of traditional power structures, we can understand them as revealing how different systems—technical, economic and political—process communications according to their distinct criteria while remaining interconnected. The viral spread of content demonstrates not just networked communication but how different systems can simultaneously process and amplify communications according to their own operational logics.

This systems theoretical understanding demands new methodological approaches. Digital ethnography, while valuable, must be reconceptualized to capture not just human experiences but the operations of different communication systems. Instead of simply transferring traditional methods to digital spaces, we need approaches that can trace how different systems process communications while maintaining their operational closure. The challenge of presence and absence in virtual environments reveals not methodological limitations but the fundamental nature of social systems as operating through communications rather than human presence.

The rise of big data and computational methods similarly requires systems theoretical reframing. Rather than seeing these as tools for capturing human behaviour, we can understand them as ways of observing how different systems process communications at scale. The integration of computational and interpretive methods becomes a matter of understanding how different analytical systems can remain operationally distinct while developing productive forms of structural coupling.

What appears as a collapse of micro/macro distinctions—a tweet spawning a global movement, an algorithmic tweak reshaping millions of behaviours—actually reveals how communication systems operate independently of traditional scalar distinctions. The needed 'scalar flexibility' is not just a methodological approach but recognition of how systems process communications according to their own internal logics while remaining coupled across apparent scales.

The phenomenon of 'glocalization' (Robertson 1995) similarly reveals how different social systems maintain their operational autonomy while developing complex forms of structural coupling across geographical and cultural contexts. Global platforms do not simply impose uniformity but demonstrate how different systems can process the same communications according to distinct local and global logics.

This Digital Sociological Imagination, grounded in systems theory, represents not just new analytical tools but recognition of society's fundamental nature as operating through distinct but interconnected communication systems. It calls for a sociology that can trace these system operations while recognizing their autonomy and interconnection. As we develop this understanding, we position our discipline to grasp not just digital phenomena but the essential nature of social reality that digital contexts make increasingly visible.

11 | The Digital Sociological Horizon: System Operations and Sociological Practice

The transformation of sociological practice through systems theoretical understanding demands more than methodological innovation or ethical guidelines—it requires fundamentally reconceptualizing the relationship between sociological observation and its object of study. This reconceptualization has profound implications for how we conduct research, develop theory, and engage with social issues in digital contexts. Building on our historical analysis of theoretical developments, we can now articulate a more sophisticated vision of sociological practice that recognizes both the autonomy of different social systems and the unique position of sociology within the scientific system.

11.1 | Understanding Digital Methods Through System Operations

The methodological challenges we face in digital research reveal themselves differently when viewed through systems theory. Consider digital trace ethnography: Marres and Gerlitz (2016) have shown how digital methods require us to fundamentally reconceptualize the relationship between research tools and social phenomena. Their work on 'interface methods' demonstrates that when we track digital traces across platforms, we are not simply following individual activities but observing how distinct communication systems process and transform information according to their own operational logics. Rogers' (2013) concept of 'platform vernaculars' further illuminates how different digital systems develop their own distinct ways of processing and reproducing communications. When researchers track user behaviours across multiple platforms, they are witnessing what Venturini, Munk, and Jacomy (2019) describe as the autonomous operations of different social systems, each maintaining its distinct boundaries while remaining structurally coupled with others.

The development of computational methods similarly takes on new meaning through this lens. Halford and Savage (2017) argue that big data and computational approaches represent more than just new tools—they fundamentally transform how we understand social phenomena. What appears as simply combining qualitative and quantitative approaches actually represents, as Beer (2019) demonstrates in his analysis of 'the data

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gaze', an attempt to develop novel forms of structural coupling between scientific observation and digital communication systems. Mackenzie's (2017) work on machine learning and social research shows how when we employ algorithmic analysis of social media discourse, we are creating specialized couplings between scientific, technical and social systems, each operating according to its own logic while remaining interconnected. This understanding helps explain why, as Crawford and Calo (2016) argue, purely technical solutions to research challenges often fall short: They fail to recognize how different systems process information according to their distinct operational criteria.

Virtual and augmented reality research presents particularly complex challenges that illuminate this systemic nature. Boellstorff's (2016) work on digital ontologies shows that rather than simply studying new technological environments, we are observing how multiple systems— technical, psychological and social—develop novel forms of structural coupling. Pink et al.'s (2016) research on digital materialities demonstrates that the challenge is not merely methodological but ontological: How do we observe systems that operate through their own self-referential logic while maintaining our position within the scientific system? This question becomes especially pertinent as we study what Hjorth and Pink (2014) identify as emerging digital phenomena that blur traditional boundaries between human and machine communication. Murray's (2020) recent work on virtual reality ethnography further illuminates how these new digital environments require us to develop theoretical frameworks capable of understanding both system autonomy and interconnection.

11.2 | Ethical Considerations Through Systems Theory

The ethical dimensions of digital research transform when viewed through systems theory, as demonstrated by recent scholarship in digital ethics. Zimmer's (2015) analysis of the Twitter archive at the Library of Congress reveals how institutional systems process and protect social media data according to distinct operational codes, whereas Kennedy (2016) shows how different social systems develop their own criteria for legitimate data use. D'Ignazio and Klein's (2020) work on data feminism further illustrates how privacy concerns in digital research emerge from interactions between scientific, legal, technical and personal systems, each operating according to its own logic. As Markham (2018) argues, this understanding helps explain why traditional ethical guidelines focused solely on human subject protection prove inadequate for digital research.

The question of algorithmic auditing particularly illuminates this systemic nature, as demonstrated by contemporary critical algorithm studies. Noble's (2018) analysis of search algorithms shows how technical systems process social distinctions, whereas Eubanks' (2018) examination of automated decision systems reveals how these operations couple with existing social inequalities. Benjamin's (2019) concept of the 'New Jim Code' demonstrates how algorithmic bias emerges from complex interactions between technical, social and institutional systems, each operating according to its own logic. Crawford's (2021) work on AI systems further shows how our ethical responsibility extends beyond identifying bias to understanding how different systems reproduce and transform social distinctions. As Costanza-Chock (2020) argues in 'Design Justice', addressing these issues requires understanding how multiple systems—technical, social, economic and political—interact to produce and maintain patterns of discrimination.

11.3 | Sociology's Position in Digital Society

Our role as sociologists fundamentally transforms through this understanding. Rather than positioning ourselves as external observers or agents of change, we must recognize our participation in the scientific system as it couples with other social systems. When we advocate for algorithmic transparency or digital equity, we are not simply making normative claims but participating in complex interactions between scientific, political and technical systems. This systems theoretical perspective does not absolve us of ethical responsibility but helps us understand how our research practices participate in broader system operations.

This recognition suggests that effective intervention requires understanding how different systems process and respond to communications rather than assuming direct causal relationships between research and social change. The methodological innovations we develop must therefore do more than capture new forms of data; they must help us understand how different systems maintain their autonomous operations while remaining interconnected. This might mean developing research approaches that can trace system operations across multiple platforms and contexts while remaining sensitive to each system's distinct operational logic.

11.4 | Theoretical Development in Digital Contexts

The development of sociological theory in digital contexts demands more than merely adapting existing frameworks to new phenomena—it requires a fundamental reconceptualization of how we understand social reality itself. This reconceptualization, emerging from our historical analysis of theoretical developments, suggests that what appears as 'digital transformation' actually reveals society's essential nature as operating through distinct but interconnected systems of communication. As Marres (2017) argues in 'Digital Sociology', this insight transforms not just how we study digital phenomena, but how we approach theoretical development itself.

Contemporary scholars have begun to recognize this need for theoretical reconceptualization, though often without fully embracing its systemic implications. van Dijck, Poell, and de Waal (2018) analysis of platform society shows how digital platforms operate simultaneously as technical infrastructures, economic entities, and social spaces. Through systems theory, we can understand this multiplicity not as theoretical contradiction but as revealing how different social systems process the same phenomena according to their distinct operational logics. When Plantin et al. (2018) describe platforms as 'infrastructural platforms', they are identifying how technical systems maintain their operational autonomy while developing complex forms of structural coupling with other social systems. Gillespie's (2018)

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work on content moderation illuminates this systemic nature particularly well. What appears as platform governance actually reveals how different systems—technical, legal, economic and political—process the same events according to their distinct operational criteria. Roberts' (2019) ethnographic study of commercial content moderators shows how these workers navigate between different systemic logics, whereas Seaver's (2019) analysis of algorithmic systems demonstrates how technical operations maintain their autonomy while remaining coupled to other social systems. This understanding helps explain seemingly contradictory phenomena in digital contexts. Consider how platform content moderation simultaneously operates according to technical possibilities (what can be automated), economic imperatives (what serves business interests), legal requirements (what must be removed), and social expectations (what users consider appropriate). Each system processes these decisions according to its own logic while remaining structurally coupled to others. As Bucher (2018) shows in 'If ... Then', algorithmic systems develop their own operational criteria while maintaining complex relationships with other social systems.

Couldry and Hepp's (2017) concept of 'deep mediatization' can be reframed through systems theory as describing how different social systems develop increasingly complex forms of structural coupling through digital technologies. Similarly, Lupton's (2019) digital sociology framework suggests how our discipline must develop theoretical approaches capable of capturing both system autonomy and interconnection. Esposito's (2017) work on artificial communication shows how algorithmic systems operate according to their own logic while remaining coupled to other social systems. Looking forward, this theoretical development suggests several crucial directions for future research. First, we must examine how digital technologies make visible society's systemic nature rather than asking how they change society. Kitchin's (2017) work on data infrastructures and Beer's (2019) analysis of data analytics show how different systems process and reproduce information according to their own logics while remaining coupled to other systems. Second, we need frameworks capable of capturing how digital technologies enable new forms of structural coupling between systems, building on Mackenzie's (2017) work on machine learning and Zuboff's (2019) analysis of surveillance capitalism.

Most fundamentally, we must recognize how this theoretical development transforms our understanding of social change itself. Rather than seeing change as driven by either technological or social forces, we must understand how it emerges from complex interactions between autonomous but interconnected systems of communication. This means developing theoretical frameworks that can capture both the distinctness of different social systems and their complex interconnections, while maintaining sociology's position within the scientific system. This theoretical synthesis offers not just new ways of understanding digital phenomena but a more fundamental grasp of how society operates through distinct but interconnected systems of communication. It positions sociology to generate insights that can enhance our understanding of both digital contexts and social reality more broadly while maintaining the scientific rigour necessary for theoretical development. As digital technologies continue to make visible society's systemic nature, this understanding becomes increasingly crucial for sociological theory and practice.

12 | Conclusion

Our exploration of digital sociality has revealed something more fundamental than simply new social phenomena requiring updated theories. What we witness in digital contexts makes visible society's essential nature as operating through distinct but interconnected systems of communication. The emergence of digital platforms, algorithmic systems and networked communications has not merely changed how people interact; it has made apparent how social reality has always functioned through the autonomous operations of different communication systems. Throughout our analysis, we have seen how various theoretical traditions—from classical sociology through contemporary digital theories—have struggled to grasp this fundamental reality. Classical theorists like Weber, Durkheim and Simmel provided sophisticated observations of social phenomena but interpreted them through human-centred frameworks. Later developments in feminist theory, practice theory and network analysis pushed towards more systemic understanding but often maintained focus on human agency or structural determination. Even recent approaches to digital phenomena, while recognizing the importance of non-human actors and technological systems, frequently retain aspects of human-centred analysis.

Contemporary digital sociology scholars have begun to recognize this limitation, even if not explicitly adopting systems theoretical language. Van Dijck et al.'s (2018) analysis of platform society, Gillespie's (2018) work on content moderation and Marres' (2017) digital sociology framework all point towards the need to understand how different systems maintain their autonomous operations while remaining interconnected. Their work demonstrates how digital phenomena resist reduction to either human agency or technological determinism, instead revealing the complex interactions between distinct but coupled systems. Systems theory transforms this theoretical landscape by revealing how what appears as human interaction, structural constraint or technological mediation actually emerges from the autonomous operations of different social systems. Each system—whether economic, political, scientific or technical—processes communications according to its own internal logic while remaining structurally coupled with other systems. Digital technologies have not created this reality but have made it increasingly difficult to ignore.

This understanding fundamentally transforms sociological practice. Our research methods must shift from attempting to capture human behaviour or social structures to observing how different systems process and reproduce communications. Contemporary methodological innovations already implicitly recognize this need. Digital trace ethnography becomes a matter of tracking system operations across platforms. Computational analysis represents not just new tools but new forms of structural coupling between scientific and technical systems. Even our ethical concerns transform from questions of human rights to understanding how different systems process and protect information according to their distinct operational codes. Sociology itself operates as part of the scientific system, maintaining its own logical autonomy while developing productive forms of structural coupling with other systems. When we conduct research or advocate for change, we are not directly intervening in social reality

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but participating in complex interactions between scientific, political, technical and other systems. Our insights become available for other systems to process according to their own operational criteria.

Looking forward, our task is not to predict or control social change but to develop increasingly sophisticated understanding of how different social systems operate and interact. This means creating conceptual frameworks and methodological approaches that can trace system operations while respecting their autonomy. It means recognizing that social change emerges not from direct intervention but from complex interactions between multiple systems, each processing communications according to its own logic. The profound nature of this transformation should not be understated. We are not simply adding new concepts to our theoretical toolkit or updating old frameworks for digital contexts. Rather, we are recognizing how society has always operated through communication systems, a reality that digital phenomena make increasingly apparent. This recognition positions sociology not as an external observer or agent of change but as a system of scientific communication developing productive resonances with other social systems.

In this light, sociology's contribution to digital futures lies not in directing social change but in generating insights that different systems can process in ways that enhance their operational effectiveness while maintaining their autonomy. This contribution becomes particularly crucial as digital technologies continue to make visible the systemic nature of social reality. From platform governance to algorithmic systems, from digital infrastructures to automated decision-making, sociology's systems theoretical understanding offers crucial insights into how different systems maintain their autonomy while remaining productively coupled.

This systems theoretical reframing does not diminish sociology's relevance but transforms how we understand it. Rather than trying to bridge micro and macro levels or reconcile structure and agency, we recognize these distinctions as artefacts of earlier theoretical frameworks. Instead, we focus on understanding how different systems maintain their autonomous operations while remaining interconnected through ongoing communications. This approach offers not just new analytical tools but a more fundamental grasp of how society operates in both digital and non-digital contexts. The challenge ahead is significant but also clarifying. By embracing this systems theoretical understanding, we position sociology to generate insights that can enhance the operational effectiveness of different social systems while maintaining their autonomy. This represents not just theoretical sophistication but practical wisdom about how social change actually emerges from the complex interactions of autonomous but interconnected communication systems.

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Systems Research and Behavioral Science

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RESEARCH ARTICLE

Transformative Services and Systemic Well-Being—Towards a Better Understanding of Distinction in Service Design

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ABSTRACT

Transformative service research studies the relationship between service provision and well-being. So far, the notion of well-being applied in this context is mainly directed at specific interventions to improve the customer's situation. We propose that well-being should rather be conceptualized from a systemic point of view, referring to the ability of a system to sustain a floating equilibrium over time. Social systems theory posits that floating equilibria rely on distinction as a basic social operation to adapt boundaries and revise interactions as systems evolve. Based on this thought, we study the treatment of distinction in transformative services. We identify five different forms of distinction that need close attention in the practice of service design, its external assessment and regulation, and storytelling about services. We illustrate problems of well-being resulting from distinction with examples from different application contexts in which service interventions are critically discussed. Furthermore, we raise a variety of questions that can help gaining a better understanding of service design for customer well-being from a systemic perspective in theory and practice.

1 | Introduction

Well-being is addressed in numerous different contexts of management research regarding individuals or collectives, including organizational behaviour and human resource management (Wright and Huang 2012; De Simone 2014), ethics and sustainability (Grewatsch and Kleindienst 2017), as well as digital transformation (Tomašev et al. 2020; Duan et al. 2021). In the context of service management, it is a specific focus of transformative service research, which is described by Anderson and Ostrom (2015), as "any research, regardless of academic discipline, that, at its core, investigates the relationship between service and well-being" (p. 243). Transformative service research takes a holistic approach to customers and their daily experiences (see also Anderson et al. 2013; Parsons et al. 2021; Larivière and Smit 2022; Christou et al. 2023). It aspires to cover all aspects of human life on the individual, communal, or social level (Corus and Saatcioglu 2015; Fisk et al. 2016; Loomba 2017; Leo, Laud, and Yunhsin Chou 2019). Furthermore, transformative service research looks at consumer groups who need special attention due to their vulnerability (Finsterwalder 2021; Boenigk et al. 2021; Dodds et al. 2023; Kabadayi, Livne-Tarandach, and Pirson 2023) and considers its achievements as a contribution to tackling grand societal challenges (De Ruyter et al. 2022; Kunisch et al. 2023; see also Neely, Fell, and Fritzsche 2018).

Service research has long recognized the importance of systemic models to capture the complex dynamics of value creation in service provision and use (Maglio et al. 2009; Demirkan, Spohrer, and Krishna 2011). From a systems perspective, however, it is

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quite clear that interventions to improve specific properties of a system must be handled with care. Basic considerations in first- and second-order systems theory and cybernetics show that such interventions can actually be detrimental to a system (von Foerster 1981; Ashby 1999; Sheffi 2015). To mention just a few examples, better transportation can result in the disappearance of local shops and reliance on larger malls or functioning online delivery (Jackson 1996; Nguyen, de Leeuw, and Dullaert 2018), better medical care can result in dependencies on the availability of specific medication (Doherty et al. 2020; Black 2022), community-building with like-minded people can result in reduced openness to other points of view (Nguyen 2020). Assuming that well-being can be achieved by a specific service is therefore dangerous. It leads to the same fallacy as believing against all medical evidence that the joy of alcohol consumption in groups is an indicator of a good life (Thurnell-Read 2015).

The situation is aggravated by the fact that most target systems of service provision not only self-regulate but also evolve over time, shifting their target equilibrium in different directions (Holland 1992, 2006). Transformative services therefore need to be designed in such a way that they allow a system (1) to return to an equilibrium and (2) to shift the equilibrium as required in the course of their evolution. So far, transformative service research has failed to give an adequate account of these requirements, which can be explained by the fact that their theoretical foundations and practical implications have not been elaborated very well. The work presented here aims to close this gap.

Building on the foundations of systems theory (von Bertalanffy 1968; Checkland 1981), we propose an approach to well-being in terms of a system's ability to sustain a floating equilibrium over time. This ability can be studied at all levels of systemic operations in society, which allows us to investigate the interdependencies of different effects of services on individuals, groups, and larger social systems. With Maturana and Varela (1980) and Luhmann (1995, 2013), we also draw attention to distinction between different systemic entities as key to a system's evolution over time. Elaborating on recent work by Maurer and Fritzsche (2023), we argue that interventions that make the boundaries of a sub-system more robust are likely to have detrimental effects on a system's ability to perform operations of distinction to sustain floating equilibria, compromising its overall well-being. In doing so, we also draw on prior studies of distinction in management research (e.g. Roth 2019; Plaza-Úbeda et al. 2020).

As service literature itself does not provide a lot of material for a substantial discussion of equilibria and distinction, the following investigation will include sources from other discourses. In particular, we will rely on publications related to postcolonialism, sustainability, disability, or intersectionality. While these four fields are highly diverse, they can all be related to transformative service provision in various ways, concerning topics such as infrastructure development and urban planning, education, energy supply, waste management, healthcare and medical technology. Furthermore, scholars contributing to these discourses often express critical views regarding the effects of services, which supports the deeper conceptual reflexions undertaken in this study.

In the following section, we discuss relevant literature in service research and systems theory to develop a sound basis for the study. We then describe our approach to theory generation and concept development. Following the different steps of service design, we the abovementioned four discourses to identify five different ways in which distinction occurs that need to be discussed in this context. Furthermore, we make suggestions as to how they can be addressed in a larger social discourse on well-being and the social good.

2 | Theoretical Background

2.1 | Transformative Services for Well-Being

Ostrom et al.'s (2010) review of research priorities for service science features transformative service research as one of the most prominent themes. This theme responds to a growing interest in the wider implications of interactions between service providers and users. In line with Prahalad and Ramaswamy's (2004) notion of value co-creation and Vargo and Lusch's (2008) understanding of operand resources, service users are considered active participants in the value creation process, whose contribution determines how the service can eventually take effect (see also Vargo, Maglio, and Akaka 2008). Furthermore, transformative service research follows Grönroos (2008) and Heinonen et al. (2010) in addressing service provision from the perspective of users, embedded in larger contexts of life experience (Sheng, Siguaw, and Simpson 2016; Rosenbaum 2015).

Transformative services encompass all efforts to increase individual and collective well-being (Rosenbaum et al. 2011; Anderson and Ostrom 2015) with a particular focus on marginalized groups with specific needs (Corus and Saatcioglu 2015; Finsterwalder and Kuppelwieser 2020; Sharma, Conduit, and Rao Hill 2017). This includes victims of disasters and crises, refugees, people with special needs, and ageing cohorts of the population (Meshram and Venkatraman 2022; Dodds et al. 2023), as well as people at the so-called bottom-of-the-pyramid (Martin and Hill 2015), describing the poorest members of society, who are usually also the largest in number (Prahalad 2006). Well-being involves either receiving positive results or experiencing positive change in value through interaction with services (Black and Gallan 2015). The positive change observed throughout service interactions reflects one transformative aspect of the services (Giraldo, Garcia-Tello, and Rayburn 2020).

Empirical research provides ample evidence of how transformative services affect well-being. Notable examples include items such as happiness, life satisfaction, and overall quality of life (Rahman 2021) financial prosperity and control (Dean and Indrianti 2020; Oluwaseun Augustine Lottu et al. 2023), healthier lifestyles and better adherence to medical regimes (Taiminen, Taiminen, and Munnukka 2020), protection against adversarial forces of nature, war, criminal activity (Reilly 2007), as well as uplifting cultural experiences (Anderson et al. 2013; Galeone and Sebastiani 2021) and elevating changes among individuals and collectives through transformative value (Blocker and Barrios 2015; Davey and Grönroos 2019; Taiminen, Taiminen, and Munnukka 2020). Transformative service research distinguishes itself from other service research in relation to the

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outcomes that it investigates (Alkire (née Nasr et al. 2020). It focuses particularly on two types of consumer well-being: eudaimonic and hedonic (Kuppelwieser and Finsterwalder 2016; Henkel et al. 2020; Odekerken-Schröder et al. 2020; Lu and Chen 2023; Mulcahy et al. 2023). Eudaimonia concerns the realization of human potential (Waterman 1984). This includes literacy, access to services, better decision making, decreasing disparities, consumer involvement, harmony, power, respect, support, and social networks (Kuppelwieser and Finsterwalder 2016). Hedonic well-being is rooted in the idea of happiness in terms of pain avoidance and pleasure attainment (Ryan and Deci 2001). These two types of well-being are relatable to both the individual and the collective level (Keyes and Lopez 2001).

Transformative service research examines how services contribute to collective well-being by addressing social dimensions of welfare (Marjanovic, Cecez-Kecmanovic, and Vidgen 2021), social justice (Steinfield et al. 2019), social cohesion (Gross et al. 2021), and social inclusion (Amine and Gatfaoui 2019; Rosenbaum and Contreras Ramírez 2019). Collective well-being refers to the happiness or satisfaction of a social group, based on shared perceptions of the group's situation and members' opinions about the group's status. Alternatively, collective well-being is described as the cumulative of individual well-being within the group or as a feature of the group itself as a community (Tuzovic, Kabadayi, and Paluch 2021). Individual and collective well-being are recognized as interrelated. For instance, when an individual earns a living (eudaimonic well-being), e.g. through entrepreneurship which is potentially transformative for the poor at the microlevel (Alkire (née Nasr et al. 2020), he or she consequently provides for family needs, enhancing their situation, and therefore is expected to positively impact the community (Giraldo, Garcia-Tello, and Rayburn 2020). Similarly, the subjective well-being of local residents could be impacted by the hosting of a sporting event (Inoue, Sato, and Filo 2020). Besides, hosting this event will generate feelings of pride (hedonic well-being) and thus influence their social well-being (Chalip 2006; Waitt 2003). Accordingly, promoting collective well-being will also improve individual well-being (Evans and Prilleltensky 2007).

Given this evidence, collective and individual well-being are widely assumed to be positively related (Gallan et al. 2019; Galeone and Sebastiani 2021). It is not difficult, however, to find counterexamples. Colonial studies, for example, have unveiled the negative consequences of singular attempts to improve the life situation in developing countries for their overall social dynamics (Osterhammel 2005). For environmental action and financial support, direct and indirect rebound effects of specific improvement measures are very well documented (Sorrell and Dimitropoulos 2008; Reimers et al. 2021). On a more personal level, similar problems are discussed in research on disability and intersectionality (Crenshaw 2013; Hankivsky 2011; Shew 2023).

Although authors such as Dodds et al. (2023) acknowledge ethical challenges in service research and call for careful consideration of context, the critical issues mentioned above are widely neglected in service literature. This can be explained by the fact that service design is commonly directed at very specific pains and gains, with the purpose of bringing about an observable improvement through service provision (e.g. Osterwalder et al. 2015). In this regard, it relies on an intuitive notion of well-being that is just too simplistic to capture complex system dynamics. The following paragraphs therefore suggest a different notion of well-being to complement existing work in service research from the perspective of systems theory. Furthermore, they explore the possibilities for assessing systemic well-being over time through the analysis of distinction operations.

2.2 | Systems Theory, Well-Being and Transformation

As Checkland (1981) points out, everything can be studied as a system (see also Maull, Geraldi, and Johnston 2012). A notion of well-being based on desirable properties of specific instantiations, drawing on some sort of an external norm determining what is good or bad, is therefore not appropriate in this context. Instead, a notion of well-being must address operational characteristics that are relevant in every study of a system. For systems in nature and society, self-regulation is such a characteristic, enabling systems to preserve their functional integrity under changing environmental conditions (Maturana and Varela 1980; see also Mingers 1989). Simple examples include the hydration of the human body, self-regulated by thirst, or the traction of an automobile, self-regulated by wheel suspension. In reference to self-regulation, well-being can be defined as a system's ability to maintain a floating equilibrium over time, which means that the system is always able to establish a balance between inputs and outputs of all its operations (Hustoon 1999; see also Ng, Maull, and Yip 2009). This definition of well-being has been adopted in a wide range of fields of research on complex phenomena (Yates 1994), including studies of human physiology, psychology, health, ageing, etc. (McEwen and Wingfield 2003; Demirovic and Rattan 2013; Sholl and Rattan 2020). It is applicable to equilibria between exhaustion and recovery in individuals, exploration and exploitation in organizations, supply and demand on markets, as well as privacy and publicity or work and leisure in society. The definition can therefore be considered relevant in all contexts in which transformative services are discussed. No matter if the services are targeted at individuals, groups, or organizations, any intervention must proceed in such a way that the system operations can return to an equilibrate state.

Using selected examples from the aforementioned discourses on colonialism, sustainability, ableism, and intersectionality, Table 1 illustrates how transformative interventions can affect equilibria on different layers of systems operation in society. It shows that consequences can be observed on many different levels, including individuals as well as groups, organizations, or complete social sub-systems. In each case, adaptations are necessary, and the success of transformative interventions depends on the ability of the respective system to perform these adaptations in such a way that it sustains a floating equilibrium. The systemic notion of well-being presented here can therefore be considered to add an important new perspective to transformative service research.

General systems theory describes floating equilibria as a result of regulatory processes (e.g. Ashby 1999; see also Checkland 1981;

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TABLE 1 | Selected examples of interventions for well-being affecting floating equilibria.

Domain	Intervention	Affected equilibrium	Consequences	References
Energy	Hydroelectric plant and dam; resettlement of population	Accumulation and decomposition in water	Persisting herbicides, metals, farming restrictions, medical care	Zhang et al. 2007; Kittinger et al. (2009);
		Social ties in community	Migration, loneliness, stress, perceived lack of security	Hwang et al. (2007); Wilmsen (2016)
Traffic	Safety measures: airbag, ABS	Control and risk-taking	More aggressive driving, higher accident rate	Winston, Maheshri, and Mannering (2006)
Waste	Recycling	Purchasing and discarding goods	Moral licensing, increasing volumes of waste	Catlin and Wang (2013)
Health	New medical treatment	Age and physical abilities	Higher performance expectations, pressure to purchase medication	Marshall (2009)
Education	High standards of medical training	Supply and demand on job markets	Brain drain; migration of professionals to richer countries	Greysen et al. (2011); Rajabi, Majdzadeh, and Ziaee (2011)
Urban planning	Better housing	Real estate pricing/usage of space	Gentrification, disappearance of traditional businesses, isolation	Rigon (2022); Azunre and Boateng (2023)

von Bertalanffy 1968). In the case of natural and social systems, Maturana and Varela (1980) show that this process does not only rely on changes regarding the input and output of different operations in the system. It also includes qualitative changes regarding the functions that are taken over by different parts of the system, allowing the system as a whole to evolve (see also Ruiz-Mirazo and Moreno 2004; Razeto-Barry 2012). Research on complex-adaptive systems further elaborates this idea from a more technical perspective (Holland 1992, 2006). A city, for example, cannot be planned once and then left as it is. Over time, ageing populations, migration, but also technical progress and changing perceptions of value require changes of infrastructure, governance, etc. In a similar way, individual human beings do not have the same needs and ambitions over time, but change due to progressing age, accumulation of experience, professional and social achievements, etc. As a consequence, they settle into very different living conditions in the course of their biography.

In this context, Luhmann (1995, 2013) describes distinction as a fundamental epistemic operation. Looking at systems in society, distinction can be observed in the form of segmentation, stratification, centralization/marginalization, and functional differentiation (Ritzer 2007). Segmentation concerns the distinction of structurally similar parts of a system according to specific properties, such as age groups, regions, work styles, consumption preferences, etc. (Goller, Hogg, and Kalafatis 2002; Kaźmierczyk 2019), whereas stratification is about hierarchical distinction or power relations in a wider sense (Collins 2015; Davis and Moore 2019). Centralization and marginalization refer to the positioning in the core or periphery of a system (Csermely et al. 2013), which has consequences for social relations, visibility, etc. Functional differentiation in systems means that different parts of a system take over different tasks and fulfil roles (Baraldi, Corsi, and Esposito 2021). Social systems use different codes and media to achieve distinction, constituting themselves as separate entities next to others (Roth and Schuetz 2015), and the ability to do so must be considered as key to sustaining the system's equilibrium.

Phenomena of distinction within and in-between systems have been addressed in various fields of management research, such as leadership (Luhmann 2018), human resource management and organizational change (Roth et al. 2018; Sales, Mansur, and Roth 2023), post-merger integration (Sales et al. 2022), sustainability and economic growth (Plaza-Úbeda et al. 2020), business ethics (Valentinov 2019), and family business and entrepreneurship (Kleve et al. 2020). Within this body of research, false distinction is recognized as a particular problem (Roth 2021). False distinction is believed to occur when lines are drawn between parts of society that are neither mutually exclusive nor jointly exhaustive (see also Roth 2019). It is not uncommon for society to rely on false distinction in daily operation (Luhmann 1995), increasing the complexity of social structure and creating paradoxes that need to be overcome to sustain floating equilibria (Roth 2021).

Regarding the security of critical infrastructures, Maurer and Fritzsche (2023) show that excessive robustness of systemic sub-structures can have detrimental effects on a system's ability to adapt (see also Maurer, Lechner, and Schumacher 2015; Miceli et al. 2021). If existing boundaries and interfaces between

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entities in the system are too strictly enforced, floating equilibria cannot be sustained (Gallopín 2006). If they are weakened too much instead, the same will happen as well. Although these phenomena are well known in social sciences, there is a clear gap in literature regarding their implications for transformative services and their contribution to well-being. Investigating the implications of services on distinction operations can establish an important conceptual connection between research focusing on specific interventions for well-being and system dynamics changing the fabric of society.

As the content of Table 1 shows, interventions affect not only functional systems in society, but also other systemic entities on different levels. In the given context, it is therefore necessary to study distinction in all its different forms, including segmentation, stratification, and centralization/marginalization. This means a departure from the approach of Roth and Schuetz (2015) towards a more general treatment of systems in society, including individuals, teams, and social groups operating systemically on different layers and on different topics.

3 | Research Design

Among the four approaches to writing conceptual articles described by Jaakkola (2020), ours falls mainly into the category of typology. We also follow the general recommendations of Fawcett et al. (2014) for conceptual work in pushing theoretical boundaries and adding precision to the concepts of transformation and well-being, borrowing theory from systems research. To make sure that we capture all relevant aspects of the phenomenon, we discuss distinction in all action phases according to the Heckhausen model described by Keller, Gollwitzer, and Sheeran (2020) (see Figure 1). Overall, the four steps appear compatible with all major approaches to service design, service development, or service engineering, such as Scheuing and Johnson (1989), Bullinger, Fähnrich, and Meiren (2003), Froehle and Roth (2009), or Stickdorn and Schneider (2010), as well as recent elaborations such as Grenha Teixeira et al. (2017) or Vink et al. (2021). Most importantly, they include evaluation as part of the process, which allows us to capture distinction in the practice of service design and observations from an outside point of view (see von Foerster 1981).

For conceptual papers, MacInnis (2011) emphasizes the contribution of real-world examples to a better understanding of what extant theory has missed. On the next pages, we take these examples from the wider context of the literature mentioned in Table 1.

In the following section, we show how the concept of systemic distinction can be used to gain a deeper understanding of the complex dynamics of transformative service provision. Drawing on the literature referenced in the previous section, we identify five different forms of distinction that need to be considered to develop a more comprehensive understanding of well-being and the social good in transformative service research. We first discuss strategic decisions in service design, then value propositions, implementation, and evaluation.

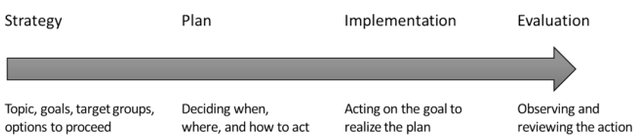


FIGURE 1 | Generic model of action phases, adapted from Keller, Gollwitzer, and Sheeran (2020).

4 | Analysis of Distinction in Services

4.1 | Strategy

Distinction in transformative services starts with identifying a target group and its need for improvement. This requires a criterion for the differentiation of the target group from other members of society. Transformative services for well-being are focused on members of social groups that are believed to be particularly vulnerable and therefore require specific attention. What this means is that the members of this target group have a deficit compared to other people, warranting intervention. Research on intersectionality (e.g. Hankivsky 2011) highlights the problem of choosing a particular deficit to define a target group for services while others are neglected. As Crenshaw (2013) noted, focusing on racial discrimination often neglects gender discrimination within the target group. As a consequence, actions are taken to improve the living conditions of the overall target group in such a way that extant gender discrimination within the group becomes even stronger. Similarly, focusing on medication and healthcare technology for the disabled bears the risk of neglecting differences regarding the competencies they apply or the financial means to afford them (e.g. Naci et al. 2014; Delavar et al. 2023).

Given the multitude and heterogeneity of criteria to identify a vulnerable group, another problem of distinction becomes apparent, which plays a fundamental role in social transformation. Choosing a vulnerable target group draws attention to a specific deficit that may actually not be relevant for the perception of well-being for many members of this target group. People may be labelled as members of a vulnerable group in society without need and against their will, with the consequence that they are treated differently than others without wanting to be treated differently, reminding them day in and day out that they are different (e.g. Shew 2023). When this happens, a distinction is upheld that, for the people in question, is dysfunctional, adding complexity that inhibits the dynamics necessary to sustain a floating equilibrium in developing as a group over time.

4.2 | Plan

In the planning phase, the value propositions of services are fixed. Well-being can be expressed in various ways. Firstly, value propositions can address the criteria for the differentiation of the target group. This is the case, for example, if this criterion is a disease that specific medical treatment can cure. As a result of the cure, the cause of distinction disappears. In a similar way, diagnostics may predict diseases and allow their avoidance before they appear (De Jong, Maya, and Van Lith 2015). Elsewhere,

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education and training may be used to make people adhere to social norms or adopt values of a country's leading culture (Castles 2004; Heinemann 2017).

In such cases, transformative services go beyond the compensation of deficits. They address the constitutive characteristics of the target group with the aim of making the cause or reason of distinction disappear. While there are often honourable reasons to do so, for example, when services address science scepticism (Richardson, Thaker, and Holmes 2023), the radical implications regarding social structure need to be taken into account. In the context of healthcare, ableist literature harshly criticizes negative views of people who are not perfect in attempts to provide a cure for a deficit, ignoring the sense of belonging and culture of disabled communities (Tarvainen 2019). The fixation on vulnerability can lead to an overemphasis on one differentiating factor for a social group, ignoring others, which would lead to a higher appreciation of diversity.

If services just offer a compensation for vulnerability, users remain members of the target group, but gain competences and abilities or make experiences that increase their quality of life. Examples from healthcare include the provision of digital Braille interfaces for the blind, enabling them to read and write (Nadeem et al. 2016), or exoskeletons for paraplegics, enabling them to walk, reach out with their hands, etc. (Gorgey 2018).

In ableist literature, two problems of compensation are addressed (Shew 2023). First, compensations imply that disabled people should be like non-disabled people, which can easily suggest that there is something wrong with the way they are. Second, compensations can push them into a dependency on services provided, depriving them of the autonomy that they could have if they led their lives in other ways. Systemic distinction is not only upheld, but also overloaded with values that further emphasize the differentiating criteria of the target group. In other contexts, this phenomenon can also be observed (Wolbring 2012), as women are enabled to behave like men, queer people like straights, and people from eastern cultures like those from western cultures.

4.3 | Implementation

During the implementation of services, roles, responsibilities, and interaction protocols are refined. Traditionally, there is a clear distinction between the roles and responsibilities of service providers and users, as the agency for value creation is assigned to the provider, who is then remunerated by the user for the time and effort spent on service delivery and the resources applied in the process. Contemporary approaches to service emphasize that providers and users create value together, sharing agency and responsibilities for the outcome (Ranjan and Read 2016). Nevertheless, there remains a means-end distinction between both parties, as providers are supposed to be instrumental to the well-being of users. Expectations regarding a similar dynamic in the opposite direction are much simpler, concerning mostly the flow of money and information from the users to the providers.

Increasing possibilities of collecting customer data from digital devices add to the disbalance of information about the opposite party in service encounters, up to a point at which issues of sovereignty arise, concerning control over one's individual action as well as autonomy of social groups (Pohle and Thiel 2020). While distinctions between provider competencies are fortified, distinctions between public and private spheres in the lives of customers are continuously redefined and adapted to match life experience in the digital age (Fritzsche 2021).

As part of this process, platform operators, who orchestrate the interaction between service providers and users, have emerged as another stakeholder in the given context. From a systemic perspective, they can be characterized as observers of service interactions with the ability to change the conditions under which these interactions take place. In cybernetic terms, such changes would be addressed as regulatory interventions (Ashby 1999).

4.4 | Evaluation

Observation and intervention are also key to understanding distinction in the step of evaluating services from a first-order and second-order systems perspective (von Foerster 1981). In addition to managers assessing the processes and outcomes of service operation, platforms orchestrating service interactions, but also scientists and policymakers have to be named as observers who claim roles that differentiate them from those who are actively involved in the provision and use of services (Roth 2019).

Interventions in service operation control the direction in which floating equilibria can evolve over time, facilitating or inhibiting transformation. In developing rationales for intervention, another form of distinction is at work, which concerns theories, methods, and epistemic perspectives applied in observation. Popular examples can be found in sustainability literature, where highly different accounts of affected ecosystems can be given at the same time (Kittinger et al. 2009), raising the question of which of them is supposed to be preserved. Furthermore, distinction operations can be recognized in narratives of social change and progress, where some actors appear to be protagonists and others antagonists. This is illustrated, for example, by the various catalogues of grand challenges that have recently been issued, accompanied by claims of leadership in addressing these challenges and solving problems (George et al. 2016; Czakon 2019).

For transformative services, distinctions expressed in such narratives are of particular importance, as they create the basis on which notions of well-being and improvement of life situations rely. It is worth noting that they are not uniformly accepted in all cultures. Political leaders, who are eventually also nothing else than service providers, rely particularly strongly on narratives. The most common vignettes for these narratives, socialism and capitalism, leave space for adaptation to local conditions, leading to different manifestations of narrative distinction. With respect to these vignettes, it is also worth asking if politics as a service does not proceed under false distinction operations, especially when capitalism and socialism as concepts that emerged in European history are used elsewhere in the world. For the Global South, they may first and foremost be European, and as such more similar than different.

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4.5 | Summary

Based on the previous subsections, there are at least five different types of distinction that need to be considered in the context of transformative services for well-being (see Figure 2).

Each one of them has particular effects on floating equilibria in society:

1. The identification of a target group and the definition of a criterion for its differentiation determine how the target group is distinguished from the rest of society. It also establishes a unifying property that all members of this group have. Sometimes, this is already associated with a deficit.
2. The value proposition determines how transformative services are supposed to bring about an improvement, distinguishing the state of users before and after service provision and thus clarifying the deficit associated with the target group. Comparisons with other members of society play a huge role in describing improvement.
3. The implementation of services makes clear how service providers are intended to add value to the lives of service users, thus distinguishing them from the users by something they can do that users cannot do (as well) on their own. This may be described as the application of a competence, the supply of a resource, or just an operational structure that works more efficiently if the users do not have to take care of it on their own.
4. Managers, policymakers, scientists, etc. set themselves apart from the people involved in service operations as external observers, evaluating what is going on and intervening where necessary. They constitute themselves as a separate entity in society according to the point of view from which they observe and the rationale behind their interventions.
5. Narratives of grand challenges, change and progress expressed from the observer perspective distinguish protagonists and antagonists by determining the trajectory for the future development of society. The express visions and ideals that inform notions of well-being and improvement of life situations.

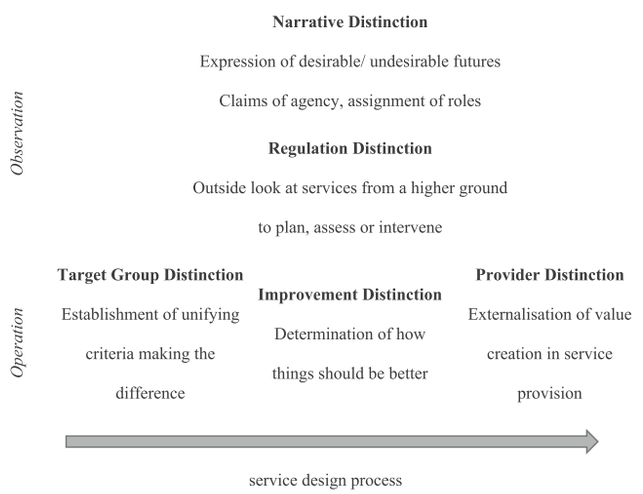


FIGURE 2 | Basic framework showing layers and forms of distinction in transformative services. [Colour figure can be viewed at wileyonlinelibrary.com]

5 | Discussion

5.1 | Novelty and Originality

Transformative service research shows how the overall life situation of different target groups can be improved by specific service offerings (Blocker et al. 2013; Blocker Dietrich et al., 2017; Echeverri and Salomonson 2019; Fisk et al. 2016; Gong et al. 2022; Martin and Hill 2015; Parkinson et al. 2017; Polonsky et al. 2023; Reynoso, Valdés, and Cabrera 2015; Rosenbaum 2015; Skålén, Aal, and Edvardsson 2015; Subramanian, Finsterwalder, and Hall 2022; Zhang et al. 2022). In doing so, transformative service research acknowledges the importance of the overall setting in which service provision takes place (Anderson et al. 2013): the interaction between service entities and consumer entities, as well as the macroenvironment. However, in order to connect transformative service research with the wider discourse on well-being and the social good in management research (e.g. Wright and Huang 2012; Grewatsch and Kleindienst 2017; Tomašev et al. 2020), it seems necessary to expand the notion of well-being from specific user groups to the overall transformation of society resulting from changes in their systemic structure.

Systems theory suggests considering well-being in terms of floating equilibria, expressing the ability of systems to stay balanced over time in an ongoing autopoietic process (Maturana and Varela 1980). In the course of this process, boundaries and interfaces change, based on changing distinctions between inside and outside (Luhmann 2006, 2013). For this reason, the work presented here has investigated how distinction operations are affected in service design and service provision. We have identified five different forms of distinction relevant in this context, providing us with a basic framework to analyse the implications of service interventions for well-being on a larger scale.

As our approach relies on second-order systems theory, it takes a different point of view than service design. Neither the designer, nor the scientist observing the designer, is considered to be independent from the phenomenon that is studied. As members of society, their own actions and decisions affect the development of distinctions on different layers of interaction and, thus, the ability of social systems to adapt and balance operations. A systemic notion of well-being in reference to floating equilibria necessarily leads to a strategic perspective on transformative services as part of a broader social discourse. Within this discourse, our framework raises questions about distinction that service designers cannot fully answer by themselves. Instead, these questions must be addressed in a larger social discourse that involves different stakeholders. Table 2 gives an overview of these questions.

Questions regarding target group distinction encourage designers and researchers to think about the structural implications of offering a service to a target group. In a dynamically evolving world, the description of a target group must be considered to

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TABLE 2 | Questions for a better understanding of the treatment of distinction.

#	Distinction	Questions to be asked
1	Target Group	• Is the name of the target group just an external label for its members of a true source of identity for them? • How diverse are the members of the target group? Is being a member of this target group really relevant for them? Do they suffer from it? • How could the target group evolve over time, how could it merge with others, subsume them or be subsumed?
2	Improvement	• Who defines what makes a good life for the target group? • Does the conception of well-being mirror the life situation of other people? • Regarding the intended improvement, will the members of the target group ever be in a situation as good as others or always lag behind? • Can well-being also be conceptualized in other ways? Was it the same in the past and will it likely be the same in the future?
3	Provision	• What is the added value of involving an external service provider? What is the added value of supporting service provision with a platform? • What do members of the target group give up by relying on others in value creation? What do they gain? • Can service providers be replaced? Can the externalization of knowledge and competences be reversed or modified?
4	Regulation	• Who observes? What do they observe, and which measures do they use? • What is the purpose of observation and how do observers justify claiming the observer's perspective? • What are the reasons for intervention? Which variations in systems operations are considered to require intervention and which are not? • How much do interventions preserve the status quo; how much do they allow for or enable structural change?
5	Narrative	• What are the origins of ideas and visions of desirable/undesirable futures? • Does the target group of transformative services appear in these visions? • What other narratives of the future exist? Who propagates them? How do the propagators of these narratives position themselves in them? • Who is considered to lead change and who is expected to hold it back?

have a constitutive effect, determining how a target group is understood and how it is supposed to change. With the questions presented here, this effect can be problematized.

Questions regarding improvement resulting from service provision contribute to a better explication of the dimensions of well-being that are addressed. Asking these questions can help to identify tensions between different notions of well-being, concerning the target group and its members as well as other parts of society that are indirectly affected by these improvements. Modelling techniques from system dynamics can be applied to further elaborate interdependencies, which are often not mentioned in service design.

Questions regarding service provision draw attention to the division of competencies resulting from the assignment of specific tasks to service providers. Principal-agent dialectics are addressed, as well as problems of self-sovereignty, which has lately become a focal point in research on digital business ecosystems. Furthermore, such questions can help to establish a long-term perspective on well-being, inasmuch as they call for a better understanding of path dependencies in service design resulting from the implementation of specific services.

Questions regarding regulation not only concern regulators in the closer sense of public management, but also all external observers who differentiate themselves from the system they observe. This includes in particular the designers of services, whose ability to assess well-being and take action to increase it depends on their own point of view, which often remains the blind spot in their models and implementations.

Questions regarding narrative invite further reflection on the organizational identities of the different individuals and institutions involved in service provisions for well-being. Narratives of well-being inform actors in public healthcare, but also other domains concerned with welfare. Leisure and entertainment industries also make claims regarding the contribution of their services to the good life of their target groups. Quite obviously, well-being is framed in different ways by these institutions. It is therefore necessary to include them in the review of transformative services as well.

5.2 | Contributions and Limitations

5.2.1 | Contributions to Theory

Our contribution to theory rests on the introduction of a wider notion of well-being in terms of floating equilibria, which is already widely accepted in the life sciences (McEwen and Wingfield 2003; Rattan and Demirovic 2010; Sholl and Rattan 2020) and compatible with recent work on social theory in management and other disciplines of the humanities (Meyer

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and Hinchman 2007; Thornhill 2017; Roth 2019). We draw on social systems theory to highlight the dynamics of distinction among different social groups in the establishment of floating equilibria. So far, these dynamics have been neglected in practical approaches to well-being, such as transformative service research. To have an impact in tackling grand challenges, however, these dynamics must be addressed to discuss well-being more in all its facets.

Using social systems theory, the work presented here has established connections between transformative research and a variety of emancipatory discourses in which well-being is discussed more comprehensively, such as ableism, colonialism, or intersectionality. They also address transformations of vulnerable groups, e.g. people suffering from chauvinism regarding culture, race, gender, physiognomy, etc., but from another perspective. Our article establishes the missing link between the different research traditions and communities, facilitating more joint research projects in the future.

We believe that these contributions to theory will be of particular value for research in countries of the Global South. In these countries, social dynamics of well-being can be expected to unfold in very different ways than in industrialized countries of the North. The catalogue of questions presented in the previous section can contribute to a better understanding of these differences. It facilitates the application of a wider conceptual repertoire to the study of transformative services, which is better able to take the specificities of the Global South into account.

5.2.2 | Contributions to Practice

In our analysis of distinction, we have referred to the general steps of service design and implementation. By doing this, we have opened up many possibilities for the usage of our work in practice to enable a critical review of the different ways in which transformative services affect the directions wherein social change can proceed. Examples from different application contexts show which kinds of questions emerge during the application of our basic framework. This should make practitioners better aware of the numerous options that they have to affect well-being and their respective implications.

The catalogue of questions presented in the previous section draws particular attention to the normative implications of service provision. It can help to improve decision-making and foresight in service design, recognizing and avoiding unwanted systemic effects. Furthermore, we believe that our work is highly relevant in scenarios where systemic structures for well-being are compromised, as it can be observed in the case of the British healthcare system. Here, it seems necessary to take a broader look at different perceptions of well-being and responses in different social groups to them. This way, coping strategies for failures in some areas can be better recognized and – hopefully – regarded in the design of better services.

The examples given in this article also show the challenges of expanding transformative service research to more controversial interventions, where there is no intuitive agreement among all stakeholders about the benefits of service provision. The more scholars venture into the territory of grand challenges, the more they are exposed to controversies, and there is a danger of being hijacked by political campaigns and associated with ideologies that discredit the scientific value of their work. Having a strong theoretical basis to describe transformation and well-being in abstract terms of distinction can help keep research neutral and as objective as possible.

5.2.3 | Limitations

Our account of distinction as an elementary systemic operation has only scratched the surface of social systems theory. Within the scope of a single journal article, it seems impossible to do full justice to the works of Luhmann (2006, 2013, 2018) and their further elaborations in the context of management by Roth and Schuetz (2015), Roth (2019, 2021), and others. We have constrained ourselves to a basic notion of distinction, which can, for the most part, already be derived from the seminal writings of von Bertalanffy (1968), Maturana and Varela (1980), and Ashby (1999). We hope that this approach will make our work more accessible for different research communities that do not necessarily agree with everything that Luhmann, Roth, and their collaborators have to say.

In consequence of our general account of distinction, our analysis of service design also leaves space for further elaboration and more precise formulations of the challenges therein. For the purpose of this article, we think that this is permissible, as it allows us to outline a broader notion of well-being and transformation without getting lost in detail.

6 | Conclusion

Well-being is an important topic, but it is also a complicated one. From a service perspective, there is always a danger of trivializing it by focusing exclusively on the direct response of the target group to the efforts of the service providers. One of the biggest achievements of transformative service research and related streams of work in service management and marketing is to position itself explicitly in a different way, putting a holistic view of the consumers lives at the centre of attention.

The work presented here follows up on this trajectory, describing an even larger notion of well-being that seems necessary to address well-being in society at a time when numerous grand challenges require the transformation of extant structures. On these pages, we have only been able to describe our approach very briefly, focusing on the most basic conceptual aspects of distinction and transformation. Future work is required to elaborate on details and add value through this approach in specific application domains.

As we are heading for a fully digitalized society, new data sources that will allow us to analyse social dynamics in depth become available almost every day. This may not only help us to better document how distinction operations take place and evolve over time, but also to engage in simulations of these procedures using the power of electronic data processing. For

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transformative service research, this may open up a whole new field of activity and inspire numerous innovations.

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RESEARCH ARTICLE OPEN ACCESS

Decolonising Special Educational Needs and Disabilities (SEND): A Systems Theoretical Framework for Global Inclusivity

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ABSTRACT

This paper reconceptualises Special Educational Needs and Disabilities (SEND) through the lens of Niklas Luhmann's universal theory of society (Müller and Powell 1994), particularly the concepts of structural coupling and interdependency to emphasise a decolonial perspective. While SEND has traditionally been informed by Eurocentric models of disability and education, this paper argues for an epistemological shift towards recognising the experiences, epistemologies and needs of the Global South and indigenous communities. By critically engaging with international legal frameworks such as the *Salamanca Statement and Framework for Action on Special Needs Education* (UNESCO 1994) and the *Convention on the Rights of Persons with Disabilities* (CRPD) (2006), the paper highlights the limitations of existing SEND models and explores how a systems theoretical approach can better accommodate global diversity. The threefold argument focuses on how SEND can perform its educational function through structural coupling, navigate interdependencies and interpenetration with societal systems (such as economy, politics, healthcare and technology), and engage in self-reflection to ensure systemic autopoiesis. Additionally, the paper calls for the inclusion of indigenous and Global South perspectives in SEND frameworks to address systemic inequalities and develop inclusive educational systems. Ultimately, it proposes a dynamic, decolonial re-entry process that challenges the blind spots in SEND's self-observation and seeks to create more equitable global policies, practices and research.

1 | Introduction

1.1 | From Social to Educational to Socio-Educational: A Historical Trajectory of SEND

There exists a span of one hundred or so years between the concepts of 'special needs' and 'special educational needs' for individuals with various physical and mental disabilities in the United Kingdom (Warnock 1978). This shift reflects a guiding binary distinction of 'need' versus 'do not need' in the socio-educational attitude since the late 18th century. It was also a time when '[i]nterest in education as a functional system arose' (Baraldi and Corsi 2017, 45). The nature of those needs was also contingent to the wider societal changes. It is suggested that the middle of the 19th century witnessed 'a stirring of social conscience over the plight of the disabled … but it was primarily concerned to relieve their stress, not to educate them' (Warnock 1978, 10). The shift from being a social support provision to one with an educational emphasis marked the genesis of the formation of Special Educational Needs and Disabilities (SEND) as a distinct system

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paralleling the evolution of the educational system. The concept of differentiation underscores the many twists and turns of the evolutionary paths of both systems.

The challenge of differentiation in SEND is twofold. On the one hand, differentiation has been person-centred. On the other hand, differentiation has been treated as a solution to perceived educational and social issues. The prevailing assumption is that differentiated treatments can change individuals, leading to broader educational and societal improvements. Its supremacy is enshrined by the United Nation's *World Declaration on Education for All and Framework on Action to Meet Basic Learning Needs* (UNESCO 1990) and the subsequent *The Salamanca Statement* 'to further the objective of *Education for All* by considering fundamental policy shifts required to promote the approach of inclusive education' (UNESCO 1994, iii; see also Eikeland and Ohna 2022, 157). Consequently, pedagogical thinking has revolved around the intrumentalisation of differentiation based on the assumed causal linear chain consisting of individuals, education and society. Educational theorists, medical professionals, psychologists, sociologists, policymakers, technological developers and activists have devoted decades to design interventional programmes and to formulate theoretical frameworks to facilitate differentiation in education (Ainscow et al. 2019; Lindsay et al. 2020; UNESCO 2024b). These endeavours are framed as pedagogical innovations that emphasise a shared moral imperative (OECD 2022). Despite its progressive pedagogical commitments, SEND is rooted in a conservative tradition stemming from European Enlightenment beliefs in the transformative power of reason and rationality through education on individuals.

In this paper, I propose a radical departure from the conservative tradition of SEND research to formulate a systems theoretical framework as a starting point towards decolonising SEND. I begin by conceptualising SEND as a subsystem of the system of education. The second section explores the compatibility of systems theoretical thinking with decolonisation in promoting social justice through inclusive education. The next section demonstrates how the principle of second-order observation can reveal the blind spot in decolonising education's relationships with other function systems in the form of structural coupling. This section is, in turn, followed by adopting a third-order observation to reflect on a systems theoretically informed praxis of decolonising SEND. The paper concludes by advocating for a paradigm shift in decolonising SEND research that takes into consideration of some of the theoretical tenets in Luhmann's systems theory.

2 | SEND as a Functional Subsystem of the System of Education

Baraldi et al. (2021, 69) suggest that functional systems must satisfy three conditions: the abilities to differentiate and combine its function for society, its performances for other subsystems and its reflection for itself. To qualify as a function system, SEND therefore must fulfil the same criteria, particularly its social function. The following paragraphs explain the ways in which SEND can be considered a suitable candidate as a function system through the process of internal systemic differentiation.

I argue that through internal differentiation, SEND has evolved as a subsystem of the education system to cope with its increasing systemic complexity as a result of attempting to fulfil its increasingly complex and complicated societal functions. Luhmann explains: 'The differentiation of functional subsystems means ... the establishment of new system/environment differences within the original system' (Luhmann 1995, 53). He continues: 'The functional orientation thereby retains the "holistic" aspect of older systems theories but combines it with the capacity to specify problems more precisely' (Luhmann 1995, 53). In this sense, SEND can be considered as an extension of the education system to specialise in addressing a specific educational challenge that intersects directly with other function systems such as healthcare, economy, politics and technology.

In has to be noted, too, that presenting SEND as a 'system' runs the risk of exacerbating the 'observed inflation of function systems in social systems theory' (Roth and Schütz 2015, 13). It is therefore important that one takes a critical approach to the theorisation of SEND as a subsystem to the function system of education against 'the horizon of functional differentiation' (Roth and Schütz 2015, 12). In so doing, the observation of the function of SEND can therefore be reformulated based on Roth's diagram (Roth and Schütz 2015, 12). Let level 2 be the system of education, level 1 its environment, in other words, society. Level 3 now becomes the system of SEND, and the system of education therefore becomes its system environment. A new level 4 is now inserted as a distinction for the subsystem of SEND at level 3 to refer to itself, thus 'turning [itself] into [its] own medium' (Roth and Schütz 2015, 18). The relationship between these two levels is referred to as 'reflection' (Roth and Schütz 2015, 18).

As a self- and other-referential subsystem, SEND therefore organises its observational operations autonomously to delineate what communications fall inside the system boundaries and what remain external in the environment. In other words, the specific problems that cannot be resolved in the 'original' system that is the broader education system, a system that is orientated around, paradoxically, the concept of 'education for all' as a mainstream educational imperative. Such operational closure within SEND implies systemic autopoiesis, a concept borrowed from Humberto Maturana and Francisco Varela (Luhmann 2013, xi–xii), that underlines a systemic capability to generate new meanings through each recursion of communicative operations and to create elements that are essential to system reproduction while remaining sensitive to its environmental irritations from other societal systems.

This understanding of SEND places greater emphasis on the recursive and discursive nature of distinction-making that guides the operations of self- and hetero-observations, in other words, multidirectional communications between SEND and other functional social systems such as education, politics, law, economy, healthcare and technology. When the distinction difference/norm is re-entered into systemic communications, distinctions such as diagnostic labels become blurred and dissolve, allowing new distinctions to form by the act of boundary-crossing—a concept borrowed from George Spencer-Brown's logical calculus *Laws of Form* (Spencer-Brown 1969)—to allow new distinctions to be identified, actualising the possibilities in 'the horizons of potentialities' (Luhmann 1995, 75). In this

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co-constructivist reframing, SEND is positioned in partnership with other co-evolving systems, not a 'footnote', an 'other', an 'addition' or an 'afterthought' (Stanbridge 2024)—an outside observer.

Theoretically speaking, re-entering the system/environment differences in the systems theoretical modelling of SEND facilitates boundary-crossing to allow potentialities to be actualised. This can mean an inevitable paradigm shift in epistemological approach. SEND research moves from the preoccupation with what it means to be an individual and the study of the interactions between individuals and society to a description of the recursiveness of social phenomena. The question of SEND must be approached as an 'interactional process or a circular system' (Ghesquière and Van der Aalsvoort 2004, 218). Practically speaking, such a theoretical actualisation can have pedagogical implications, influencing policymaking, and guiding future research through interdisciplinary, transdisciplinary and multinational collaborations towards a system that is capable of the safeguarding its own autopoiesis.

To understand SEND as a subsystem of the system of education also has several theoretical ramifications. Firstly, such understanding treats SEND as a system capable of organising its structural elements through organisational communications in the manner of operational closure while maintaining its openness to its environment. The system/environment differences are therefore characterised by SEND's structural coupling, interdependency and interpenetration with other societal systems. In the case of SEND, its communicative structure has evolved over the past centuries to allow further communications to continue to develop its systemic structure. For example, to facilitate the establishments of specials schools catering for the welfare and education of the blind and the deaf in the late 18th-century Britain (Warnock 1978; Lindsay et al. 2020) required coordination with political communication around the semantics of needs and of responsibilities using pupils as its medium (Luhmann 2023). The distinction of need/no need and the distinction of responsible/not responsible then guided the self-referential and other-referential communications within the symbolically generalised medium of 'special needs'. Over time, the concept of 'special educational needs' emerged in response to societal demands to support those individuals whose apparent and/or hidden needs are not satisfactorily met by formal education (Stanbridge 2024).

When ascertaining the relationship between SEND and other societal systems, it is necessary to make a distinction between the educational system and schools (Luhmann and Schorr 2000, 237–238). In that education 'is a global function system communicating through teaching and instructions. Schools, on the other hand, are (becoming) local organisations communicating through decisions' (Anderson and Pors 2021, 822). By extension, the same differentiation applies to the system of SEND. The following discussions of SEND as a subsystem to educational system therefore concentrate on SEND as a system based on communication through pedagogical programmes that are informed by, and informing, other systems in its environment through structural coupling and interdependency. It is in this sense that we can talk about the relationship between SEND and institutions at multiple levels in terms of system/environment differences. Each serves as the other's environment. Based on this conceptualisation, we can then formulate a theoretical framework to address some of the environmental conditions on which the system of SEND can fulfil its core functions as our first step towards decolonising SEND.

3 | The Compatibility of Systems Theory and Decolonising SEND

The discourse surrounding Special Educational Needs and Disabilities (SEND) has historically been shaped by Eurocentric perspectives, rooted in Western philosophies of education and disability (Kamenopoulou 2020). These models, while globally influential, have not adequately accounted for the diverse experiences and epistemologies of marginalised populations, particularly those in the Global South and indigenous communities (Connell 2020; Meekosha 2011). This paper aims to address these limitations by advancing a decolonial reconceptualisation of SEND through the lens of Niklas Luhmann's systems theory as a framework for fostering global inclusivity (as discussed in Sections 3 and 4).

Purported to resolve the theoretical shortcomings of 'incongruent perspectives' (Luhmann 2020, 11) that characterise contemporary sociological enterprise in a global context, Luhmann offers his distinction-based social theory of reflexive self-referentiality (Luhmann 2020, xiii) as an alternative to contribute to a more pluralistic approach. In the sense of de-ontologising Eurocentric rationality, it can be regarded as a precursor to the call for decolonising sociology (Connell 2018). It prefigures a paradigmatic shift from northern to southern theory (Connell 2020). Luhmann's systems theory is designed to be independent from (not outside of) existing social theories and free from the limitations of humanistic, regional (natural) and anthropocentric epistemologies of traditional sociological investigations (Luhmann 2020, 10). Instead of being construed as yet another example of privileged Eurocentric perspective, the universal applicability (Müller and Powell 1994) of systems theory lends itself a compatible analytical tool to describe and to critique the dominant social understanding of SEND. By applying its theory of distinctions, the guiding distinction of Global North and Global South becomes visible and its observation possible. However, it is also worth noting that this second-order observation of SEND is not free from its own blind spot, which requires another perspective to reveal; and this process continues. It is the recursive nature of observation of society that gives systems theory its circular nature (Luhmann 2020, 1).

At its core, systems theory explores how complex systems—such as education and SEND—structure themselves to manage internal and external complexities through processes of differentiation. SEND, as a subsystem of the educational system, organises its operations through structural coupling to coordinates with external societal systems such as economy, politics, healthcare and technology while maintaining operational closure to preserve its autonomy (Luhmann 1995). However, this structural coupling has been historically biased by Western models of disability and education, which often disregard the epistemological contributions and lived experiences of non-Western societies (Goodley 2013; Grech 2012; Meekosha 2011; Grech and Soldatic 2016). More problematically, they are also intertwined

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with broader societal subsystems that operate under their own internal logics, often limiting the scope of inclusivity within SEND. For instance, the neoliberal economic system functions according to the operational logic of profit/loss, which places a financial emphasis on educational outcomes that favour productivity and measurable achievements. Similarly, healthcare system often centres around the binary code of identifiable/unidentifiable diseases, where medicalised views of disability can obscure complex social or cultural underpinnings in the domain of social work that applies the distinctions of 'help/non-help and case/non-case' (Roth and Schütz 2015, 20). Politics, too, operates according to the distinction of power/powerlessness, which may marginalise those with disabilities when policies are shaped by hegemonic ideologies. Even technology, guided by a binary opposition of works/does not work, often excludes individuals with disabilities by failing to design adaptive tools that meet diverse needs.

These operational logics, or 'binary schematizations' (Baraldi et al. 2021, 42), of societal subsystems intersect with SEND in ways that reinforce existing inequalities. The Eurocentric focus of SEND, therefore, has inadvertently aligned with the dominant Western paradigms that prioritise efficiency, productivity and uniformity over diversity and inclusivity. In these situations, we witness (or observe) an unfolding paradox of binary distinctions in the case of SEND when inclusive intensions (guided by liberal values) lead to excluding actions (that liberal values intend to eradicate) by applying the guiding distinction of inclusion/exclusion into inclusion itself. Rasch remarks that 'the distinction of inclusion/exclusion is quintessentially self-referential. It desires inclusion but can achieve it only by excluding exclusion' (Rasch 2000, 109). By employing Luhmann's theory of distinction, this paper argues for a critical shift away from these constraints, proposing a more flexible and reflexive framework that allows SEND to decouple from these limiting operational distinctions and embrace a more pluralistic, global approach to education and disability. In the same breath, this paper serves also as a reminder that the distinction of inclusion/exclusion is 'doubly paradoxical' (Rasch 2000, 108). While striving for global inclusivity, we are mindful that whatever solution that is on offer, though it 'deftly "unfolds" the paradox of the original problem, making it at least temporarily invisible[,] it never *permanently* solves the original paradox' (Rasch 2000, 109; emphases are original).

In spite of the inherent double paradox of inclusivity, this paper proposes a systems theoretical framework that moves beyond these Eurocentric biases, advocating for the integration of perspectives from the Global South and indigenous communities. By embracing the plurality of knowledge systems to undo epistemic violence (Morris 2010, 35), or epistemicide (Santos 2015), SEND can evolve into a more inclusive and reflexive system, capable of adapting to the complexities of global diversity and reflecting on its constraints and limitations, not—this is important—to make itself perfect, or 'complete' (Luhmann and Schorr 2000, 377) through reflection.

A critical engagement with international legal frameworks such as the *Salamanca Statement* (UNESCO 1994) and the *Convention on the Rights of Persons with Disabilities* (CRPD) (2006) underscores this need for change. Although these documents communicate organisational decisions to promote inclusive education, they often reinforce Western-centric assumptions about disability and inclusion. By re-entering SEND's guiding distinctions—such as difference/norm and need/no need—into communication through a decolonial lens, this paper suggests that SEND can navigate its interdependencies with other societal systems more equitably, creating structural coupling that better reflects global realities.

A key focus of this systems theoretical approach is SEND's ability to perform its educational function while engaging in self-reflection. It is a fundamental process in systemic autopoiesis. Autopoietic systems generate their own elements through recursive communication, ensuring their self-reproduction and continual evolution, a biological concept of self-regeneration that Luhmann borrows from Humberto Maturana and Francisco Varela (Luhmann 2013, xi–xii). However, for SEND, as a meaning-constituted self-referential system, to engage in meaningful self-reflection, it must confront its blind spots, particularly the Eurocentric assumptions that have historically shaped its development. By introducing a dynamic process of boundary-crossing and re-entry, the system can evolve, forming new distinctions and facilitating a more equitable framework for education.

4 | SEND and Structural Coupling

Central to the adaptation of Maturana's concept of structural coupling is Luhmann's emphasis on compatibility and selectivity. He explains that such coupling can be conceived as a two-sided form and this form 'does not refer to the entire environment, since not everything that exists is structurally coupled with the system. Rather, couplings are highly selective. Something is included and something else is excluded' (Luhmann 2013, 85). Crucially, 'structural coupling is always compatible with autopoiesis' (Luhmann 2013, 85). The implication of this assertion is that in the dynamic relationship between system and environment, 'there are possibilities of [structural coupling] exerting influence on the system as long as its autopoiesis is not destroyed' (Luhmann 2013, 85). Brunczel (2010) infers that structural coupling therefore means 'a narrow zone emerges, in which a system can get into contact with its environment' (Brunczel 2010, 53). It implies that systems only include information that can be of value by excluding everything else from the environment. Given that SEND is resulted from systemic differentiation from the education system by means of adding SEND's 'operative closure ... into the binarity' (Baraldi et al. 2021, 42) of the system of education that 'develops a specific code that distinguishes between conveyable and unconveyable' (Baraldi et al. 2021, 83), SEND's coupling with other functional systems can be expected to serve more specific purposes. For example, the decree of inclusive education connects SEND with other function systems such as politics (Lindacher 2024). Under this condition, we can try to ascertain how SEND aligns its expected social functions with societal systems in its environment by retrospective analysis. The theoretical framework of structural coupling therefore offers us an analytical tool to identify the specific elements in other systems that are deemed viable environmental irritations through SEND's self- and other-observation for its autopoiesis.

Special Educational Needs and Disabilities (SEND) as a subsystem within the broader educational system is expected to

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fulfil specialised roles while contributing to the overarching social function of the entire system through structural coupling with other societal systems. The following section outlines how SEND is structurally coupled with the system of economy, politics, healthcare and technology to fulfil its social function.

4.1 | SEND and the Economic System

The social model of disability is deeply connected to the economic system, as economic policies and resource allocation play a significant role in either reinforcing or dismantling barriers to education for students with disabilities (Ainscow 2020b; Frawley et al. 2015). Taking an instrumentalistic view of education, two economists based at University of Chicago, Gary Becker and Theodore Schultz, conceptualise education as 'human capital' (Robeyns 2006, 72), effectively treating human individuals collectively as a national asset, in so doing fundamentally dehumanising individual human beings to the point of serving exclusively an external function that is the growth of economy. Guided by this principle of economic instrumentalism, any investment in education has positive values only if it brings about financial returns. It is therefore understandable why human capital theory (HTC) enjoys such a broad appeal among political economists, policymakers and educators with its glossy mantra of 'knowledge economy' (Livingstone 2012). What happens when economic returns cannot be guaranteed, when 'investment' seemingly turns to 'waste' according to such a linear causal input/output relationship in certain areas of educational provision?

Luhmann's concept of structural coupling between SEND and the economic system focuses on the provision of financial resources, grants and employment programmes that support the inclusion of students with disabilities which have suffered from 'chronic underfunding' (NCB 2024), according to National Children's Bureau. Interestingly, from the perspective of second-order observation, it is worth noting the interactions between the operational logics of structurally coupled systems.

In education, there has been a growing trend since the 1990s to adopt the logic of social Darwinism in the neoliberal economic system that is based on the distinctive binary codes of profit/loss, win/lose or survive/perish. This inextricable 'intersystem' (Luhmann 1995, 213) link between education and economy has long been observed by political economists and educational commentors in terms of the commodification of education and learners in a neoliberal economic system (Hastings 2019; Patrick 2013; Rudd and Goodson 2017). The relationship between education as a public service for the common good and neoliberalism that places higher values on competition, personal responsibility and reduction of government spending, for example, has been argued as being one of incompatibility and rising tension, particularly in the context of SEND and educational inclusion (Broderick and Roscigno 2021; Mac 2015, 2022; Patrick 2013; Romstein 2015; Rudd and Goodson 2017). Nevertheless, the coupling between the two systems is evident.

The OECD report, *Equity and Inclusion in Education* (2023), highlights the growing concerns among governments and education policymakers with equity and educational inclusion, following major developments around the globe such as 'demographic shifts, migration and refugee crises, rising inequalities, and climate change' (OECD 2023, 11). From an economic standpoint, governments and institutions are under pressure in their responsibility for the distribution of funds that enable schools to allocate resources, including providing necessary accommodations and pedagogical adjustments, such as adaptive technology, specialised teaching assistants and accessible infrastructure. National and Federal policies such as the Equality Act (Gov.UK 2010) in the United Kingdom and the Individuals with Disabilities Education Act (IDEA) in the United States create the structural coupling between SEND and economic systems by providing the financial framework for inclusive education. In a global context, the disparities between contrasting socio-economic conditions across nation states and geographical areas further exacerbate the challenges in the provision of quality education to learners with special educational needs and disabilities, often found in the most socio-economically disadvantaged households (Cole 2023; Kauffman 2020; Frawley et al. 2015; Miles and Singal 2010).

This interaction exemplifies how SEND depends on economic policies to perform its function, though the economic system must account for SEND in its resource distribution. For example, inclusive education may increase economic equity in the long term by fostering the skills of all citizens, including those with disabilities, who will then contribute to the workforce.

4.2 | Political System: Legislation and Rights-Based Frameworks

Subsystems in a functionally differentiated society form interdependent relationships through observing relevance in each other for reproduction (Baraldi et al. 2021, 118). For example, functional systems can be structurally coupled through shared symbolically generalised communication media. In the previous section, we see how the systems of SEND and economy are structurally coupled through the shared symbolic media of specific needs and funding, in which both pedagogical knowledge and money are conveyed in the intersystemic network of communication, incorporating common language of specialist educational terminology and fiscal vocabulary to construct a reality understood by both systems.

Perhaps, the most intriguing coupling is between SEND and its broader system of education. In this relationship we see how the symbolically generalised medium of 'success' in education (Baraldi and Corsi 2017, 32) can overshadow its 'wellbeing' counterpart in SEND. In turn, we can see how 'success' gains currency at the expense of 'wellbeing', for example, in a neoliberal economic system, the symbolic medium of success is privileged in the pursuit of efficiency, competitive advantage and productivity over wellbeing. The following paragraphs examine the interplay between SEND and the political system that is mediated by the legal system.

In this section, we turn our attention to the relationship between the system of SEND and the political system. Their relationship is primarily mediated through legal and regulatory frameworks. Political system establishes the power of mandates

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and expectations for inclusive education, as seen in the *CRPD* (2006), which enshrines the right to inclusive education without discrimination and on the basis of equal opportunity in Article 24 (*CRPD* 2006, 14). The decree of inclusive education therefore 'is unfolded in its potential for irritation for the educational system' (Lindacher 2024, 3). Considerable momentum has been garnered by international and national political developments. For example, the *Salamanca Statement* and the United Kingdom's Equality Act (Gov.UK 2010) provide further guidance for ensuring equality in education (Ainscow 2020a, 2020b; OECD 2023; Göransson and Nilholm 2014; Hornby 2014; Mitchell 2005; Schuelka 2018). It is important to note, however, structural coupling does not imply direct influence from one system to another, for example, from politics to education, or to the SEND system. Rather, systems require catalytic impetus in the form of irritations that are 'generated and perceived (and possibly processed) by a system' (Lindacher 2024, 3). From the perspective of systems, in additional to 'irritation' and 'stimulus' (or 'perturbation' if quoting Maturana), Luhmann prefers the term 'resonance capability [*Resonanzfähigkeit*]' (Luhmann 2013, 88) activated by structural coupling.

The structural coupling between SEND and politics in this context is encapsulated by the latest UK government report, 'Special educational needs and disabilities (SEND) and alternative provision (AP) improvement plan: right support, right place, right time' (Gov.UK 2023). Political system can only appear to 'exerts influence' on SEND through legal frameworks of laws and regulations that outline the rights of students with disabilities if its potential for irritation is actualised. SEND system, in turn, reciprocates such environmental irritation with organisational communications regarding the effectiveness of political directives, potentially advocating for further legal reforms or adjustments in the implementation of inclusive education (Ainscow 2020b; Lindsay 2003; Oad 2023; Thomas 2013). On a practical level, the social model of disability encourages policymakers to focus on dismantling institutional and societal barriers rather than simply providing accommodations for impairments (Nichols and Quaye 2008). A concrete example of this is the continuous dialogue between SEND professionals, advocacy groups and policymakers, leading to the refinement of education policies to better serve students with disabilities. The utilisation of such feedback loop is evinced, for example, in the context of higher education (Riddell et al. 2005). Interdependent reflexivity underlines this kind of intersystemic interaction, whereby both systems (education and politics) adjust their self-referential operations based on feedback (other-reference) from one another, in so doing creating a more responsive and inclusive legal framework.

4.3 | Healthcare System: Addressing Diverse Needs

Similar to the political and the economic systems, the healthcare system contributes to the construction of SEND as a constantly evolving self-referential system by making its own complexity available in a way that Luhmann describes as interpenetration (Luhmann 1995, 213). Such occupational and professional parallelism is prevalent in the argumentation in educational discourse surrounding the idea of professionalism and professional status of the teachers. The overarching semantics of 'evidence' as the basis of practice is transfused from the scientific reflection of the medical system to the pedagogical reflection of the educational system. Central to the mission of SEND is its care for the wellbeing of the most vulnerable groups in society. This mission can only be realised when supported by medical evidence, in turn, reports of interventional and/or therapeutic success provide evidence to justify the pathologisation of conditions, thus forming a profoundly interpenetrative relationship by explicitly linking clinical patients and children with SEND as a shared medium. Like the healthcare system's operational logic based on the sickness/health guiding distinction that 'structures the arena of communication between doctors and patients' (Baraldi et al. 2021, 145), in its support to students with special educational needs and disabilities—certified by the medical and registered in the social welfare systems—the system of SEND requires educational practitioners to act on evidence to implement recommendations from the healthcare providers to perform both educational and social functions.

The intense parallelism between SEND and healthcare also reveals that, like the healthcare system, the entire SEND system 'is geared towards the negative side of its code' (Roth and Valentinov 2022, 336)—deficiency. Whereas healthcare system surveys its environment for cases of illnesses rather than health, SEND system searches out individuals who are 'deficient' in certain physical, mental, intellectual, emotional, psychological and communicative capacities. When healthcare system 'is characterised and maintained by operations pertaining to the treatment of ill not healthy person' (Roth and Valentinov 2022, 336), it can be argued that the system of SEND is also characterised and maintained by operations pertaining to the treatment of person 'with special educational needs and disabilities' not person in the mainstream educational and social settings. But does this intensely close relationship between SEND and healthcare sit comfortably with individuals who may have medical diagnosis of certain forms of special educational needs or disabilities but refuse to be pathologised, especially when informed by critical disabilities studies or educational decolonisation (discussed in Section 5)?

This basic relational model is profoundly hierarchical in its privileging professional judgement informed by scientific knowledge, which is in turn based on another level of guiding distinction of knowing/not knowing. The assumption is clear: The patients and students with SEND are in a passive position (not knowing), whereas the doctors and teachers assume their active role (knowing) in administering required medical treatments or pedagogical interventions. Or we can assess this polarisation in a Spencer-Brownian expression that shows not knowing = unmarked state and knowing = marked state. What if we, in Luhmann's terminology, crossed the boundary?

It is worth considering a different scenario when the difference of the unity after such a transgressive act is observed as part of SEND's self-description. In other words, a scenario that facilitates the emergence of a new form of knowledge that factors in the lived experiences of patients and students with SEND (Hall 2019). The theorisation of this emerging body of knowledge therefore necessitates a methodology that emmeshes 'scrutinizing not bodily or mental impairments but the social norms that defines particular attributes as impairments, as well

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as the social conditions that concentrate stigmatized attributes in particular populations' (Minich 2016, 3). In systems theoretical framing, Michailakis (2003) takes this methodological departure further to argue the 'improbability of communication' (Luhmann 1995, 157) about a person's 'disabilities' across a range a functional systems on the basis that 'system-specific communication about these individuals cannot be transferred into another system' (Michailakis 2003, 215).

Ghesquière and Van der Aalsvoort's (2004, 218) advocacy for a systems theoretical understanding of SEND as an 'interactional process or a circular system' comes significantly close to a more recursive and discursive observation (that is not without the inevitable blind spot of its own) of the relationship between SEND and the healthcare system that may offer a more nuanced description of their complex interdependency. The author of *What Really Works in Special and Inclusive Education* (Mitchell and Sutherland 2020) further supports this structurally coupled relationship by showing how educational systems must integrate medical, psychological and legal inputs (external systems) to ensure inclusivity, however improbable or imperfect the intersystemic communication is. At the same time, the SEND system remains focused on its core mission of quality education, even when it must accommodate external interventions recommended in documents such Education, Health and Care Plans (EHCP), Individualised Education Plans (IEPs), Student Support Document (SSD in higher education in the United Kingdom) and therapies.

The interaction between SEND and the healthcare system therefore is critical for addressing the diverse needs of students with special educational needs and disabilities. Crucially, empirical research based on participatory designs or conducted by persons with disabilities can help build a fuller self-image of SEND system. The evolution of the theorisation of disabilities (Hosking 2008; Fine 2019; Hall 2019) underscores that health services should not merely focus on treating impairments but should work in tandem with education to remove the barriers identified by studies from a diverse range of perspectives that limit participation (Ainscow 2005; Hodkinson 2010; Miles and Singal 2010; Qu 2022). This interrelationship is vital for ensuring that students' medical and therapeutic needs are met, allowing them to engage fully in education.

From a practical perspective, structural coupling can take the form of a continuous dialogue between SEND and healthcare systems to ensure that students receive necessary accommodations, such as speech therapy, mental health counselling and physical therapy. These services are critical for enabling students with disabilities to participate in education on equal terms with their peers. The healthcare system also provides necessary diagnostic and support information that SEND uses to adapt its educational strategies (Castro and Palikara 2017). For example, collaboration between health professionals and schools ensures that students with autism spectrum disorders receive the necessary accommodations in class (Saggers et al. 2023). Healthcare providers and educators must continuously share information to create an individualised educational programme (IEP) that addresses both the educational and health-related barriers these students face (Jachova et al. 2018).

4.4 | Technology: Interface of Inclusion, Equality and Equity for SEND

If improbability underlines intersystemic communication with regard to SEND (Luhmann 1995, 158; Michailakis 2003), embeddedness characterises the ubiquitous presence of technology in education (Watson and Romic 2024), and by extension, SEND. Offering an expansive definition of technology to extend 'beyond machines or software to include a variety of processes aimed at simplifying or automating tasks, functions or processes' (Watson and Romic 2024, 2), Watson and Romic (2024, 11) consider technology as being bimodal. From the perspective of structural coupling, they argue that, on the one hand, 'it is instrumental in that it structurally couples between thought (the psychic system) and the physical world'. On the other hand, 'it has a semantic role in that it becomes a medium for communication and thought and therefore is a structural coupling between thought and society (the system of communication)' (Watson and Romic 2024, 11).

Being a tool and a medium at the same time to connect humans to society in both tangible and abstract forms underscores technology's unique position and potential in the functioning of SEND. Within this theoretical framing, technology plays a pivotal role in supporting students with SEND in overcoming societal barriers, particularly in the context of the competing medical, social and rights models. Technological innovations, such as adaptive devices, assistive software and online learning platforms, enable students with disabilities to engage in education more fully, for example, during the global pandemic when teaching was delivered online (Ahmed and Opoku 2022; Rice 2022). In this sense, technology acts also as a mediator between SEND and society by providing the tools needed to facilitate access and participation (Benton and Johnson 2015; Lambert 2019; Mahmod et al. 2017; Schindler et al. 2017), and on the other hand, it provides a useful vehicle for feedback from the system of SEND to that of technology (Gov.UK 2021), contributing to the network of systemic self-observation as a result.

Ensuring that all students have access to necessary technological resources requires coordinated efforts between SEND, policymakers, and the technology sector (Sweeney 2016) through meaningful intersystemic interpenetrative communication. For example, the United Nations' *Convention on the Rights of Persons with Disabilities (CRPD)* highlights the state's responsibility to ensure equal access to education for people with disabilities (Article 24). This legal mandate shapes the operations of the SEND system, showing how legal frameworks penetrate education, creating a structurally coupled relationship reinforceable by law. SEND adapts to these mandates while maintaining its core educational functions through operational closure.

In terms of the integration of technology into SEND in practice, structural coupling takes place when educational institutions adopt technological innovations designed to assist students with disabilities. For instance, text-to-speech software, screen readers and communication devices allow students with physical or learning disabilities to access the same educational content as their peers (Coleman et al. 2015; Mitchell and Sutherland 2020; Mulloy et al. 2014). Given such close structural coupling, the technology sector is compelled to continuously adapt its

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offerings based on feedback from SEND professionals, creating an ongoing cycle of improvement and innovation, which in turn yields greater financial returns for its investment. As such, the interdependency of the systems involved forms a symbiotic relationship that binds each other in a co-evolutionary process, as evinced in the most recent technological breakthrough in the field of artificial intelligence (AI).

The popularity of generative AI has gathered its momentum in recent years. In response, education practitioner and policymakers have also placed greater emphasis on its inclusive potential with its applications in educational settings. Following the release of ChatGPT in November 2022, AI has become a global focal point in the promotion of social justice through educational inclusion to narrow the digital divide and to remove inequality. Crucially, inclusion is defined to be a 'transformative process that ensures full participation and access to quality learning opportunities for all children, young people and adults, while respecting and valuing diversity and eliminating all forms of discrimination in and through education' (UNESCO 2019a, 1). In other words, education under the auspices of UN directives is expected to be designed for all, and it can be argued, *by* all and *for* all, with the help of the multifaceted affordances of AI.

Despite the burgeoning optimism however, technological advancement also exacerbates the situation of digital divide and inequality. One of the inherent attributes in technology is digital divide that is indicative of the broader social and structural inequalities where students with disabilities have limited access to technology (DiMaggio and Hargittai 2023; Gorski 2005; Sloane 2019) in both local and global contexts. Global organisations such as World Economic Forum published *A blueprint for equity and inclusion in artificial intelligence white paper* (WEF 2022) to point out that 'AI as a tool to improve the lives of people in an inclusive way is a promise yet to materialize' despite its 'profound impact on all industries, and more importantly, on the lives of people in all communities' (6). The opening paragraph in the *Global education monitoring report* (2024) highlights the disparities in a global context, citing: 'Children with at least one sensory, physical, or intellectual difficulty are 7 percentage points less likely than the average child to complete primary school: with a gap of 10 percentage points in Zimbabwe and 14 percentage points in Iraq' (UNESCO 2024a, 3).

Education, more than any other functional systems, is entrusted with such a noble mission, seen particularly in the context of Education 2030 (2016). To reiterate education's role and functions in society, the Assistant Director-General for Education of UNESCO, Stefania Giannini, proclaims in the opening speech of the Artificial Intelligence for Sustainable Development policy forum during the Digital Learning Week 2019: 'It is education that powers sustainable development, and this will only succeed if it leverages the digital revolution and in particular AI' (UNESCO 2019b, 22). Education is positioned as the key to the safeguarding of future international developments and the promotion of social justice, and the adaptability of education to technological advancement will determine their outcome.

Like the general educational system, SEND shares the role of fulfilling a critical societal function, ensuring the inclusion and development of students with special needs and disabilities that is outlined in the UN Sustainable Development Goal (SDG) 4: 'Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all' (UNESCO 2016, 7). Although the broader education system is tasked with transmitting knowledge, fostering social integration and preparing individuals for societal roles, SEND specifically adapts this mission to the unique needs of individuals with disabilities. For example, in the United Kingdom, the *Special Educational Needs and Disabilities (SEND) and Alternative Provision improvement plan* (Gov.UK 2023) proposes to achieve such a goal by introducing a single national system (7). This subsystem ensures that society's values of equity and accessibility are realised, contributing to broader goals such as economic productivity and social cohesion.

Leveraging technological innovations to bring about reforms in education may seem technically plausible, pedagogically compatible and morally desirable. Besides, the introduction of assistive technology to remove barriers to access to quality education for students with SEND injects much hope and excitement for educators. Yet, it is worth considering the inherent paradoxes in educational reform in terms of its two main objectives: quality and equality (Baraldi and Corsi 2017, 96). Because quality implies the differences between better and worse, inequality becomes an inevitable and direct product of the pursuit for quality (Baraldi and Corsi 2017, 96). It is in this sense that the coupling of technology and education for the advancement of educational inclusion must account for its own internal paradoxes: the more sophisticated the technology the potentially more subtle inequalities that it will produce. Exclusions in this process of inequality production become more difficult to identify and therefore to attribute to certain levels of the intersystemic coupling.

To acknowledge the inherent paradoxes of self-observation is to observe the blind spot of self-observation. Up to this point, this paper has offered a second-order observation of the self-description of the SEND system in terms of structural coupling, also with references to interdependency and interpenetration. As self-referential systems can 'insert description of themselves into themselves' (Luhmann 1990, 184), SEND formulates its self-description not with a simplified image of itself. Instead, it conceives itself as one of those complex systems that 'orient themselves towards their own complexity' (Luhmann 1990, 184). Unlike self-conscious units such as human individuals, Luhmann explains: 'Self-observation on the level social systems has to use social communication. Self-observing communication refers to the system that is produced and reproduced by the communication itself' (Luhmann 1990, 184). Functionally differentiated modern society, Luhmann continues, 'had developed theories as instruments of self-observation within different functional sectors' (Luhmann 1990, 185).

So far, we have focused on the self-observation of SEND by connecting it to theories developed within various social domains such as economy, politics, healthcare and technology. Though not being able to provide a comprehensive theoretical framework for self-observation, all of these theories serve as useful instruments nonetheless. The following pages attempt to offer a third-order observation of the self-observation of SEND to observe its own blind spot. This third-order observation is made from the vantage point of decolonial praxis

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as another instrument for SEND's self-observation, drawing references from theories developed within critical disability studies.

5 | The Horizon of Potentialities: The Future of Decolonising SEND

This paper has highlighted an epistemological limitation in its description of a second-order observation of SEND as a subsystem of the broader system of education in the United Kingdom. By extension, it also suggests areas for future research foci. The limitation of observing how SEND observes itself through analysing its structural coupling with other functional social systems such as economy, politics, healthcare and technology presupposes the existence of a blind spot (Luhmann 2013, 111) that requires a third-order perspective to render it visible and meaningful (Luhmann 2000, 61; Luhmann 2020, 328; Salem 2014, 30). The ordinal sequencing of observation denotes not a hierarchy of significance nor does it delineate a mere 'chain phenomenon ... It is also about reflection on the conditions of the possibility of second-order observation and its consequences for what can then still be a common world or a society that makes description possible' (Luhmann 2020, 328). The possibility of second-order observation is dependent upon the structural coupling between SEND and other societal systems based primarily on ideals and concepts developed in the industrialised Global North or the West. Because of this epistemological standpoint, on reflection, this paper offers only a partial view of our common world or society.

This systems theoretical capacity to reflect is consistent with the Luhmannian concept of re-entry whereby the system/environment distinction is re-entered into the system. In other words, the guiding distinction of the Global North and the Global South is re-entered into the system of SEND to allow further distinctions to emerge (Baraldi et al. 2021, 206). At the operational level, I propose a boundary crossing to the previously unmarked state in the SEND discourse to facilitate a third-order observation, namely, from the standpoint of decolonial scholarship in conjunction with critical disability studies.

As discussed at the beginning of this paper, the evolution of SEND as a subsystem of education in the United Kingdom reflects a specific socio-historical development (Lindsay et al. 2020; Warnock 1978). However, this trajectory has largely been shaped by Eurocentric and Western orthodoxy, often ignoring the diverse experiences and epistemologies of the Global South and indigenous peoples. The notion of 'special educational needs' itself reflects a paradigm rooted in modernity and Enlightenment ideals, where educational provision is based on standardised, individualised interventions grounded in biomedical approaches to disability (Grech and Soldatic 2016; Grech 2012; Soldatic and Grech 2017). Such approaches risk reinforcing forms of exclusion for populations in the Majority World, where these models do not always resonate with local realities or the complex ways disability is understood and identified within their communities (Singal 2010). Disability studies, when observed through the lens of southern theory, can be accused of becoming 'complicit in the neocolonising of the Southern space' (Grech 2012, 52).

When examining SEND as a subsystem of education through a decolonial lens, it is also crucial to acknowledge and re-examine its structural coupling with other social systems, such as economy, politics, healthcare and technology, often privileging the Global North. Global inequalities mean that systems in the Global South often do not have the same resources, infrastructure or support to provide inclusive education. In this context, SEND research must move beyond simply exporting Western models of disability and inclusion and instead engage in empowering and enriching dialogues with local communities to develop contextually relevant practices (Connell 2020). Historically, SEND emerged within a specific colonial context. The concept of 'special needs' emerged against the backdrop of industrialisation and the rise of nation-states in Europe, which began categorising people based on their ability to participate in labour markets (Goodley 2013; Goodley et al. 2019). As the Global North developed systems to manage and 'include' disabled people, the Global South's experiences of disability remained deeply affected by colonial histories that marginalised indigenous ways of knowing and being (Meekosha 2011; Shakespeare et al. 2002).

The traditional SEND paradigm has perpetuated forms of marginalisation by means of taxonomical categories informed by Western medical science, particularly when policies and practices are exported from the Global North to the Global South, often ignoring the indigenous, cultural and socio-economic contexts that shape education and disability (Grech 2012). For instance, international frameworks such as the *World Declaration on Education for All* (UNESCO 1990) and the *Salamanca Statement* (UNESCO 1994) have promoted inclusive education worldwide, yet they have been critiqued for embodying a neoliberal agenda that privileges Western ideals of inclusion from an ableist perspective without considering the realities of the Majority World (Goodley and Lawthom 2019; Kumar et al. 2012; Armstrong et al. 2010).

Indigenous epistemologies often conceptualise disability differently, focusing on communal wellbeing and collective responsibility rather than individual impairment. Singal (2010) explains her preference for the term '"people with disabilities" rather than disabled people, in an attempt to highlight a need to focus on the individual rather than the disability' (417). Yet, these perspectives are rarely acknowledged in dominant SEND frameworks, which centre medicalised and individualised approaches to education. In countries within the Global South, especially those grappling with postcolonial realities, SEND practices that rely on such frameworks can be ill-fitting, even harmful, as they do not align with indigenous concepts of community and disability (Grech and Soldatic 2016).

A decolonial perspective on SEND challenges its Eurocentric foundations and calls for an epistemological shift towards recognising the diverse ways in which disability and education are understood globally (Yee and Butler 2020). Indigenous epistemologies, for example, offer alternatives that see disability not as a deficit to be rectified but as part of the fabric of human diversity that should be respected and supported within communal contexts. In many indigenous cultures, education is not an individualised endeavour but is seen as a communal activity, where learning is holistic and integrated with the needs of the

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community, environment and spiritual life (Yee and Butler 2020). Drawing inspiration from the spiritual dimension that often characterises indigenous belief and attitudes towards different attributes of a person, advocates of decolonising research have proposed a methodology that is built on an understanding of 'indigenous modes of difference' (Lovern 2021). Introducing the case of Māori Vitalism as 'the belief in an original single source of life continues as a force that imbues and animates all forms and things in the cosmos' (Lovern 2021), the author argues that since an ideal person or way of existing is absent from Māori spirituality, '[d]ifferences in bodies or in minds allows for the expansion of knowledge beyond a single set of shared constructs or shared theories' (Lovern 2021). Others have proposed specific approaches to conduct qualitative research that employs explicitly indigenous methodologies, including '(1) exercising critical reflexivity, (2) reciprocity and respect for self-determination, (3) embracing "Other (ed)" ways of knowing, and (4) embodying a transformative praxis' (Thambinathan and Kinsella 2021, 1).

In the Global South, the systems of education, including SEND, are often deeply affected by socio-economic factors such as poverty, political instability and under-resourced public institutions. For instance, in African and South Asian countries, access to special education services may be limited, and many children with disabilities remain outside formal education systems altogether (Miles and Singal 2010). Yet, the Western model of SEND, rooted in individualised support and formal schooling, fails to account for these broader systemic issues (Hodkinson and Williams-Brown 2022). A more relevant approach would recognise the need for multi-level strategies that address not only educational barriers but also the wider social, economic and political contexts in which children with disabilities live (Erevelles 2011).

Furthermore, the technological and political systems that SEND is coupled with in the Global North may not translate well to countries where infrastructure is lacking. In the Global South, schools may not have access to assistive technologies, and political systems may be unable or unwilling to prioritise the education of children with disabilities (Barnes 2011; Puli et al. 2021), as shown also in the case of South Africa during COVID-19 pandemic (McKinney et al. 2024, 2).

6 | Conclusion

A Luhmannian approach to decolonising SEND is particularly pertinent because it emphasises the autopoietic nature of systems, whereby systems such as SEND continuously reproduce their structures through recursive communications. This self-referential process allows SEND to adapt to changing societal conditions. Decolonisation, in this sense, becomes not merely a political or ethical imperative, but a systemic one, the other side of the coloniser/colonised distinction, the negation of colonialism. For SEND to remain relevant and effective globally, it must engage in a process of self-reflection that challenges its Eurocentric blind spots and integrates the diverse, often marginalised, perspectives of the Global South and indigenous populations. The inclusion of these perspectives ensures that SEND can evolve in ways that reflect the lived realities of different communities, thereby fostering greater equity and inclusivity.

In the enigmatically titled 'I see something you don't see' (Luhmann 2002), Luhmann criticises the Frankfurt School by pointing out that their 'occupation with texts rather than with realities, the description of others' descriptions—all of this fits into the picture of a tradition of thought unable to see what possibilities today's society offers for self-description' (192–193). Against this particular historical backdrop, decolonising SEND may stand to offer a *differing* perspective from a post-Enlightenment tradition of rationality that privileges logocentrism and scientific objectivity.

The systems theoretical framework proposed in this paper offers three distinct benefits for decolonising SEND to safeguard its function to society, performance in relation to other function systems and its ability to reflect. Firstly, it allows for structural coupling with non-Western epistemologies and indigenous knowledge systems, enabling SEND to engage in more dynamic exchanges with diverse societal systems to formulate a kind of global, ecological communication. This reconceptualisation moves beyond Western-centric diagnoses and interventions, recognising that disability and education are experienced and understood differently across cultures. By facilitating boundary-crossing and communication across systems, Luhmann's theory helps SEND better accommodate these diverse perspectives through structural realignment to promote social justice as its core function.

Secondly, interdependency between SEND and other subsystems—such as economy, politics, healthcare and technology—is reconceived to include Global South and indigenous systems of knowledge, fostering a more inclusive approach to education and disability. SEND's interdependency with other societal systems must not only accommodate the needs of the Global North but must also be sensitive to the political, economic, healthcare and technological realities of other regions while remaining sensitive to dramatic changes to global environment and ecosystem. By using a Luhmannian framework, SEND can actively engage performatively with these systems, ensuring that educational policies are responsive to the unique challenges faced by marginalised populations.

Thirdly, turning itself into its own medium through self-reflection and autopoiesis, SEND can address the limitations of its current models and generate new elements for systemic reproduction. This is essential for decolonising research to generate new theories, as SEND must critically re-examine its foundational assumptions and use new theories for self-observation. Luhmann's emphasis on the recursive nature of systems helps to create spaces for re-entry, where new distinctions and possibilities emerge as SEND engages with its own blind spots. The systemic ability to reflect and evolve is particularly critical for ensuring that SEND's future development is globally inclusive, rather than reproducing Eurocentric biases. We can anticipate a programme that broadens the research horizon by entering decolonisation into the Global North/Global South distinction in SEND. Such reflective praxis creates spaces for global partnerships and interdisciplinary collaborations that challenge dominant Western paradigms. In so doing, it supports a more equitable and globally representative system of education. In Luhmann's terms, decolonising SEND can therefore be described as follows: 'The basic difference between actuality and

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the horizon of potentialities is that it is possible to redifferentiate differences among open possibilities' (Luhmann 1995, 74–75).

Furthermore, recalling the warning against decolonisation as a tokenistic piecemeal or a mere metaphorical posturing (Tuck and Yang 2012), in advocating for a decolonial shift, this paper also calls for the inclusion of indigenous and Global South epistemologies into SEND's operational framework. Decolonising SEND research entails moving away from Eurocentric prescriptions and fostering methodological pluralism that values the diverse ways in which disability, education and inclusion are conceptualised across cultures. This paradigm shift is critical for reshaping the research methodologies and theoretical foundations that have long informed SEND. Decolonising SEND research through a systems theoretical lens not only broadens the epistemological horizons of SEND but also challenges the structural inequalities that have marginalised non-Western contributions to educational theory and practice. This paper, therefore, urges education practitioners, researchers and policymakers to engage in decolonial praxis (in a Freirean sense) in their endeavour to promote social justice through global educational inclusion. In doing so, a systems theoretically informed decolonising SEND research inserts the North/South distinction back into the distinction between educational studies (*Erziehungswis-senschaft*) and the art of education (*Erziehungskunst*) (Luhmann and Schorr 2000, 205) to continue the debates about the relationship 'between theory and praxis' (Luhmann and Schorr 2000, 205).

Ultimately, this paper argues that a Luhmannian systems theoretical framework offers SEND a way to navigate the complexities of global diversity while retaining its systemic function. By emphasising structural coupling, interdependency and autopoiesis, the framework not only supports the decolonisation of SEND but also promotes its evolution as a subsystem capable of fostering global inclusivity and equity. The decolonisation of SEND is, therefore, a theoretical and practical imperative for reshaping global educational policies, practices and research.

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RESEARCH ARTICLE OPEN ACCESS

The Regenerative Semantics and Structural Change: Social Systems Using Nature as a Regenerative Medium

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ABSTRACT

This study examines how recursive feedback, and shifts toward regenerative semantics co-evolve with systemic autopoiesis, transitioning businesses to regenerative models. Methods: Grounded in Luhmann's Social Systems Theory, the research develops and applies a conceptual transition model based on Luhmann's understanding of evolution. Four illustrative cases demonstrate regenerative practices and various positions in the emerging ecoservice market. Results: The findings reveal that recalibrated market mechanisms, such as payments for ecosystem services, digitally supported transparency, and new supply chains are critical for adoption of regenerative models. Meta-reflection, reflection, and reflexivity embed regenerative principles into organizational practices and polycentric networks. Conclusions: While early progress is evident, achieving a regenerative phase transition requires broader regulatory support, strengthened shared semantics, and accelerated adoption. Regenerative semantics enable society, including businesses, to move beyond harm mitigation, extensionally engage to regenerating nature and enhancing human well-being, offering a hopeful but non-deterministic path to a regenerative future.

1 | Introduction

Luhmann's social systems theory has become significant in sustainability, ethics and corporate social responsibility (CSR) discussions, offering insights into dynamics between corporations and their social, human and ecological environments. Regenerative concepts extend beyond sustainability by emphasizing systems that engage with an intension to actively restore and improve their environments through autopoietic processes. This advances Luhmannian scholarship by proposing that firms can do more than adapt; they can engage with an intension to regenerate their social and non-social environments. These regenerative ideas are not mere semantics but manifest in structural changes, as explored in this article.

Luhmann (1995b) defines social systems as self-referential, autopoietic entities composed of communications. These systems are operationally closed but open to communication. They 'know' about non-social environments only through communication, which limits their ability to predict or influence ecological conditions (Luhmann 1993a). This challenge arises from the interplay of knowledge and non-knowledge, with unknown variables complicating ecological predictions (Luhmann 1993a, 534–535). This uncertainty persists in climate modelling, illustrating the difficulty in forecasting non-social environments.

Luhmann's concept of 'structural coupling' describes how systems selectively resonate with their environments (social and non-social) through a medium without interfering with the

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system's autopoiesis. While this structural coupling informs the systems structures, it also excludes elements, sometimes with negative consequences (Luhmann 2012–2013, 85). For example, social systems' structural coupling with ecological conditions reveals complexities in predicting the impact of human actions. As Luhmann notes (1993a, 534–535), understanding the effects of social and technological systems on ecological conditions involves navigating a mix of knowledge and non-knowledge. This is also highlighting the challenges of applying regenerative approaches.

The notion of thresholds, akin to tipping points, is central to Luhmann's exploration of system boundaries, social evolution, and complexity. Thresholds mark moments when systems adapt or respond to stimuli, facilitated by communication across boundaries. These transitions are fraught with uncertainty, especially in ecological contexts, where side effects of interventions are difficult to predict (Luhmann 1995b). This underscores the complexity of achieving systemic transformation through regenerative solutions.

Despite these challenges, new market mechanisms address sustainability by integrating nature-based solutions to restore ecosystems and address societal challenges (IUCN and UNEP 2021). Digital platforms demonstrate evolving structural couplings between social systems and their psychic, technological, and nature-based environments. This article illustrates regenerative thinking through four cases, showing how multifunctional organizations (Roth 2014) engage with the polycontexturality of modern society (Luhmann 2012–2013, 183), ecological environments, and human well-being. By leveraging recalibrated market mechanisms and digital technologies to verify ecological impacts, these businesses have made regeneration central to their operations. Moving beyond 'doing no more harm,' they adopt regenerative semantics to create a net positive impact on their environments.

The cases align with Luhmann's third-order observations, which involve reflectedness where self-descriptions become a topic of self-description—a meta-reflection (Luhmann 2012–2013, p. 328). This reflective capacity fosters systemic change, as organizations integrate regenerative semantics into their communication and operations in ways rethinking business by making the regenerative purpose centre stage, and business becomes a mean to the end. Luhmann (2000, 2012–2013) highlights the role of semantics (encompassing language, principles, and models) in shaping structural evolution, where generalized meanings co-evolve with societal change. The relationship between semantics and structure is complex and dynamic, as semantics serve both anticipatory, constitutive and retrospective functions (Stichweh 2006).

However, corporate communication often risks hypocrisy when semantics suggest alignment with sustainability goals without substantive action (see Section 2). While there is no guarantee that regenerative semantics will achieve widespread adoption, they improve societal self-observation by integrating previously excluded externalities into functional systems like the economy. This fosters a symbiotic co-evolution of social systems and their environments, enabling a regenerative approach.

Regenerative semantics (Neisig 2022, 2023a, 2023b, 2024) emphasize the structural coupling of social systems with human (psychic and organic) and natural environments, often mediated through technology. This approach aims to restore and improve environments while enhancing sustainability feedback mechanisms (Valentinov 2014, 2017; Neisig 2022). However, this article also explores whether regenerative semantics enable corporate hypocrisy or drive substantive shifts in business practices. The illustrative cases demonstrate how regenerative semantics influence the potential for real change in corporate strategies.

This research seeks to answer: *How can regenerative feedback mechanisms influence the transition from sustainability-focused to regenerative business practices, and what part does regenerative semantics play in catalysing change of social structures?*

The notion of transformation versus transition is worth being clear about. Transformation focuses on the outcome (what changes), while transition focuses on the process (how the change happens).

The article examines how regenerative feedback and evolving semantics 'irritate' businesses, prompting shifts in structures toward regenerative practices. It highlights the co-evolvement of meaning-making, communication, and structural change in driving this transition.

First, the article will account for how the social systems theory contributes to the understanding of sustainability issues, and how semantics play a part—but also how regenerative semantics advance these contributions. Second, the article builds a conceptual transition model explaining how semantics can support a structural regenerative transition. Third, the article unfolds how market mechanisms are recalibrated and then brings four illustrative examples of emergent business models making use of the recalibrated market and regenerative semantics—feeding into a discussion about how these examples embody the new semantics and the conceptual transition model. Fifth, in conclusion, the article wraps up on the research question, and in the closing remarks addresses how to avoid, that the new market mechanisms provides leeway for corporate hypocrisy but facilitates real changes in corporate strategies.

2 | How the Social Systems Theory Contributes to the Understanding of a Potential Regenerative Transformation

Luhmann (1995b, 2) identifies three types of social systems: interaction systems, organizational systems and societal systems. Organizational systems are centred on decision-making processes, where the structure and continuity of the organization depend on a series of decisions made and executed over time. Prior decisions define the organization's orientation and guide its future decision-making. Societal systems, on the other hand, are characterized by functional differentiation, where various functional subsystems such as the economy, politics, law, science and education operate independently but may structurally couple. Each subsystem performs distinct functions that contribute to the overall stability, evolution and complexity of society.

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Related to the functional differentiation of society, Luhmann (2012–2013, 183) refers to polycontexturality, recognizing that:

"... society would have to describe itself in metaconceptual terms as polycontextural or hyper-complex. Every single self-description as description then takes account of its own contingency. It takes into account (and indicates that it does so) that there can be other self-descriptions of the same system."

Luhmann further describes polycontexturality as a self-describing system conceding that there can be more than one equally plausible self-description (2012–2013, 313). He links this to the need to "*shift the standpoint of the observer to the level of second-order observation, if not a third-order one*" (2012–2013, 313). This means that each functional system operates within its unique context or 'logic,' creating multiple, overlapping social realities.

Organizations are not directly tied to specific functional systems. Roth (2014) elaborates that organizations often operate as multifunctional entities, capable of shifting their primary functional orientation over time. For instance, an organization may prioritize economic functions at one period and later transition to emphasize political or legal functions, depending on strategic objectives and environmental demands. This adaptability enables organizations to serve as translators between various functional systems, effectively bridging and integrating diverse societal functions through decision-making processes.

As society's complexity increases, organizations increasingly create polycentric networks (Teubner 1993, 2011a) where multiple centres of decision-making operate autonomously yet interdependently, fostering adaptability and resilience. These networks enable organizations to navigate and better respond to the diverse demands of functional systems within a functionally differentiated society. While the concepts of polycentric networks, multifunctionality, and polycontexturality seem similar, they differ in focus: decision-making is in focus for polycentric networks and multifunctionality in organizations while function-specific operations and logics are in focus for the polycontexturality.

Luhmann (1995b, 2) also identifies three types of non-social systems: technological systems (machines), organisms, and psychic systems, acknowledging that this is not an exhaustive list. He emphasizes that systems do not have an essence but instead produce and reproduce a difference between themselves and their environment (1993a, p.531). However, Luhmann is sceptical about classifying ecosystems as systems due to their lack of clearly definable boundaries, which he sees as necessary for operational closure and self-referentiality. Counterarguments suggest ecosystems can have dynamic boundaries, but this article abstains from this debate, focusing instead on the social systems and ecological environments.

2.1 | Advancing CSR Through Luhmann's Social Systems Theory: Toward Regenerative Operations

Luhmann's social systems theory has become foundational in discussions of sustainability, ethics, and corporate social responsibility (CSR), emphasizing autopoietic, operationally closed social systems that are open only to communication. This framework helps explain how corporations interact with their social, human, and ecological environments. The regenerative approach extends beyond sustainability, highlighting the potential for systems to engage actively to restore and enhance their environments, enabling companies to not just adapt but positively impact their environments.

Valentinov (2013) integrates Luhmann's and Boulding's ideas, advocating for sustainability approaches that respect ecological and social boundaries while aligning corporate actions with them. Regenerative practices build on this by transitioning from mere sustainability (doing no harm) to having an intension of actively restoring and improving environments. Valentinov (2014) further explored the complexity-sustainability trade-off, suggesting organizations balance operational complexity with sustainability goals. Regenerative operations align with but extend this by the possibility for redesigning operations to restore and improve social and non-social environments, ensuring long-term ecological and human well-being.

Alexander and Blum (2016) applied Luhmann's theory to integrated reporting, showing how corporate communications bridge economic and ecological objectives. While traditional sustainability reports focus on operational legitimacy, regenerative reports would reveal how core business activities engage to actively contribute to the regeneration of climate, ecological environments and human well-being. Similarly, Valentinov (2017) linked Luhmann's ideas on feedback mechanisms with Wiener's, demonstrating how feedback loops foster self-regulation and adaptation. Regenerative practices extend these loops to ensure net-positive outcomes, enhancing resilience in natural environments, social systems, and human well-being.

Valentinov, Roth, and Will (2019) examined stakeholder theory through Luhmann's lens, demonstrating that stakeholder interactions are mediated by corporate communications to maintain autopoiesis. Regenerative practices redefine stakeholders as partners in fostering regenerative cycles that enhance shared social and ecological environments.

Jauernig and Valentinov (2019) explored the 'hypocrisy avoidance' approach in CSR, which bridges the gap between corporate communication and tangible action. To maintain credibility and public trust, corporations should align CSR communication with genuine efforts observed by stakeholders. This reduces the risk of greenwashing. A regenerative approach to CSR advances this concept by emphasizing structural change rather than merely aligning actions with communication. While hypocrisy avoidance aims to prevent reputational damage, the regenerative approach embeds regeneration and ethics into business operations, transforming CSR from reputational management into proactive strategies for fostering trust through regenerative innovation. Instead of merely avoiding harm, businesses adopting a regenerative approach commit to practices that contribute to long-term, positive change in their environments.

Roth and Valentinov (2020) highlighted the interdependence between societal function systems and ecological environments, advocating for organizations to recognize their relation to

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multiple environments and incorporate multiple functional systems into their operations. Regenerative approaches extend this perspective by including previously externalized impacts on nature and human wellbeing into the logics of functional systems.

The article "*CSR Beyond Economy and Society: A Post-Capitalist Approach*" (Roth et al. 2020) critiques traditional CSR for its entrenchment in capitalist logic, which limits its ability to address broader societal and environmental issues effectively. Conventional CSR often reinforces capitalist structures by prioritizing economic growth and therefore risks superficial greenwashing. In contrast, a regenerative approach reshapes CSR, integrating the regeneration of degraded environments into business operations rather than treating it as an add-on. This approach redefines CSR to foster meaningful interactions between businesses and their environments, embedding genuine social, ecological, and human value into business models.

Valentinov, Roth, and Pies (2021) explored the alignment of social goals with corporate operations through reflexive mechanisms. The regenerative approach extends this by proactively enhancing both social and ecological environments as well as human well-being.

Knudsen (2024) draws on the distinction between Umwelt (what social systems observe) and environment (the unobserved world), arguing that indifference to the environment outside the observed Umwelt underlies Grand Challenges. He suggests organizations must compensate for society's inability to address these challenges by developing intelligent self-limitation. An intelligent organization is aware of its non-knowledge and incorporates this awareness into its actions.

Using the Umwelt-environment distinction, organizations demonstrate intelligence by reflecting on the impact of their Umwelt-bubble and adopting policies that avoid negative environmental effects. This represents second-order observation, where organizations acknowledge their limitations and act accordingly. Third-order observation, which is explained below, allows organizations through meta-reflections to change distinctions integrating more of the external environment into their Umwelt, enabling such organizations to adopt regenerative practices that positively impact their environments (Net+), and to create meaningful inner representations of the unobserved world.

This shift likely requires new semantics, recalibrated logics of function systems, advanced digital technologies, and polycentric networks (as defined by Teubner 1993, 2011a) spanning new supply chains. The polycontexturality, semantics and organizational self-descriptions, thus, co-evolves in this process, as demonstrated in Section 4. While these changes are complex, the co-evolvement of the regenerative semantics, recalibration of market mechanisms and the four illustrative cases in this article exemplify the emerging state of this transformation as well as the transition process.

In summary, incorporating regenerative semantics, recalibration of functional systems, and changing organizational self-descriptions, into Luhmann's systems theory advances sustainability research and CSR by seeing businesses as potential agents of regeneration. Rather than merely adapting to ecological and social pressures, firms can possibly contribute to regeneration, fostering net-positive developments and resilience in both social and non-social environments.

2.2 | Reframing Paradigms: The Role of Third-Order Observation in Systemic Change

Crises such as the 2008 financial crisis and the COVID-19 pandemic highlight the urgency of addressing sustainability challenges. The UN's 2030 sustainability goals seem achievable only by the end of the century (Neisig 2023a), and the world risks surpassing the 1.5°C threshold outlined in the Paris Agreement (UNFCCC 2015). Environmental degradation, climate crises, and geopolitical tensions – such as the Russia-Ukraine conflict – underline the complex interdependencies of energy, resources, and food security. Yet, the modern polycontextural society, constrained by fragmentation and risk-inducing dynamics, often fail to respond effectively (Luhmann 1997).

Luhmann's social systems theory explains how observation and semantics drive structural change. Functionally differentiated systems (e.g., economy, politics, media) operate with distinct codes, such as payment/non-payment in economics or government/opposition in politics (Luhmann 2012–2013; Roth and Schütz 2015). While these codes enable self-reproduction, they also fragment societal self-descriptions into a polycontextural landscape (Luhmann 2012–2013, 313). To operate in this complexity, systems reduce external complexity through internally generated meanings (Luhmann 1995b). These meanings, though transient, stabilize through generalized semantics that guide reflection and structural adaptation across systems, such as sustainability semantics influencing politics, economics, and education (Luhmann 1980–1995; Luhmann 1995b; Andersen and Born 2000).

Observation underpins social systems adaptation. Observations distinguish and interpret reality, but the distinction itself – a 'blind spot' – remains invisible to the observer. Semantics shape how systems create distinctions, observe and respond to their environments. Repeated observations refine semantics, creating a feedback loop. Reflection, or second-order observation, enables systems to observe observations, fostering dynamic adaptation (Luhmann 1993b, 1995a). As Luhmann and Rasch (2002) note, the observer "*sees what the object sees, how it sees what it sees, and perhaps even what it does not see*." This process has been instrumental in evolving concepts like stakeholder capitalism (Freeman 2017), the circular economy (Ellen MacArthur Foundation (EMAF) 2015), and ESG reporting (Eccles, Lee, and Stroehle 2020), though these often focus on harm reduction rather than regeneration (Neisig 2025).

However, Luhmann also introduces third-order observation, which elevates reflection by critically examining the paradigms and premises underlying observations (Luhmann 2000, 2012–2013, 313, 328, 337). While not fundamentally different from second-order observation, third-order observation involves deeper abstraction, meta-reflection, and scrutiny of distinctions and frameworks shaping self-observations. For businesses, this can mean redefining paradigms like profit, reframing it as a tool

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for ecological regeneration, which fosters structural changes in decision-making and supply chains.

Third-order observation enhances adaptability by allowing paradigmatic shifts of self-descriptions e.g. by addressing the polycontexturality of systems in a transformative way—e.g. integrating perspectives in a multifunctional way including also technological, ecological, and human contexts (Roth and Valentinov 2020). Using structural couplings to include previously externalities, such as when the political system, listen to the scientific systems, and 'irritate' the economic system to include ecological considerations through the political system's structural coupling with the legal system, is exemplifying this process. By reframing paradigms and semantics, systems recalibrate structures and operations, fostering transitions toward regeneration through changed feedback mechanisms (Valentinov 2014, 2017).

Semantics dynamically co-evolve with structures and communication processes, guiding systems' evolution (Luhmann 2012–2013). Over time, new semantics may reshape distinctions to better navigate environmental complexity, serving as enabler for long-term structural adaptation. Third-order observation amplifies this transformative potential, allowing systems to reassess foundational premises, align with ecological imperatives, and embrace regenerative practices that transcend harm reduction to engage to actively restore degraded environments.

3 | Regenerative Semantics and the Regenerative Transition: A Conceptual Model for Societal Change

A regenerative approach calls for new self-descriptions and business models throughout entire supply chains. For regeneration to occur, communication within society must promote regenerative solutions to ecological damage and human suffering, originating from not including externalities in the logics of functional systems. Understanding a regenerative transition is grounded in Luhmann's concept of autopoiesis and emerging from the system's own capacity for reflection and adaptation. The regenerative semantics is allowing for dynamic changes that reshape the systems' identity and functioning over time—reshape the distinctions by which various systems observe and reflect. For understanding how this could occur, the point of departure is Luhmann's understanding of evolution explaining how systems develop and adapt over time through a non-linear, three-step process involving variation, selection, and stabilization (Luhmann 1995b):

- *Variation*: Systems generate new possibilities internally or in response to environmental perturbations. Variations emerge from existing structures, creating new semantics through internal distinctions or external challenges. For example, societal systems may generate new paradigms to address novel ideas.
- *Selection:* Systems choose variations compatible with their internal logic, discarding those that do not integrate smoothly. For instance, scientific systems evaluate new theories based on compatibility with established knowledge but may eventually select new paradigms.
- *Stabilization*: Selected variations are embedded into system structures through repetition and communication, ensuring alignment with autopoietic organization. For example, new scientific concepts become institutionalized through publications, teaching, and practice.

By addressing how systems transition from old to new meanings, Luhmann's understanding of evolution explains not only structural changes but also the evolution of the interpretive frameworks that guide those changes—semantics. This perspective is crucial for understanding how systems remain dynamic and responsive to their environments while maintaining coherence and operational closure.

One key feature of Luhmann's understanding of evolution is its non-deterministic nature. He proposes that evolution is influenced by chance occurrences and system-specific contingencies rather than being driven by external causes alone. This perspective highlights the unpredictability and unique internal dynamics that guide each system's development. Another central aspect is the principle of system-environment differentiation. While external factors may act as triggers for change, the evolutionary process itself is confined within the boundaries of the various systems. This means that the systems operate with a degree of autonomy, responding to external stimuli through internally governed mechanisms. Finally, Luhmann's understanding underscores the importance of dynamic adaptation. This feature allows systems to make meaning of the complexity of their environments and adjust to changing circumstances. Crucially, this adaptive process occurs while each system retains its operational closure, meaning it remains self-referential and maintains its distinct identity even as it evolves, and the system finally eventually selects a changed self-description. This understanding explains how systems evolve by continuously processing disturbances and internal innovations within their own (co)evolving frameworks.

Grounded in this general understanding of evolution, a Luhmannian conceptual model for a regenerative transition should include elements such as 1) *Strengthening sustainability feedback with a regenerative focus,* 2) *Reentry (reflection) creating regenerative reflexivity*, 3) *Strengthening rearranged structural couplings for regeneration,* 4) *Tipping points (thresholds) leading to regenerative phase transitions*, and 5) *Regeneration becoming part of the systems memory of social systems (Retention).*

Thus, a Luhmannian conceptual transition model for regenerative societal change could be:

1. *Strengthening sustainability feedback (see* Valentinov 2013, 2014, 2017*) with a regenerative focus*: Most communication and semantics, as for now, are taking the current state as point of departure for feedback. To create regenerative feedback loops, require regenerative market mechanisms, regenerative supply chains and cultures. Corporate reporting frameworks (semantics) aimed not only at doing less harm, but at regeneration needs to be created. These should account for contributions toward regeneration of ecosystems, such as success of reforestation, improved soil health, and regenerated biodiversity, as well as improvement of human well-being and inclusion of a broad

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multifunctional orientation in the business models (see the Luhmannian based multifunctional compass described by Roth and Valentinov (2020)). As reentries (reflection) across multiple systems are required in phase two, *strengthening of sustainability feedback with a regenerative focus* will need compliance with a semantics for a 'transparent' communication, as e.g. mandated in the EU's new ESG regulations which is now legally binding and introducing penalties (Neisig 2025). Enforcing regulation through the legal system is one way to 'irritate' organizations to select a specific semantics in communication making polycentric networks more aligned and attuned for rearranging structural couplings.

2. *Reentry (reflection) creating regenerative reflexivity*: Reentry refers to a system's capacity to observe and reflect on its own operations by distinguishing between itself and its environment within its internal framework. This allows the system to process its interaction with the environment not as external input but as observations mediated through its own structures and distinctions. By recursively integrating these reflections into its operations, the system adapts and evolves while preserving its self-referential organization.

In a regenerative context, this process is supported by embedding narratives and evidence of regeneration into the semantics through mass media, policy, education, science, arts and other function systems using the results obtained by first mover organizations with affinity to the economic system and the newly included previously economic externalities (see Section 4). Thus, this phase requires various functional systems in the polycontexturality to resonate with regenerative semantics. These emerging narratives should ensure regenerative outcomes are central to societal discourses, encouraging organizations to reflect on and incorporate regenerative practices into their operations in an infectious process of 'irritation'.

3. *Strengthening rearranged structural couplings for regeneration*: Structural couplings refer to the selective interdependencies between social systems and their environments. For regeneration to happen, these couplings must support regenerative principles. This includes altering communication processes within and between systems to integrate regenerative perspectives when forming structural couplings (Neisig 2022) and thereby transforming the flow of resources to regenerate nature and human well-being (see the *four-layered structural coupling* described by Neisig 2022). Interactions and decision-making in polycentric networks of organizations (defined by Teubner (1993) and elaborated in (Teubner 2011a)) in which different 'nodes' are playing different roles focused on regenerative practices can support this transformation and transition process (which will be illustrated in Section 4). Regenerative practices reframe stakeholders as structurally coupled organizational systems cultivating regenerative cycles that sustain, and nurture social systems and ecological environments to become net-positive. (Now the structural change is not only for first movers but the contagious process is gaining momentum).
4. *Tipping points (thresholds) leading to regenerative phase transitions*: Societies undergo rapid change when they reach critical tipping points—thresholds (see Luhmann's explanation of historical shifts (Luhmann 2012–2013, chapter 4)). Tipping points such as soil depletion, catastrophic weather events and wildfires with heavy human and economic consequences, or political pressure for regenerative action, can catalyse a shift from sustainability to regeneration. For instance, the EU's approval of the Nature Restoration Law (Official Journal of the European Union, 29.7.2024), effective from August 2024, mandates Member States to restore at least 20% of land and sea areas by 2030 (EU countries must restore at least 30% of habitats in poor condition by 2030, 60% by 2040, and 90% by 2050). This EU law is based on actionable goals set out by The Global Biodiversity Framework, COP in 2022 (Official Journal of the European Union, 29.7.2024), and are thus supposed to become a global trend, which could enforce a tipping point toward regeneration.
5. *Regeneration becomes part of the systems memory of social systems:* This phase highlights the retention of regenerative concepts, making them a permanent aspect of social systems' operations. In this final phase, regenerative practices and semantics, developed earlier, embed within the systems memory. Luhmann describes systems memory as the accumulation of past communications that can be reintroduced in future operations, helping systems adapt to new challenges. For regeneration to endure, regenerative feedback, reflexivity, and structural couplings must be codified and routinely utilized. Retention of these practices ensures they become recurring operations, not just temporary responses to crises. For instance, climate and ecological regulations and sustainability protocols must evolve from innovations to become integrated into the frameworks within the systems. Once internalized, regeneration becomes part of the system's memory, enabling it to reproduce these practices without immediate pressures, maintaining resilience and adaptability. As regenerative concepts shape the systems' self-descriptions, they guide future communications, decisions, and policies, embedding regeneration as the core of the systems' identity.

Regenerative change is likely to happen through such steps over time—if at all. Societal communication could evolve to emphasize not just sustainability but the transformative potential of regenerative practices. Media, education, science, and politics could communicate the regenerative semantics, expectations and structures, building broader support facilitating widespread selection.

Feedback systems could track and communicate the regenerative projects creating expectations. Monitoring metrics such as carbon capture through nature-based solutions, ecosystem recovery, and biodiversity restoration could provide confidence in documented evidence of progress if performed by third parties using standardized, science-based methods (Neisig 2017). These metrics could guide further actions and be integrated into long-term policymaking (Neisig 2023a).

The development of structurally couplings of polycentric networks (Teubner 1993, 2011a; Neisig 2021, 2024), of innovative business organizations and supply chains, research institutions,

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and local communities is essential to support regeneration. How such polycentric networks can create nature-based solutions and regenerative practices on local and global scales, while supporting local communities and livelihoods, are to be illustrated in Section 4. By creating adaptable frameworks, regenerative efforts can be scaled across sectors and regions.

The shift from sustainability to regeneration also brings forth challenges in corporate communication. Research on corporate social responsibility (CSR) communication highlights its potential for hypocrisy. Companies sometimes engage in CSR to project a socially responsible image without effecting real change, a phenomenon known as 'greenwashing' reinforcing capitalist structures with overly emphasis on the economic system (Roth et al. 2020). However, CSR communication can also serve a performative function. The 'hypocrisy avoidance' approach (Jauernig and Valentinov 2019) suggests that even superficial CSR actions can trigger shifts toward more genuine practices over time.

In a regenerative context, even if communication begins performatively, it could catalyse deeper structural change, if feedback based on monitoring and documenting has either economic or legal consequences for organizations—as in the new EU regulations. The pressure to avoid hypocrisy could encourage organizations to adopt regenerative practices, contributing to the broader goal of regenerating social and ecological systems as well as human wellbeing. While regenerative communication may initially lack substance and only show intensions, it holds the potential to catalyse meaningful transformation by aligning corporate actions with regenerative principles.

Thus, CSR as well as regenerative communication, even when starting from a place of hypocrisy, can play a role in driving genuine change. Semantics can, as described by Stichweh (2006), behave both *anticipatory and constitutive as well as retrospective/reconstructive* to social structures. A *catastrophe* as a 'threshold' or 'tipping point' is dealt with by Teubner (2011b), who more radically talks about 'a constitutional moment.' This, however, underline, that there is nothing that determines, that the transition toward a regenerative future is going to happen—maybe we are more likely to end in a scenario, in which this future is passed over, overburdening the functionally differentiated, polycontextural society. However, if selected, for regeneration to endure, it also needs to be retained in the systems memory of social systems by being codified and routinely utilized.

4 | Emergent Business Models Using Regenerative Semantics

Over the decades, the UN world summits, conventions, and agreements – such as the Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (UNCBD), the Convention to Combat Desertification (UNCCD) and the Sustainable Development Summit (2015) – have played significant roles in 'recalibrating' market mechanisms to incorporate externalities into the economic system through structural couplings of the political, scientific and legal systems. Luhmann conceptualizes the market as a 'mirror' for the economic system, reflecting not only the firm itself but also its competitors and the broader environment (Boldyrev 2013; Luhmann 1988). The market, as the economic system turning itself into a second-order system, observing the 'polycontexturality,' also serves as an environment for various systems potentializing their reflections depending on the perspective of each participating system (Luhmann 1988, 94). This process helps systems observe themselves in second or even third order.

The UN conventions and agreements have created new mechanisms such as global funds, cap-and-trade systems, and credit markets that interlink payments not only to money but also to climate and ecological outcomes. These mechanisms rest on shared semantics, such as measurable targets, documentation, and tracking, which are integral to realizing sustainability goals. According to Alves, Kovasna, and Penha-Lopes (2019), these new mechanisms are driving the development of complementary payments, including various types of credits that refer to specific natural or human resources, and may or may not be blockchain-based. This innovation is gradually changing the monetary system to include ecological, human and social expectations and outcomes.

These new market mechanisms are facilitating large-scale regenerative projects that are organized through polycentric networks using digital platforms. As these projects grow, they aim to address global grand challenges such as biodiversity loss, soil degradation, water cycle restoration, and ocean clean-up. The expectations created by these mechanisms are leading to a rearrangement of structural couplings among organizations, economic markets, and non-social systems. These shifts are enabling new ways to regenerate ecosystems and address the complex challenges of ecological sustainability. However, while markets are increasingly allowing the economic and other social systems to become reflective in second and third orders, the inclusion of externalities still seems to remains insufficient to meet the 2030 Sustainable Development Goals (SDGs) and the Paris Agreement's targets (Neisig 2023a, 2023b, 2024).

Nature-based solutions (IUCN and UNEP 2021) are gaining traction as a way to address ecological and climate challenges through market mechanisms such as CO_2, biodiversity, and plastics credits, SDG funds, and taxation schemes for impact investors. These models aim to regenerate ecosystems, such as improving soil health, restoring biodiversity and transforming degraded arid land into arable areas (ELD Initiative 2015; Lorenz and Lal 2018; McLennon et al. 2021). For example, regenerative agriculture can restore soil and biodiversity, while initiatives like restoration of Kelp forests aim to increase marine biodiversity, store CO_2 and support sustainable fisheries (Duarte et al. 2017; Froehlich et al. 2019; Hoegh-Guldberg et al. 2019). These solutions are based on creating a symbiotic relationship between social systems and natural environments, seeing nature as a regenerative medium.

4.1 | Example 1: Regrow Ag—Software as a Service for Ecosystem Outcomes

Regrow Ag offers scalable, science-based software-as-a-service (SaaS) to measure, report, and verify ecosystem outcomes such as soil carbon and nitrogen leaching (Regrow n.d.). The company, with connections to Australia, Ukraine, and the USA, has

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secured investments from entities like Microsoft's M12 venture arm (Ellis 2021) and Cargill (Crunchbase n.d.). It positions the agricultural ecosystem market as complex, involving various players:

a. *Farmers* adopting practices to earn payments
b. *Agronomists* advising on practices and data collection.
c. *Standards and Registries* developing protocols and certifying credits.
d. *Project Developers and Ecosystem Programs* enrolling farmers, tracking changes, and selling credits.
e. *Service Providers* like Regrow Ag, tracking and quantifying credits.
f. *Buyers* purchasing credits.

This emerging market structure reflects the recalibration of market mechanisms facilitated by the structural coupling of political, scientific, and legal systems. These new market mechanisms allow new supply chain structures to evolve supported by digital technologies.

Regrow Ag utilizes advanced tools, including remote sensing, AI, and soil science, to monitor over 150 million acres across 45 countries (Regrow n.d.). Its technology aids corporations like General Mills, Bayer AG, and The Nature Conservancy in achieving sustainability goals. Notably, it powers Cargill's RegenConnect™ program, which incentivizes farmers to adopt regenerative practices by compensating them for carbon sequestration (Cargill 2022). These tools facilitate the scalability, transparency, and accessibility of ecosystem markets, integrating digital technologies into decision-making processes.

Regrow Ag also supports other carbon credit programs, like Bayer's initiatives, by providing data for carbon credit issuance. A distinctive aspect of its work is 'in-setting,' where companies offset emissions within their own supply chains rather than through external projects (Cargill 2022).

The Regrow Ag case highlights the growth potential of digital services in soil carbon sequestration, emphasizing transparency and confidence-building in carbon markets through technology and third-party verification. Its orchestration of investors, service providers, and project developers has been critical to its success. For instance, Cargill, both an investor and a user of Regrow's services, plays a pivotal role in promoting regenerative practices in their agricultural supply chain while maintaining impartiality in the documentation taken care of by Regrow Ag.

The success of Regrow Ag also reflects broader trends where multinational corporations finance tech start-ups and support small farmers, fostering a shift toward regenerative farming practices.

4.2 | Example 2: GreenWave

GreenWave (n.d.) is a non-profit that helps fishermen transition to marine ecological agriculture. Its innovative production system leverages the entire water column in near-shore waters for farming shellfish and seaweed, providing sustainable seafood, fuel, and fertilizer for coastal communities (Rinehart 2019). This regenerative approach addresses overfishing, supports ecosystem services like carbon sequestration, and creates new economic opportunities by reskilling fishermen and engaging young people in sustainable marine farming.

GreenWave also runs the Kelp Climate Fund (KCF), which pays farmers for climate impacts such as carbon, nitrogen, and reef restoration. Farmers earn $1 per foot of kelp seed planted, based on a study by NOAA and The Nature Conservancy (Barret et al. 2022). GreenWave tracks these impacts across North America, although digital methods for documenting blue carbon outcomes are less developed than terrestrial systems.

KCF's climate impacts are grounded in research by leading scientists (Duarte et al. 2017; Froehlich et al. 2019; Project Drawdown 2021), which establish standards for measuring macroalgae's climate benefits. Despite this foundation, digitalization in blue carbon monitoring remains limited. Recent advancements in geospatial technologies, such as GIS, LiDAR, UAV data, and machine learning, offer promise for improving data collection and mapping (Pham et al. 2023). These developments are expected to enhance monitoring processes and increase confidence in blue carbon markets.

GreenWave demonstrates how reskilling fishermen for regenerative marine production benefits coastal communities while providing valuable ecosystem services. It highlights the challenges and potential of digitalization in the blue carbon sector and shows how payment for ecosystem services is reshaping business models.

4.3 | Example 3: The Regenerative Resources Company (RRC)

The Regenerative Resources Company (RRC) is an ecosystem services firm dedicated to coastal ecosystem restoration (Regenerative Resource Co n.d.-a). RRC acquires degraded land through purchases, long-term leases, or partnerships with governments, tribes, and private landowners. They transform these lands into regenerated ecosystems or agroecological systems, commercializing the outputs. Using regenerative onshore aquaculture, RRC combines high-tech seafood production, seawater agroecology, mangrove agroforestry, and seagrass groves to regenerate arid coastal areas. This approach restores degraded ecosystems, creates jobs, and provides sustainable livelihoods for vulnerable populations in regions like Eritrea, Ghana, Namibia, Saudi Arabia, and more.

RRC's origins trace back to the Al-Baydha Project in Saudi Arabia, where founder Neal Spackman collaborated with Bedouins (2010–2018) to green deserts, alleviate poverty, and preserve local heritage using permaculture and hydrological design (Permaculture Research Institute 2015). The project fostered financial and social independence through employment and infrastructure-building, blending social movements with practical applications (Grayson 2018).

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RRC generates revenue through multiple streams, including blue carbon credits, biodiversity credits, seafood, and biofuels, leveraging a zero-waste production called Regenerative Seawater Agriculture (RSA). This production method restores ecosystems while supporting local blue economies. However, acquiring land and securing local political support is costly and risky, especially in the early stages (Spackman 2022). To mitigate these challenges, RRC established a Donor Advised Fund (DAF) under the SDG Impact Fund, enabling tax-deductible donations in cash, stocks, cryptocurrency, or property (Regenerative Resource CO n.d.-b; SDG Impact Fund n.d.). This fund supports new projects aligned with SDGs and RRC's goal of planting one billion mangroves over 15 years, sequestering 250 million tons of carbon, combating desertification, and regenerating marine biodiversity.

RRC's business model exemplifies how large-scale ecosystem programs can address climate change, biodiversity loss, and desertification combined while creating livelihoods. Their projects link carbon and biodiversity credits to ecosystem markets, ensuring accountability and transparency to build market confidence. Unlike digital service providers like Regrow Ag, RRC operates as a Project Developer and Ecosystem Program Manager, using AI-based digital tools to measure and document data for carbon credits, biodiversity credits, and DAF requirements. Their approach applies permaculture-inspired regenerative principles to coastal ecosystems, blending impact investments, blue carbon credits, real estate, and regenerative agriculture into a comprehensive business model.

4.4 | Example 4: The Climate Foundation

The Climate Foundation (Climate Foundation n.d.-a) is advancing large-scale marine oceanic permaculture by cultivating seaweed to provide food, feed, and fertilizer while sustaining blue carbon sinks. Its mission is to regenerate ocean life, protect coral reefs, and establish a billion-dollar seaweed export market within the next decade. Positioned as a project developer, the foundation has developed an oceanic platform and plans to sell or franchise its Marine Permaculture technology, though its commercialization model is still evolving.

Marine permaculture addresses issues like warming surface waters, which limit nutrient availability for algae and disrupt fish habitats (von Herzen et al. 2018). By leveraging ocean currents and renewable energy to power pumps, the Climate Foundation restores nutrient circulation, enhances habitats and biodiversity, and supports resilient fisheries. This innovation meets growing global protein demand, as each 1000-m-long array can grow over 3000 tons of seaweed annually, sequester carbon, and provide ecosystem services like coral reef protection and biodiversity (von Herzen et al. 2018).

The foundation also supports ocean regeneration more broadly, including the recovery of whale populations, which significantly impact global ecology (Nicol et al. 2010; Nicol 2011; Roman and McCarthy 2010). Thus, its core business operationalizes science and technology to scale deep-ocean permaculture for food, feed, and fertilizer production while promoting ocean biodiversity and climate resilience.

To fund its initiatives, the Climate Foundation has developed the Kelp Coin® token, a blockchain-based digital forward contract representing one ton of seaweed grown and one ton of carbon sequestered. This token, along with regenerative carbon credits, forms part of the foundation's financing strategy. However, specific details about the token's issuance and platform remain under development (Climate Foundation n.d.-b). The foundation also operates a Donor Advised Fund (DAF) to attract tax-deductible donations, further leveraging recalibrated market mechanisms combined with digital technologies (Climate Foundation n.d.-c).

Educational outreach is another key aspect of the Climate Foundation's work, aligning with the permaculture movement's tradition of knowledge sharing (Climate Foundation n.d.-d). While its token and carbon credit systems require robust surveillance and measurement tools, the details of these technologies are not yet fully disclosed.

The Climate Foundation demonstrates how regenerative practices, paired with innovative financial models, digital technologies, and market mechanisms, can scale ocean regeneration. Its approach exemplifies how businesses can address global climate and ecological challenges while leveraging the new economy as tools for impactful change—also on the ocean.

4.5 | Analysis and Discussion

This section illustrates how structural coupling of science, politics, and law has 'irritated' market mechanisms, enabling the economy to recalibrate to include previously excluded elements like climate and ecology. This shift has enabled businesses to scale regenerative solutions that positively impact climate, biodiversity, combat desertification, improve soil quality, protect coral reefs, produce food, feed, and fertilizer, and provide livelihoods. Digital media plays a key role in educating people about regenerative practices and business models, while digital technologies, such as surveillance technologies and blockchains, are used to foster confidence in new market mechanisms and facilitate payments.

Traditional payments for goods like agricultural products, fish, or marine biomass are now complemented by payments for ecosystem services. These include carbon sequestration, biodiversity enhancement, and combat of desertification credits, documented by remote measurements or local community monitoring. Investors can also engage through tokens recognized by registries or benefit from tax reductions via Donor Advised Funds (DAF). These mechanisms monetize regenerated nature through eco-services adhering to recognized standards.

All four examples demonstrate a multifunctional approach, navigating the polycontextural society while using the recalibrated market mechanisms to scale regenerative solutions. They reveal the emergence of a new ecoservice market with diverse positions connected through polycentric networks, supported by new semantics, legal contracts, eco-service payments, and technology.

The regenerative semantics underlying these examples represent a third-order semantic shift in business models, moving beyond

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'doing less harm' to engage with the intension to actively regenerating nature and livelihoods. Businesses are now rethinking their self-descriptions, transitioning to a new paradigm in which profit is a mean to the end—regeneration of what has already been degraded. This co-evolutionary process transforms the identity of business itself through deep meta-reflection, combined with both reflection and reflexivity supported by various educational and consulting frameworks.

These frameworks, including agronomists, ecosystem programs, and permaculture's knowledge-sharing tradition, help farmers, fishermen, and maritime foresters to radically shift their business models. Through training, consultancies, and social media, these actors are guided to how to engage to actively regenerate degraded systems instead of merely reducing harm.

Structural couplings for regeneration are evident across the examples, where regenerative principles connect natural environments via legal contracts, technology, and recalibrated market mechanisms. These couplings are reinforced by functional systems like political, scientific, and judicial systems and supported by international organizations such as the UN COPs, scientific advisory panels, and treaties. This creates higher-order systems of polycentric networks (Teubner 1993, 2011a; Lepskiy 2017), where social systems and natural environments enter symbiotic relationships. Elements like CO_2 and biodiversity, previously excluded from the economy, law, and politics, are now integrated, leading to structural changes retained in the memory of systems like new market mechanisms, polycentric networks, and evolving positions in the ecoservice market.

However, the tipping point for a full regenerative transition has not yet been reached. While large-scale soil depletion, extreme weather events, wildfires, species extinction, and resource conflicts act as triggers, the shift toward widespread regeneration is still slow.

Nevertheless, promising signs include the EU's approval of the Nature Restoration Law (Official Journal of the European Union 2024) and increasing interest in regenerative agriculture. Yet, scaling remains a challenge. According to the Sustainable Markets Initiative Agribusiness Task Force (2023), regenerative farming must expand threefold to address climate change and biodiversity loss. The initiative calls for an increase in regenerative farming from 15% of global cropland to 40% by 2030, which could remove 600 million tons of emissions annually—equivalent to Germany's emissions footprint.

Similarly, scalable production models like GreenWave offer inspiration. Denmark's NGO HAVHØST, founded in 2011, now operates over 30 marine gardens cultivating seaweed, mussels, and oysters (Havhøst n.d.). Backed by EU projects like Cool Blue and Cool Blue Baltic, these gardens focus on low-trophic cultivation, ecosystem restoration, and local job creation. The goal is to establish regenerative near-shore farming as a community-driven industry through education, activism, and business development.

In summary, while the regenerative shift in business models is gaining momentum, the transition to a fully regenerative economy is still in its early stages but growing contagious. The examples demonstrate how new market mechanisms, regenerative semantics, deep meta-reflection, and the integration of natural environments into market economies are reshaping industries and creating new self-descriptions for businesses. However, broader support from political, legal, scientific, educational, and media systems is essential to achieve a tipping point and realize the potential for global regeneration.

5 | Conclusion

This study has explored how regenerative feedback mechanisms, and the evolution of regenerative semantics can catalyse systemic structural change, transitioning businesses from sustainability-focused practices to regenerative models. Grounded in Luhmann's Social Systems Theory and a conceptual transition model based on Luhmann's notion of evolution – spanning variation, selection, and stabilization – this research demonstrates that regenerative semantics and recalibrated market mechanisms are essential to fostering systemic adaptation and embedding regenerative principles into business operations.

The article examines four examples of regenerative business models: Regrow Ag, GreenWave, Regenerative Resources Company (RRC), and the Climate Foundation. Although these organizations approach regeneration differently, they share common goals of regenerating degraded systems. These cases illustrate practical applications of regenerative principles and illustrate emerging business models that emphasize regeneration. All cases operate within polycentric networks, forming an emerging regenerative ecosystem market (Regrow 2022). From a systems theory perspective, these networks rely on regenerative semantics, incorporating sustainability feedback mechanisms (Valentinov 2013, 2014, 2017) and recalibrated markets, which now include previously excluded externalities. In addition, all cases are interpenetrated by digital technology. While promising, these examples also highlight the challenges and opportunities involved in reaching a critical tipping point for a full regenerative phase transition.

The findings emphasize the importance of regenerative semantics in coevolving with a systemic transition. Regenerative practices extend beyond 'do no more harm' to ecological regeneration by addressing broader issues like biodiversity, soil health, water cycles, and human livelihoods. Traditional sustainability models, focused on 'doing less harm,' are insufficient to confront current ecological crises and human well-being deficits. Regenerative semantics deal with ideas, concepts and models for how to engage to actively restore ecosystems, combat desertification, regenerate biodiversity, and improve livelihoods.

Regenerative thinking, through its concepts, models, tools, and measurements, fosters third-order observation and meta-reflection, encouraging organizations to scrutinize their self-descriptions and meta-reflect on the systemic structures through which they observe, interpret, and act within their environments. This introspection is critical for addressing structural transformation. Reflexive, ongoing learning processes – evident in the case examples – are also central to this change.

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This semantic shift, reinforced by meta-reflection, reflection, and reflexivity, has enabled organizations to create new business identities and self-descriptions aligning with the regenerative agenda taking advantage of recalibrated market mechanisms, while fostering polycentric networks in an emerging ecosystem market.

5.1 | The First Three Transition Steps in the Conceptual Model

The first step in the conceptual model emphasizes strengthening sustainability feedback loops with a regenerative focus. The case studies demonstrate this through recalibrated market mechanisms that account for ecosystem services. Payments for carbon sequestration, biodiversity enhancement, and soil restoration – previously external to the economic system – are operationalized into new market mechanisms. Investors can now purchase tokens tied to ecosystem services, and Donor Advised Funds incentivize impact investments. These mechanisms monetize regenerated nature and ensure transparency and reliability through digital technologies such as blockchain and remote sensing.

The case organizations show how feedback loops foster multifunctional awareness and orientation toward multiple functional systems such as science, education, media, politics, law, and recalibrated market mechanisms (Roth and Valentinov 2020). The case organizations integrate both human and ecological environments into their operations through layered structural couplings (Neisig 2022). Thus, they create new paradigms for the self-description of businesses making profit a mean to the end—regeneration. The recalibration of market mechanisms facilitates a contagious diffusion of regenerative solutions, as seen in regenerative agriculture, near-shore farming, and community-led ecosystem restoration projects. However, achieving widespread adoption (selection) requires stronger regulatory frameworks, such as the EU's Nature Restoration Law, and supportive semantics to enforce compliance and foster systemic alignment.

The second and third steps of the conceptual model – reentry creating regenerative reflexivity and strengthening rearranged structural couplings – highlight systemic adaptations needed to embed regenerative practices. Recursive observation and reflection, is critical for businesses to internalize regenerative principles and adapt their structures. The cases demonstrate how regenerative reflexivity is supported by knowledge-sharing traditions rooted in permaculture, educational programs, and digital media campaigns. By embedding regenerative narratives into societal discourse and fostering a culture of continuous learning, more organizations may consider aligning their self-descriptions with regenerative semantics, even though they may not be ready yet.

Structural couplings, as selective interdependencies between social systems, are essential to both the transition process and the outcome of the transformation. New ecoservice markets emerged through interactions of international political organizations, scientific advisory panels, and judicial organizations. These interactions resulted in concerted decision-making enabling previously externalized elements – such as biodiversity and CO_2 – to be included within economic, legal, and political systems. This has resulted in symbiotic structural couplings between social systems and ecological environments fostering regenerative practices and resilience by reinforcing ecological communication.

The four cases illustrate how legal contracts, technological innovations, and recalibrated market mechanisms facilitate the selection of regenerative principles in polycentric networks. Organizations within these networks act as individual nodes while collectively addressing the complexity of societal polycontexturality from a regenerative perspective (Teubner 1993, 2011a; Neisig 2021, 2024).

5.2 | Tipping Points and Systemic Change

The fourth step in the conceptual model emphasizes the role of tipping points (thresholds) in catalysing systemic change. While progress has been made, the transition to a fully regenerative phase is still far from being realized. Triggers like large-scale soil depletion, extreme weather events, wildfires, and species extinctions underscore the urgency of this shift. Despite growing interest in regenerative practices, scaling remains a challenge. For instance, achieving 40% global adoption of regenerative farming by 2030 would require tripling the current global cropland used for regenerative agriculture. Similarly, near-shore farming initiatives show potential but need broader support to achieve transformative impacts. Regulatory frameworks, like the EU's Nature Restoration Law, offer promising steps forward but must be implemented and expanded to other continents to accelerate the transition.

5.3 | Embedding Regeneration Into Systems Memory

The final step of the conceptual model focuses on embedding regenerative practices into the memory of social systems. This requires codifying regenerative principles into organizational decision premises, policies, and market mechanisms to ensure long-term retention and reproduction. The case studies show how regenerative feedback, meta-reflection, reflection and reflexivity, and structural couplings are being operationalized into systems memory through standards, certifications, and educational frameworks. For example, digital technologies used to document and monitor ecosystem services ensure consistent application of regenerative practices, fostering resilience and adaptability.

Sustained support from political, legal, scientific, and educational systems is crucial for this recurrence. If regenerative concepts become central to societal discourse and regulatory frameworks, they will reshape organizations' self-descriptions, guiding future communications, decisions, and policies. This process will help ensure regeneration becomes an enduring feature of social systems, enabling them to navigate future challenges with resilience and regenerative creativity.

5.4 | Closing Remarks

This study underscores the transformative potential of regenerative semantics in recalibrating market mechanisms, and

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reshaping business models, while fostering meta-reflection, reflection and reflexivity. By embedding regeneration into systems memory, society (including businesses) can create resilient systems that operate to actively restore natural and social environments. While a tipping point for a full regenerative transition has not yet been reached, the momentum generated by early adopters provides a hopeful pathway toward a more regenerative and sustainable future.

It is worth mentioning, that the ecosystem credit market has sparked a lot of criticism for hypocrisy, but as the illustrative cases in this article shows, the emerging structures at the ecosystem market includes either digital or community-based surveillance, tracking and science-based documentation by third party to create confidence in the credits. As the cases also show, still digital surveillance of 'blue credits' i.e. water-based ecocredits, are difficult to perform, but doing progress. To reach a tipping point, confidence in the ecoservice market is crucial. Therefore, the control mechanisms and reliability related to the ecoservice market are centre stage, as also the cases highlight. To be classified as a so called, high-quality carbon credits, they need to be conservatively quantified and based on credible baselines, show assurance of additionality, prevention of leakage, and permanence.

In conclusion, regenerative feedback mechanisms and semantics are essential for transitioning businesses from sustainability to regeneration. The conceptual model, supported by four illustrative cases, highlights the systemic adaptations needed to embed regenerative principles into business practices and societal structures. Achieving a full regenerative phase transition will require broader regulatory support, polycentric networks, educational initiatives and mass media exposure to ensure regeneration becomes embedded in social systems memory as a lasting paradigm. However, nothing is determined but depended on selection and retention. With the mix of knowledge and non-knowledge regarding non-social environments, regenerative change risks becoming similarly symbolic and ritual like rain dances as described by Roth, Sales, and Clausen (2024), as the global effect is difficult to know, even if scaled.

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RESEARCH ARTICLE

N-Factorial Scenarios: A Systems-Theoretical Approach to Scenario-Planning

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ABSTRACT

Scenarios are among the most popular techniques for managing the uncertainty and complexity of the future. Even the more sophisticated scenario designs, however, often reduce the future to a narrow set of typically only two key factors that are arranged into a four-square matrix representing four distinct yet interrelated scenarios. Consequently, scenarios have been criticised for being simplistic or reductionist by design. In this article, we address these criticisms by proposing a basic design for n-factorial scenarios. Following a short discussion of the procedures and limitations of classical scenario design, we draw on the example of a standard 2×2 matrix titled 'Four Scenarios for the Digital Transformation' to illustrate the limitations of the standard approach and demonstrate the potential of a digital approach to scenario building. We conclude that standard scenario planning is often characterised by a systematic omission of potentially critical scenarios, which our proposed digital approach can detect and map out.

1 | Introduction

Since the early days of foresight and futures studies, scenarios have remained among the most popular techniques used by organisations to manage the uncertainty and complexity of the future. Scenario planning has constantly ranked among the 25 most frequently used management tools in the Bain & Company Tools & Trends Survey for over two decades now. Major corporations, NGOs and global institutions have been employing scenarios for more than half a century to address a wide variety of issues such as market changes, demographic challenges, climate change, space colonisation, or the coronavirus crisis (Campa, Szocik, and Braddock 2019; Esfeld 2022; Kaivo-oja 1999; Kaivo-oja, Luukkanen, and Malaska 2001; Kuhbandner et al. 2022; Samanaseh et al. 2023; Serrano et al. 2018; Taagepera 2014; Tegegne, Penker, and Wurzinger 2016; Wicke et al. 2022; Wójtowicz and Szocik 2021).

The origins and evolution of scenario techniques in long-range business planning have been well-documented, highlighting their transformation from predictive tools to instruments for navigating complexity (Bradfield et al. 2005). Scenarios 'are not predictions, but plausible stories about how the future could evolve in uncertain and often surprising ways' (MacKay and Stoyanova 2017, 89), and unlike conventional planning that follows a 'predict and control' strategy (Ramírez and Wilkinson 2016), scenario planning does not externalise uncertainties, but supports their internalisation in the form of informed judgements about an uncertain and uncontrollable future (van der Heijden 1996; Wack 1985a, 1985b). This internalisation is achieved by scenario analyses that split the future into typically 3–6 distinct yet inter-related futures (Amer, Daim, and Jetter 2013, 33). Within the larger context of scenario planning, the ultimate purpose of 'the scenario and the scenario system is not to produce scenarios, the purpose is option creation, is to generate new options that you would not have thought

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of otherwise' (Wack 1982 in Chermack and Coons 2015, 191). This concept of scenarios aligns with Godet's (1994) notion of scenarios as 'future memories', which constitute not merely reflections on possible futures but rather frameworks for strategic decision-making.

Over the decades, the pertinent literature has focused on definitions, use cases, selection criteria, ideal arrangements, or enhancements of scenarios (Derbyshire and Wright 2017; Wright and Goodwin 2009; Wright et al. 2017). Yet, while there is some evidence for positive impacts of scenario planning on organisational resilience (Bodin, Chermack, and Coons 2016; Bouhalleb and Tapinos 2023; Chermack and Nimon 2008; Chermack et al. 2020; Hillmann et al. 2018; Marinković et al. 2022), this evidence has at times been qualified as scarce (Wright et al. 2017; Bouhalleb and Smida 2018). This observation blends into the contention that the bulk of research on scenarios is application-focused, descriptive, and thus still under-developed particularly regarding theory development (Derbyshire 2017; Meadows and O'Brien 2020; Spaniol and Rowland 2018). Moreover, as Durance and Godet (2010) caution, scenario-building processes can sometimes be misapplied, with a tendency towards overly simplified approaches that undermine the tool's potential for nuanced foresight.

Recent calls for deeper theoretical and empirical examinations of the role of scenarios in organisational contexts have led to emerging research programs that focus less on the ascribed qualities of scenarios and more on how actors collectively apply or cocreate them (Andersson and Westholm 2019; Rowland and Spaniol 2017; Wouters, De Fraine, and Simons 2019; Wenzel et al. 2020; Garsten and Sörbom 2021). This focus on collective scenario practice or action, however, seems to contradict the original purpose of scenario planning. According to Chermack & Coons (2015, 192), it is a recent development that 'scenario planning tends to be a group process in which many have equal input. As a result, it can be an exercise in regression toward the mean, generating little that is novel or provocative'. This suggests a considerable risk that scholars focused on group interactions and negotiations around scenarios may actually be studying and coperforming a process by which 'modern scenario planning has been watered down' (id., 191), rather than studying the forms and impacts of the tool in question.

A second line of criticism, however, has focused on the tool itself. The contention here is not only that the tool has increasingly been presented 'relatively straightforward and linear' and thus 'the scenario process has become a somewhat simplistic, off-the-shelf tool' (Derbyshire and Wright 2017, 262), but also that scenarios are reductionist by design (Martineau 2017). Despite occasional excursions into three-dimensional modelling (e.g., Mendonça et al. 2009), and even rarer attempts at n-factorial scenarios (Ritchey 2018), the standard approach of scenario-building indeed remains the compilation of a list of uncertain factors, out of which only the two most important are selected to create the famous four quadrants matrix and thus up to four scenarios (Amer, Daim, and Jetter 2013; Ramirez and Wilkinson 2014). Even more sophisticated designs, such as the Wilson matrix, ultimately resort to plotting a larger number of factors on a 2×2 impact-versus-probability-matrix, thus limiting the interaction between the factors as well as their potential to create interrelated scenarios.

In the present article, we aim to address the second line of criticism by introducing a basic design for n-factorial scenarios. Our method of creating scenario frames addresses some of the issues inherent in the 2×2 model, while also complementing traditional approaches to scenario design. After briefly discussing the procedures and limitations of classical scenario design, we shall draw on the example of a standard 2×2 matrix, 'Four Scenarios for the Digital Transformation', developed by Bodrožić and Adler (2022) to illustrate these limitations and demonstrate the potential of a truly digital approach to scenario building. The results of this demonstration suggest that standard scenario planning is characterised by a systematic omission of potentially critical scenarios, which can be identified and charted by our proposed digital approach. In thus replacing analogue 'sliding scale' models underlying most future scenarios, including those popularised by foundational work from Stafford Beer or Buckminster Fuller, our method represents truly digitally transformed approach to scenario planning.

2 | Standard Scenario Planning: Two-Dimensional Limits to Growth

Brief histories of scenario planning date its origins back to transition from World War II to the Cold War (Derbyshire 2017; MacKay and Stoyanova 2017; Rowland and Spaniol 2017). However, early traces of scenario thinking have been identified across a broad historical and geographical range of contexts. These span from Mesopotamian 'celestial sciences' and the role of 'foreknowledge' in Sun Tzu's *The Art of War*, to Prussian military wargaming exercises, while the 'term 'scenario' itself harkens back to the silent film era, when a film script was called a scenario because of its creative, literary and playful connotations' (MacKay and McKiernan 2018). This association with creativity, narration, and playfulness, along with the resulting potential for surprise, may still be considered constitutive of scenario planning (Derbyshire 2017) and resonates with its deeper historical roots in theological and philosophical traditions of computational thought, which sought to model and understand complex systems of possible futures (Williams 2016).

Scenarios gained a first peak of popularity with the publication of *The Limits to growth* (Meadows et al. 1972), while Shell is credited as the first private sector organisation to have applied scenario planning, particularly during the 1970s oil crises (Ringland 2002). Williams (2016) identifies this emergence of scenario planning as part of a broader cultural shift towards observations of 'World Futures', where the objective was not just prediction but the systematic explorations of multiple, plausible futures. This transition underscored a pluralistic and narrative-driven approach that has influenced how scenarios are conceptualised today, at a time when 'scenario planning (...) has progressed beyond fashion' (McKiernan 2017, 66).

Based on a literature review of pertinent 77 definitions, Spaniol and Rowland (2019) conclude that scenarios may be

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defined as systematised sets of comparatively different future-oriented narrative descriptions of possible and plausible events or situations that might occur in an external context. This meta-definition is compatible with the idea that, 'in an organisational context, scenario planning is a strategic planning process that attempts to explore alternative states of being, separated from the present by some temporal movement and from each other alternative by a turn in logic or reasoning' (Fuller 2017, p.).

The standard approach to producing scenarios is outlined in Wright and Cairns' (2011, 22) listed description of the 'The scenario process in action':

- Stage 1: *Setting the Agenda*—defining the issue and process, and setting the scenario timescale
- Stage 2: *Determining the Driving Forces*—working, first, individually, and then as a group
- Stage 3: *Clustering the Driving Forces*—group discussion to develop, test and name the clusters
- Stage 4: *Defining the Cluster Outcomes*—defining two extreme, but yet highly plausible—and hence, possible—outcomes for each of the clusters over the scenario timescale
- Stage 5: *Impact/Uncertainty Matrix*—determining the key scenario factors, A and B
- Stage 6: *Framing the Scenarios*—defining the extreme outcomes of the key factors, A1/A2 and B1/B2
- Stage 7: *Scoping the Scenarios*—building the set of broad descriptors for four scenarios
- Stage 8: *Developing the Scenarios*—working in sub-groups to develop scenario storylines, including key events, their chronological structure, and the 'who and why' of what happens'.

Though this process clearly combines what Amer et al. (2013, 34) refer to as minimal and standard approaches for drafting scenarios, the outcome of this exercise ultimately boils down to the result of the minimal approach, namely, a four quadrant or 2×2 matrix containing or framing four scenarios. Figure 1 depicts the critical phase of the process:

Figure 1 shows a set of pre-selected factors, which had already been ranked along the horizontal axis based on their assumed impact on the future course of the issue at stake. These factors have now further been ranked according to their degree of uncertainty. As a result, we find that factors A and B have been identified as the two most impactful and uncertain factors in the entire set, and it is typically these two factors that the final four-square matrix depicted in Figure 2 is made of.

Figure 2 shows a matrix created by the combination of the two high-impact and high-uncertainty factors, A and B. In this figure, the grey boxes or post-its, respectively, do not refer to (sub-) factors anymore, but rather to descriptors that help to flesh out the four scenarios created by different combinations of factors A and B. The numbers behind the letters

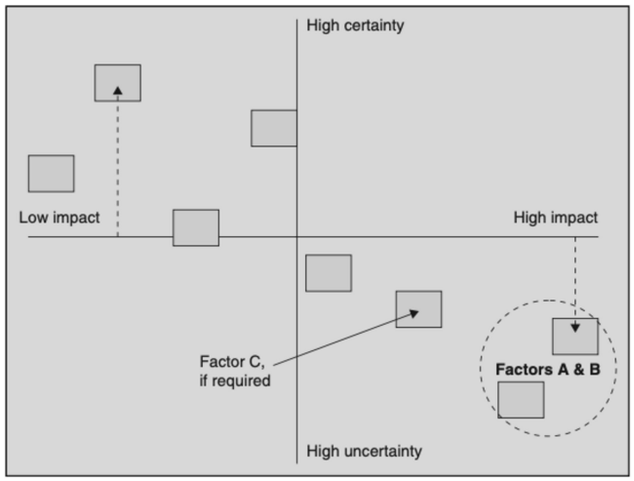


FIGURE 1 | Impact/uncertainty matrix: relative certainty/uncertainty of outcomes (Wright and Cairns, 2011, 38).

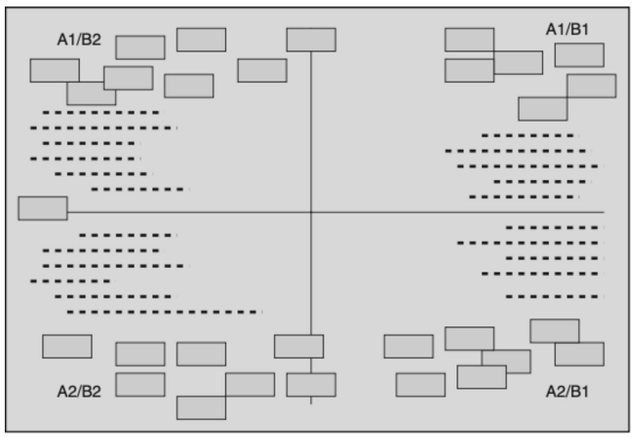


FIGURE 2 | Framing and scoping the scenarios (Wright and Cairns, 2011, 42).

indicate that A and B are almost always conceived as continua between the poles of A1 and A2 and B1 and B2, respectively. The above examples of certainty versus uncertainty and impact versus insignificance are cases in point. The fact that we are facing a more/less- or better/worse rather than either/or-logic is further illustrated by the circumstance that some descriptors in Figure 2 have been posted onto rather than next to the dividing lines between the scenarios. According to Chermack (2022), there has been a general trend towards designing scenario frameworks using continuums rather than clear-cut distinctions. At the end, we are looking at a window to a world made of four different futures, in which there is little of both A and B (A2/B2), much of both A and B (A1/A2), and two mixed scenarios.

In revisiting Figure 1, we notice an arrow pointing at a factor C that might deserve our attention, 'if required'. The case of this factor is interesting insofar as it raises the question of how it might be integrated into the scenario depicted in Figure 2, if required. The answer, however, is as brief and tacit as it is disappointing. Factor C is just a 'Plan B':

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> If one or more of the four combinations is viewed by the scenario team as implausible, then Factors A and B are not independent of one another. At this point, Factors A and B could be combined as one factor and another possible factor, Factor C, should be selected as a potential second factor from the previously developed impact/predictability matrix.
>
> (Wright and Cairns, 2011, 39)

The key message is that factor C might replace one of the two other factors, 'if required'. A systematic integration of third, fourth, or further factors into the ultimate scenario design is not foreseen. This issue is typical of most scenario design processes and not resolved if, like in the case of Wilson matrices, the middle-ranges between the poles are designated as 'medium' categories. Thus, the inclusion and adequate representation of more-than-two-factorial scenarios remains an issue.

3 | Digital Transformation of Scenario-Building: From False to True Distinctions

The main contention of this article is that the above limits to multifactorial scenario-building are a result of the intentional or unintentional use of false distinctions in scenario design. Once this issue is addressed, these limits can be overcome.

> True distinctions are made of two mutually exclusive and jointly exhaustive sides (...). True distinctions spilt the entire space in which they are drawn into two sides and thus create a world where everything located in it belongs exclusively to either the one or the other side. Distinctions that fail to satisfy this definition may consequently be defined as false distinctions.
>
> (Roth 2023a, 452)

Whereas true distinctions split the entire frame of reference, false distinctions fail to do so. As a result, architectures made of true distinctions create different 'windows to the world' than architectures of false distinctions. This circumstance can be illustrated by a brief discussion of Table 1.

As is well known, the famous SWOT matrix reproduced in Table 1 is created by a cross-tabling of two distinctions. These distinctions are *positive* versus *negative* and, depending on the source, *internal* versus *external* (Weihrich 1982) or *present* versus *future* (Humphrey 2005). In looking at Table 1, it is obvious that the utility of the resulting window to the world critically depends on whether this window is made of true or false distinctions. Whereas the distinctions positive/negative and internal/external constitute reasonably true distinctions, the distinction between present and future is clearly not jointly exhaustive unless we completely ignore the past. Thus, we find that combinations of true distinctions create universal (though not exclusive) windows to the world, whereas windows made of false distinctions are of limited utility. Moreover, it is obvious that the tool is most useful if distinctions such as positive/negative actually are treated as mutually exclusive categories rather than as two poles of one continuum.

TABLE 1 | SWOT as an architecture of distinctions (author provided).

	Positive	**Negative**
Internal *Present*	Strength	Weakness
External *Future*	Opportunity	Threat

If we contrast these considerations with the daily routine of scenario-making, however, it becomes evident that scenarios made of false distinctions are prevalent. Consider the four scenarios for the digital transformation identified by Bodrožić and Adler (2022) and depicted in Figure 3, for example.

In looking at Figure 3, we find that the most frequent terms are 'of', 'digital', and 'dominance'. Whereas the second term acts as topic marker, the third term clearly indicates that we are looking at a traditional window made of two continua. Both 'Business Process management' versus 'Community-and-Collaboration management' and 'proactive system-building public policy' versus 'neoliberal laissez-faire public policy', therefore, indicate poles of their respective continuum. As everything on this map seems to be a matter of gradual transitions, it is safe to say that this map is not made of mutually exclusive concepts and thus based on false distinctions. But even if we treated 'proactive' versus 'neoliberal' public policy as mutually exclusive categories, the question remained as to whether these concepts are jointly exhaustive. This, however, is not the case as Bodrožić & Adler (2022, 117) claim that *the* 'alternative to a neoliberal laissez-faire regime' is the 'new form of system-building regime' described by Mazzucato (2015, 2021) in terms of her idea of an 'entrepreneurial state' that takes the lead and defines the economic missions of a 'mission economy', while Mazzucato (2020, 59) is very clear that her idea of a mission economy 'is not about socialism', but rather about an alternative between laissez-faire capitalism and a socialist command economy. The vertical axis in Figure 3, therefore, represents only a smaller section of a larger continuum

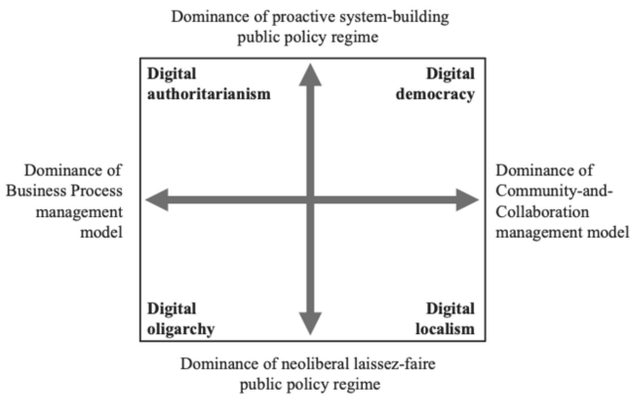


FIGURE 3 | Four scenarios for the digital transformation (Bodrožić and Adler 2022, 120). [Colour figure can be viewed at wileyonlinelibrary.com]

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between capitalist laissez-faire and socialist central planning regimes.

Even in looking at the larger continuum between capitalist and socialist regimes, however, we remain confronted with the question whether capitalism/socialism is a true distinction. This question is critical as, true to Roth (2019, 2023a, 2023b), true distinctions can be safely combined, whereas false distinctions ought to be translated into two true ones. Tables 2 and 3 illustrate the issues at stake.

If we take capitalism/socialism for a true distinction, we can combine it with other distinctions, including the distinction itself. The result of such a self-application is shown in Table 2 and makes a strong case that capitalism/socialism is a false distinction, at least unless we suggest that capitalist socialisms and socialist capitalisms are independent categories rather than middle-grounds or mixed types.

The cross-check in Table 3, too, indicates that capitalism/socialism is a false distinction. In translating this false distinction into two true ones, capitalism/noncapitalism and socialism/nonsocialism, we find that both capitalism and socialism are only two out of a much larger set of regimes.

Considering this discussion, it is reasonable to infer that the scenarios identified by Bodrožić and Adler (2022) emerge through an architecture of distinctions that are neither mutually exclusive nor jointly exhaustive and, thus, false distinctions. This, in turn, suggests that the authors present a forced focus on a narrow quadrant rather than a full window to the futures of digital transformation, while the circumstance that they apply analogue, gradual thinking to their digital topic adds another layer of concern. As argued in the precedent chapter, however, the prevalence of gradual thinking and false distinctions is not specific to the authors' approach but is characteristic of the entire craft of scenario-building.

TABLE 2 | Capitalism/socialism. A true distinction? (Roth 2023a, 455).

	Capitalism	**Socialism**
Capitalism	Capitalism	Socialist capitalism
Socialism	Capitalist socialism	Socialism

The primary takeaway from the above discussion is then the realisation that when examining a typical 2×2 scenario matrix, we are actually faced with a much larger number of distinctions. In the case of Figure 3, these distinctions are non-/proactive, non-/laissez-faire, non-/business process management, and non-/collaborative management. Add to this a total of four more/less distinctions. As we shall demonstrate in the subsequent chapter, this multitude of distinctions suggests that we are dealing with more scenarios than actually displayed in such a typical four-square matrix.

4 | N-Factorial Scenarios

Even if we abstract from the more/less distinctions as well as from the implicit distinction between digital transformation and no digital transformation, the unfolding of the scenario map presented in Figure 3 leads to a larger number of scenarios than initially displayed on it. Table 4 presents one way to map the resulting complexity.

Table 4 presents a digitally coded version of the fully unfolded scenario map presented in Figure 3. As it becomes apparent, the scenarios highlighted in Figure 3 represent only a proportion of all scenarios actually contained by it. In fact, the scenarios 'digital authoritarianism', 'digital democracy', digital oligarchy' and 'digital localism' identified by Bodrožić and Adler's (2022) correspond to the four highlighted scenarios 7, 6, 11 and 10, respectively. Whereas it is understandable that scenario designers tacitly exclude scenario 1, that is the irrelevance of all identified factors (scenario 1), it is less reasonable to negate situations where all factors or dimensions are 'dominant' or given (scenario 16). In the present example, this would be the case of a scenario where an entrepreneurial state competes with other entrepreneurial actors in a laissez-faire economy characterised by both business process management and collaboration management, that is, by 'collaborative business process management' models (Niehaves and Plattfaut 2011). On all accounts, the uncommented omission of 75% of the scenarios identified in Table 4 is justified only in scenarios maps that are made of true distinctions, which is clearly not the case in Figure 3.

On a positive note, one major aspect of the above digital transformation of scenario mapping and design is that this approach is not limited to the traditional number of two key factors *if and only if* these key factors refer to, or can be translated into, true distinctions (see Table 5).

TABLE 3 | Capitalism/socialism. A false distinction (slightly modified from Roth 2023a, 455).

	Capitalism	**Noncapitalism**
Socialism	Capitalist socialism Socialist capitalism	Socialism
Nonsocialism	Capitalism	Despotism Feudalism Fascism Environmentalism etc.

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TABLE 4 | Figure 3, unfolded (author provided).

	Laissez-faire	Proactive	Business process	Collaborative
Scenario 1	0	0	0	0
Scenario 2	0	0	0	1
Scenario 3	0	0	1	0
Scenario 4	0	0	1	1
Scenario 5	0	1	0	0
Scenario 6	0	1	0	1
Scenario 7	0	1	1	0
Scenario 8	0	1	1	1
Scenario 9	1	0	0	0
Scenario 10	1	0	0	1
Scenario 11	1	0	1	0
Scenario 12	1	0	1	1
Scenario 13	1	1	0	0
Scenario 14	1	1	0	1
Scenario 15	1	1	1	0
Scenario 16	1	1	1	1

TABLE 5 | N-factorial scenario mapping: a digital approach (author provided).

	Factor …	Factor 3	Factor 2	Factor 1	Description
Scenario 0	…	0	0	0	…
Scenario 1	…	0	0	1	…
Scenario 2	…	0	1	0	…
Scenario 3	…	0	1	1	…
Scenario 4	…	1	0	0	…
Scenario 5	…	1	0	1	…
Scenario 6	…	1	1	0	…
Scenario 7	…	1	1	1	…
…	…	…	…	…	…

In looking at Table 5, we find that a digital approach to scenario mapping and design does, in a first step, not necessarily require the use of electronic computers. In fact, arrangements of the size and complexity of Tables 4 and 5 are most likely manageable for most human computers. What is interesting and critical about Table 5, however, is the existence of what has been relabelled as 'Scenario 0', that is the case where none of the identified key factors plays a key role in shaping the future. These 'null scenarios' might therefore act as constant reminders of the speculative nature of scenario mapping and design and, thus, as remote functional equivalents of the null hypotheses in quantitative research methodologies. Another critical aspect of the present digital approach is that it prevents the omission of implicit scenarios and puts an additional focus on the process of the pre-selection of those scenarios that are developed in greater details at later stages of the scenario planning process. Thus, the proposed approach is instrumental for both the development of original n-factorial scenarios and for the examination and 'unfolding' of traditional four-square matrix scenarios.

5 | Conclusions

Scenarios remain among the most important tools for managing the future. Yet, even more sophisticated scenario designs tend to funnel down the future to a narrow set of key factors, which are either plotted on a 2×2 matrix or used to create a world of four different yet interrelated scenarios of the future. Consequently,

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scenarios have been criticised as being simplistic or reductionist by design.

This article addresses this criticism by proposing a basic framework for n-factorial scenario design. We drew on the exemplary 2×2 matrix of 'Four Scenarios for the Digital Transformation' developed by Bodrožić and Adler (2022) to demonstrate that standard approaches to scenario building are characterised by a systematic omission of potentially critical scenarios. Our proposed digital approach can detect and map out these overlooked scenarios. Among these scenarios, we highlighted the importance of a 'null scenario' in which none of the identified critical factors play a key role in shaping the future.

As indicated by Tables 4 and 5, our approach to scenario planning implies translations of analogue, gradual factors into digital, binary ones. As a result of this exercise, it becomes apparent that, unlike earlier attempts at tabular representations of scenarios (e.g., Kaivo-Oja 2013), our *integrated and binary* scenario mapping approach does not impose a limit on the number of factors that may be considered. Whereas it is evident that larger numbers of factors might eventually necessitate computer supported-supported scenario selection practices as outlined by Amer, Jetter, and Daim (2011); Amer, Daim, and Jetter (2013), our approach expands the range and number of factors that human scenario planners can consider. Analyses of 3×3 or 4×4 matrices, such as those presented in Tables 4 and 5, are certainly not beyond the capacities of most human computer.

Though our approach is distinctly digital, it is also grounded on a theoretical framework that allows for the translation of analogue into digital factors or distinctions. Thus, our introduction to the distinction between true and false distinctions provides a theoretical interface between the still rather analogue world of scenario design and planning on the one hand, and computerised approaches to scenario selection and cross-impact analysis (Amer, Jetter, and Daim 2011) on the other hand, the latter of which have remained black-boxes to many scenario-planners so far. As our approach is connected to a larger research programme towards a digital transformation of social theory (Roth 2019), it also contributes to theory-development in the still under-theorised domain of scenario planning and design (Derbyshire 2017; Meadows and O'Brien 2020; Spaniol and Rowland 2018).

Whereas we strongly advocate the inclusion of more than two key factors into scenario design processes, we primarily recommend our approach for cases where traditional 2×2 matrices appear to provide overly reductionist views of the future. In all other instances, a 2×2 matrix will certainly suffice and create 'complete and coherent scenarios' (Godet 2010, 17) *if* it is made of true distinctions.

Ethics Statement

The authors have nothing to report.

Data Availability Statement

The authors have nothing to report.

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RESEARCH ARTICLE OPEN ACCESS

Value Plurality and Multifunctional Commensuration in Organisation: A Systems-Theoretical Approach

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ABSTRACT

This article aims to challenge the prevailing economic bias in studies of organised valuation and commensuration by exploring the broader plurality of values that organisations must manage. The article draws on social systems theory in the tradition of German sociologist Niklas Luhmann to conceptualise organisations as multifunctional systems of decisions that pertain to and commensurate a plurality values associated with a diverse set of value domains, also known as 'function systems'. The utility of the proposed framework is demonstrated through cases related to carbon rationing and legal issues during the coronavirus crisis. A key finding is that commensuration is not limited to processes dominated by financial metrics, as political and educational metrics, among others, can also serve as primary drivers of commensuration processes, effectively guiding organisational decision-making. The paper demonstrates how organisations can effectively commensurate diverse value systems without relying solely on financial metrics and concludes that future research in non-/financial of valuation and commensuration will be crucial for developing more nuanced and multifaceted strategies and concepts, including multifunctional approaches to the formation, justification, and management of moral judgements and values.

1 | Introduction

The attribution of value to social and environmental events or factors is becoming a popular area of interest in sustainability research as much as in business and management studies, where this stream of valuation research is characterised by a perceived conflict between economic *value* and social or environmental *values*. Sustainability reporting, the public disclosure of an organisation's environmental, social and corporate governance (ESG) performance, for example, is often seen as a quantification of social and environmental values that subordinates these values to economic value (Parfitt 2020, 2024; van Bommel, Rasche, and Spicer 2023). Other prominent topics include the commodification of environmental factors (Fourcade 2011; Kallis, Gómez-Baggethun, and Zografos 2013) or the financialisation of virtually everything (Zelizer 1994), two processes thought to reduce 'deep' or 'intrinsic' moral values (Donaldson 2021) to aspects of economic profitability.

Although the field puts significant emphasis on the difference between the moral qualities of environmental and social values as compared to the allegedly less moral economic value, it has not placed equally high value on studying the diversity of values within social and environmental domains so far. Neglecting the importance of the *plurality of values* (Arjaliès and Bansal 2018; Arjaliès, Laurel-Fois, and Mottis 2023) within these domains, however, is problematic because organisations must not only bridge the gaps between them (Gao and Bansal 2013) but also manage increasingly diverse and often conflicting expectations within each domain to achieve sustainability. Sustainability tensions (Carmine and De Marchi 2023; Hahn et al. 2018) therefore emerge not only

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because operations that are beneficial for an organisation's economic sustainability might be detrimental for its social or natural environment but also because organisations are confronted with diverse sets of stakeholders (Corbett, Webster, and Jenkin 2018; Hahn et al. 2015; Neesham, Dembek, and Benkert 2023; Pies, Beckmann, and Hielscher 2014; Pies and Valentinov 2024; Valentinov 2022a, 2023), each representing different and potentially conflicting environmental and social values. Whereas some stakeholders might expect organisations to protect their natural environment from negative externalities, others might expect them to go further and 'restore-preserve-enhance' (Hahn and Tampe 2021) it. Yet, other stakeholders might be more concerned with issues of social sustainability as they align with their preferred value domain, such as the political, scientific, educational or religious one. Though incommensurable in nature, however, these domains have remained subsumed within the category of the 'social', which is moreover morally and conceptually opposed to the economic domain, as if economic value and social or environmental values were located in 'hostile worlds' (Zelizer 2010, 277), where 'contact between those separate worlds corrupts in both directions', rather than representing different dimensions of a plurality of social values. As a result, the perceived conflict between seemingly *amoral* economic value on the one hand and seemingly *moral* social and environmental values on the other hand has overshadowed the importance of value plurality within social and environmental domains.

The aim of this article is to address this artificial and morally charged separation, as well as the associated neglect of research in social value plurality, by exploring how both economic and other social values are commensurated in organisational contexts.

To this end, Section 2 explores the concept of valuation as the social construction of value, also showing that key concepts of valuation studies, such as quantification and commensuration, have been overidentified with financiationalisation and other forms of economic quantification.

To challenge this economic bias in research on organised quantification and commensuration, Section 3 then presents a systems-theoretical perspective that views organisations as systems of decisions that relate to a plurality of economic, political, scientific, religious, legal and further social values. This approach maps (a) the plurality of values within the social domain and (b) the plurality of both economic and environmental values onto the social. Based on the resulting framework, the section further demonstrates how organisations operate commensurations between values associated with a plurality of incommensurable social value domains, which social systems theory refers to as function systems.

Section 4 then discusses two examples where organised commensuration between selected function systems was performed without resort to financial metrics or where financial metrics were subordinated to non-financial ones, respectively.

The final section of this article not only suggests several avenues for future research into the plurality of values and forms of valuation, including various forms of non-financial/financial commensuration, but also emphasises that this plurality necessitates new, 'multifunctional' approaches to the formation and justification of moral value judgements.

2 | Value, Valuation and Commensuration

The concept of valuation refers to the social construction of value (Lamont 2012; Zuckerman 2012) and corresponding definitions of objects or events that count as such. Though valuation may also be a matter of tradition rather than decision, most works in valuation studies have focused on deliberate forms of value creation in contexts such as the evaluation of art (Plante, Free, and Andon 2021; Plante, Maire, and Pucci 2022), the commodification of nature (Fourcade 2011), the assetisation of baseball players (Nappert and Plante 2023) or the unresolved challenge of valuing assets and calculating adequate 'transfer prices' not only with regard to sports and other domains of society but also within the economic domain itself (Agafonow and Perez 2024a). With some exceptions (e.g., Chong 2013), most works in this sample focus on cases of economic valuation, that is, processes by which non-economic objects or events are ascribed economic value, which typically takes the form of financial quantification. Though quantification is not limited to prizing and other forms of financialised valuation (Arjaliès, Laurel-Fois, and Mottis 2023; Islam 2022) but also occurs in the non-economic realm (as shown not least in Section 4 of this article), quantification has become firmly associated with economic valuation as 'financialization has permeated all types of organizations, making financial numbers the dominant calculative device of contemporary societies' (Arjaliès and Bansal 2018).

Recently, Espeland and Yung (2019) have identified three aspects of quantification that might raise moral concerns. Numbers steer attention, determining what is considered relevant and what remains outside its scope. This implies that statements about what should be measured *can* be regarded as moral value statements (see also Espeland and Sauder 2007; Kornberger 2017). Quantification also serves as a means of control and compliance which asserts power over persons or organisations, thereby turning it into a matter loaded with concerns regarding ethical exercise of power. As quantification is a way to keep things under control, it can also serve educational purposes by determining compliance with certain expectations and allocating rewards to compliant actors or entities. It is therefore only consequential that ranking and reward systems are extensively applied in and to institutions of higher education (Alvesson, Einola, and Schaefer 2022; Jemielniak and Greenwood 2015; Espeland and Sauder 2007).

Interestingly, however, the concerns related to political power and education implied in these critiques of quantification reflect a plurality of value domains that challenges the dominant focus on quantification as financialisation. This observation also aligns with earlier work in which Espeland and Stevens (1998) have problematised practices of commensuration inherent in many processes of quantification. By utilising quantification, otherwise incomparable, incommensurable factors are made comparable and commensurable (see also Agafonow and Perez 2024b). Through this 'transformation of different qualities into a common metric' (Espeland and

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Stevens 1998, 314), quantification acts as a universal scale, levelling the playing field for all factors to be assessed on an equal footing. This is the case when, for example, rating agencies combine environmental, social and corporate governance factors into one single score (Crace and Gehman 2023), a practice that might appear as problematic if these agencies act as moral black boxes (Esposito and Stark 2019) that do not disclose information regarding the relative value they have ascribed to the different ESG factors.

Concepts and critiques of commensuration, therefore, imply a plurality of values that transcends the prevalent overidentification of quantification with financialisation, in which context economic and non-economic values are treated as hostile worlds.

In the subsequent section of this article, the article presents a systems-theoretical framework for valuation and quantification studies that is neither biased to translations of non-economic values into economic value nor based on the tacit assumption that environmental or social values are morally superior to economic ones.

3 | Commensuration in Organisation: A Systems-Theoretical Approach

If valuation studies in management and organisation research consider valuation a matter of decision rather than tradition, then the question arises of how decisions relate to the plurality of values that shape valuation processes.

A social systems-theoretical answer to this question can build on shared constructivist foundations of both valuation studies and social systems theory. As values and valuations are social constructs in valuation studies, so too are decisions in social systems theory in the tradition of Niklas Luhmann (2008, 2013, 2018) not mental operations of individual human beings, but specific forms of communication (Ahrne, Aspers, and Brunsson 2015; Blagoev 2024; Cooren 2020; Hernes and Bakken 2003; Knudsen 2011; Rasche and Seidl 2020; Tekathen and Dechow 2020).

> It is not the case that decisions are first made and then communicated; decisions are communications, which, in contrast to 'ordinary' communications, are described as 'compact communications' (...) that consist of two parts. While the ordinary variant communicates only the selected content, a decision communicates also *that* a selection has been made; i.e., that there were alternatives to the selected content that could have been—but were not—selected. (Seidl and Mormann 2014, 139)

Value communication is an even more compact form of communication insofar as values are preferences for selected alternatives that tacitly present themselves as alternativeless. If we refer to justice as value, then we imply a preference for justice over injustice. If justice is one of our values, and we are confronted with the choice between a just and an unjust alternative, we do not have much of a choice. Thus, values prevent decisions. At the same time, values trigger decisions. 'Like stars in the heavens there are countless values', yet there is 'no firm hierarchical (transitive) order of such a type that certain values are always preferable to certain other ones, for instance, that freedom is more important than security in every case, peace always more important than freedom, justice always more important than peace, etc. The question of preference is only decided in advance when a value refers to its opposite (peace is better than war), but not when it refers to the contradictory demands of various distinctions between value and non-value' (Luhmann 2008, 28f).

Thus, such contradictory demands between different values constitute precisely 'those questions that are in principle undecidable', which (von Foerster 1992, 14) famously identified as prerequisites for decisions. In other words: 'decisions are always and only due when values pose conflicting demands (because if not, the decision would already be decided)' (Luhmann 2008, 29).

If we further concede with Luhmann (2018) that organisations are systems of decision communication, it follows that organisations systematically refer to a broad scope of values as they seek to manage conflicts between them. Organisations do so by using past decisions as premises for future ones, thus forming complex structures, including organisational programmes that define whether decisions are made correctly.

Evidently, an organisation's programmatic orientation to values is aligned with its specific purpose. As shown by a recent stream of research (La Cour and Højlund 2017; Roth, Sales, and Kaivo-oja 2017; Roth et al. 2020; Sales et al. 2022; Sales, Mansur, and Roth 2023; Roth 2023; Valentinov, Roth, and Will 2019; van Assche, Valentinov, and Verschraegen 2022; Will, Roth, and Valentinov 2018), however, organisations are less one-dimensional in their value orientation than commonly assumed. True, organisations pursue specialised mission. Most governments, for example, are less concerned with managing contradictory demands of religious values than most churches are. Yet, regardless of their core mission or purpose, most organisations are to some degree oriented to a broad scope of social domains. Both churches and governments, beyond their primary religious or political missions, engage in activities such as managing finances, educating staff, complying with legal requirements and interacting with the media. In total, the authors identify approximately 10 social domains or 'function systems' (including politics, art, science, religion, education, health, law, the mass media and the economy, the latter of which social systems theory views as one functional subsystem of society, among others) and demonstrate that most organisations refer to most of these function systems. Consequently, organisations are described as fundamentally 'multifunctional' systems of decision.

As organisations refer to and manage the different values associated with these different function systems, they also need to make them commensurable. Such commensurations are often not merely necessary side operations that support the pursuit of the core mission; instead, they frequently constitute the core mission itself. The *Contergan Foundation for People with Disabilities* is a case in point.

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As outlined by Roth (2014), between 1957 and 1961, the German pharmaceutical company Grünenthal GmbH distributed the now notorious tranquilliser Contergan (thalidomide). When taken by pregnant women, Contergan caused severe birth defects. In 1961 alone, Grünenthal received over 1600 urgent warnings about the drug. Moreover, the company did not deny that by 16 November 1961, it was fully aware of the drug's harmful effects. Despite this, Contergan continued to be distributed until 26 November 1961, a day after the German newspaper *Welt am Sonntag* published a relevant article. By this time, at least 5000 children had been born with severe birth defects, not to mention an unknown number of prenatal deaths. The criminal case against the company was concluded in 1970 after 283 days in court. Eight months earlier, Grünenthal and the parents of affected children had reached a private settlement: The company paid a lump sum of 100 million German marks (DM), leading to the creation of a *Foundation for the Relief of Handicapped Children*, later renamed the *Contergan Foundation for People with Disabilities*. The foundation's purpose was to coordinate the distribution of compensation for birth defects according to the scheme outlined in Table 1.

Table 1 provides an overview with the first column listing a quantitative indicator (*Schadenspunkte*, literally 'damage points' in the German original) of a child's deformity, categorised into 14 levels ranging from relatively mild (1–4.99) to the most severe (80 and above). The second and third columns then assign specific monetary compensation to each category, including both a lump sum and a monthly pension. This quantification goes beyond merely putting a price on a moral issue. Instead, it reveals that quantification and monetisation are two distinct processes. Initially, the individual issues related to Contergan were subjected to medical classification. Only after this medical ranking was established could the conversion between medical assessment and economic valuation occur. In other words, Table 1 provides a tabular representation of the core decision programme of an organisation whose purpose is to translate a health issue into an economic one in order to address a legal problem. Thus, the Contergan Foundation is a prime example of an organisation where commensuration is its core mission.

Although it highlights the difference between quantification and financialisation, the present case shares a certain economy bias with the broader discourse on valuation and commensuration, as it is once more a financial metric that serves as 'the dominant calculative device of contemporary societies' (Arjaliès and Bansal 2018).

To address this bias, in the subsequent section of this article, the focus will be on cases where financial metrics play a different role, or no role at all.

4 | Coronavirus, Carbon and Credits: Three Cases of Non- or Transeconomic Commensuration

In the coronavirus crisis, individual rights such as the freedom of movement were severely limited. In the later course of the crisis, some of these individual rights were graciously returned to individuals who complied with certain health measures. In autumn 2021, for example, two German federal states decreed that persons who had received a so-called booster vaccination were exempt from the requirement to undergo a COVID test before entering certain spaces that where accessible to tested and vaccinated individuals but restricted for unvaccinated persons. Restaurants, bars, discotheques, museums, cinemas, shops and many other organisations were therefore compelled to implement and enforce compliance with the following simple programme (see Table 2).

Table 2 presents a political programme that defines a person's legal status based on their health status. Such programmes

TABLE 1 | Quantification and economisation of pain (Translation from German Bundesanzeiger N° 189, 06.10.1973).

Damage points	Compensation payoff	Monthly pension
1–4,99	2.500,– DM	—
5–9,99	5.000,– DM	—
10–14,99	7.500,– DM	100,– DM
15–19,99	7.500,– DM	150,– DM
20–24,99	15.000,– DM	200,– DM
25–29,99	15.000,– DM	250,– DM
30–34,99	12.500,– DM	300,– DM
35–39,99	12.500,– DM	350,– DM
40–44,99	15.000,– DM	400,– DM
45–49,99	15.000,– DM	450,– DM
50–59,99	17.500,– DM	450,– DM
60–69,99	20.000,– DM	450,– DM
70–79,99	22.500,– DM	450,– DM
80–...	25.000,– DM	450,– DM

Source: Roth (2014).

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TABLE 2 | Legal status as a function of health status. A common subroutine during the coronavirus crisis (own table).

Health status	Legal status
Booster vaccination	Freedom of movement without test
Two vaccinations (or documented recovery)	Freedom of movement with test
No vaccination	No freedom of movement

were common during the coronavirus crisis and installed as a subroutine in many organisational contexts. As a result, many organisations routinely translated health issues into legal ones. Although not devoid of quantification, the programme outlined in Table 2 is free of any reference to financial metrics, making it a clear case of non-economic commensuration.

Another example where financial metrics are not the dominant calculative device involves the concept of personal carbon allowances (PCA). Referring to PCA as a form of commensuration not dominated by financial considerations may initially seem counterintuitive. The idea of PCA typically entails the allocation of an individual carbon allowance, which is deducted whenever the person engages in carbon-intensive consumption. Persons with a carbon-neutral or carbon-conscious lifestyle accumulate a surplus of PCA, which they can sell to persons with more carbon-intensive lifestyles or, as discussed in the context of a similar scheme of tradeable energy quotas (Starkey 2012, 9), foreigners who have not been allocated PCA in a certain country or region. As the allowance would be constantly reduced in line with environmental policies, carbon-intensive lifestyles would become increasingly costly over time, thus incentivising individuals to transition to environmentally sustainable lifestyles.

Except for some pilots, PCA trading schemes have not been implemented yet mainly due to anticipated public acceptability issues (Bristow et al. 2010). Since the coronavirus crisis, however, a growing number of voices have called for revitalisation of the concept. This statement from a perspective article in *nature sustainability* is a case in point:

> In particular, during the COVID-19 pandemic, restrictions on individuals for the sake of public health, and forms of individual accountability and responsibility that were unthinkable only one year before, have been adopted by millions of people. People may be more prepared to accept the tracking and limitations related to PCAs to achieve a safer climate and the many other benefits (for example, reduced air pollution and improved public health) associated with addressing the climate crisis. (Fuso Nerini et al. 2021, 1027)

This line of argumentation was prominently supported, not least by the World Economic Forum, and interest in the concept has been growing again (see, e.g., Tan Roth 2023).

Although the potential roll-out of a scheme of tradable PCA may seem like a prime example of the financialisation of everything (Zelizer 1994), including climate change, PCA trading ultimately is a form of carbon rationing, and thus a political market intervention rather than a case of economic marketisation. This assessment is further supported by discussions about purchase limits for individual carbon allowances to 'avoid excess personal use of carbon' by affluent individuals and to prevent speculation (Bristow et al. 2010).

The ultimate purpose of a still-fictitious organisation or organisational ecosystem charged with the implementation of a PCA allocation, deduction and trading scheme would hence be a political one. Much like in the case of the coronavirus crisis, this purpose would be the causation of politically desired levels of scientifically measured values and their eventual reduction to zero.

If the reduction of carbon emission metrics is the actual goal of PCA schemes and similar policies, then a potentially emerging PCA trade would only be a transitory and certainly not the ultimately desired policy outcome (see Table 3).

As shown in Table 3, the ultimate outcome of carbon rationing policies, such as PCA schemes, would be that individuals avoid the costs associated with exceeding their carbon 'consumption' ration and rather perform lifestyle changes that lead to the desired reduction of the total carbon emissions attributed to a given population. The more individuals comply with these lifestyle expectations, the less significant the economic dimension of this politically enforced artificial shortage of a superabundant gas becomes, and the clearer that the purported end of this rationing policy is, in fact, educational.

The two cases presented in this section show that commensuration is not limited to processes where financial or other economic metrics are the dominant calculative device. But in the case of carbon rationing, economic metrics play a role only if individual behaviour fails to stay within a politically defined range of scientific metrics, which primarily serves an educational purpose, the commensuration of health status into legal rights during the coronavirus crisis operated entirely without reference to economic metrics.

TABLE 3 | Political commensuration of carbon emission metrics and potential policy outcomes (own table).

Scientific quantification of carbon emissions	Political carbon rationing	Potential policy outcomes
Higher	Above declining ration	Economy: carbon pricing and trade
Lower	Within declining ration	Education: lifestyle change
Zero	*No ration*	*End of policy?*

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The concept of value plurality is also increasingly relevant in a globalised and technologically driven society where the pervasive influence of algorithms in rating and evaluating behaviour is evident the everyday digital interactions experienced globally (Tække 2011). Platforms like Uber use customer ratings to influence driver behaviour and access to work opportunities, whereas social media platforms such as Instagram and Facebook quantify social value through likes, shares and comments. These systems rely on algorithmic governance to manage and commensurate diverse values—ranging from economic behaviour to social and moral conduct—within a unified framework. This trend reflects what Luhmann described as the increasing functional differentiation within society, where different value systems, such as those in the economy, law and social media, develop their own logics and criteria for success. The integration of these value domains through algorithmic systems underscores a broader move towards the quantification and management of behaviour in both public and private spheres.

To date, perhaps the most extreme example is China's Social Credit System (SCS), which integrates a diverse range of societal values within a single governance system, managed by the state.

The SCS is deeply rooted in China's long tradition of bureaucratic governance, where systems like the Dang'an (personnel dossier) have historically been used to document and control the behaviour of individuals and officials (Jiang 2020; Malaurent and Mehrpouya 2024). These practices laid the groundwork for the modern SCS, which has significantly expanded in scope and technological sophistication. The SCS now integrates digital technologies to manage and evaluate a broad spectrum of behaviours across multiple societal domains, including legal, social and political values (Mistreanu 2018; Tække 2022; Tække and Paulsen 2020; Zou 2021). It integrates diverse value domains—economic, social, legal and political—into a coherent system that assigns scores to individuals and entities based on their behaviour (Ohlberg, Ahmed, and Lang 2017). For instance, the system rewards financial compliance and social responsibility with access to favourable loan terms and public services while penalising legal infractions and antisocial behaviour with travel restrictions and public blacklisting (Zou 2021).

Initially conceived to improve financial creditworthiness, the SCS has evolved into a more comprehensive system that includes social behaviours, legal compliance, political loyalty and other variables (Creemers 2018). This expansion reflects the system's multifunctional nature, wherein various societal values are commensurated and integrated into a single evaluative framework. Luhmann's idea of functional differentiation helps us understand how the SCS, like other modern systems, is engineered to manage the complexity arising from diverse value systems within a single societal framework.

This multifaceted approach to commensuration illustrates the system's ability to integrate and quantify a wide array of values within a unified framework. However, the SCS's reliance on algorithmic rationality raises ethical concerns, particularly regarding the reduction of complex moral and social behaviours to quantifiable metrics. In this context, 'it is worthwhile to recall that the notorious Chinese social credit system started as financial credit scoring system similar to those in place in many Western countries, and that it has long been focused mainly on organisations', before it was extended to include 'to non-financial aspects of social life and an increasing detailed monitoring of individual behaviour [which] has given rise to the concerns commonly associated with the system today' (Roth 2023, 101278).

5 | Outlook: Multifunctional Studies of Organised Valuation and Commensuration

The present article drew on the social systems-theoretical concept of functional differentiation to emphasise the complexity and plurality of values that organisations are confronted with in different societal contexts. Its main contention is that commensuration—the process of making different values comparable—extends beyond economic or financial metrics and encompasses a broader range of social values, including political, legal, religious, scientific and health- or mass media-related ones. In particular, this article highlights how different functions within organisations and societies often require managing these diverse value systems. To illustrate this point, the article discussed cases such as the management of carbon emissions, the health statuses-based policies during the coronavirus crisis and the SCS in China. These examples demonstrate how the commensuration processes can operate effectively without relying solely on economic metrics, showing that political, educational, and even algorithmically driven metrics can serve as primary drivers of commensuration. The case of the Chinese SCS, in particular, underscores the challenges and ethical dilemmas associated with consolidating a plurality of values within a single evaluative framework. The system's reliance on algorithmic governance to integrate economic, legal, social and political values reflects the complexities organisations face when attempting to navigate and manage multiple, often conflicting, value domains. This case also serves as a cautionary example of the potential consequences of over-reliance on any one metric or system of valuation, whether economic, ecological or otherwise.

Thus, the present paper not only underscores the importance of acknowledging and managing a plurality of values within decision-making processes but also challenges the bias to financial and other economic forms of commensuration, whose analyses prevail and motivate criticism in valuation studies and management and organisation studies alike (Arjaliès and Bansal 2018).

In drawing on cases such as carbon rationing, health status-based policies during the coronavirus crisis and the Chinese SCS, this article demonstrated that commensuration processes can operate effectively without, or without a predominance of, economic metrics, also showing how political and educational algorithmic metrics can serve as primary drivers of commensuration.

In proposing a systems-theoretical framework for understanding how organisations navigate the commensuration of various values, this article moreover showed that organisations, as systems of decision communication, inherently deal with multiple and sometimes conflicting value domains. To go one step

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further, one might even suggest that commensuration of ultimately incommensurable perspectives is a key function organisations have in modern society. Function systems are not only incommensurable but also interdependent, and this interdependency ultimately requires commensuration. At the same time, the incommensurability of function systems requires mediation, which is provided by organisations in terms of commensuration. This argument directly ties into Heinz von Foerster's and Niklas Luhmann's ideas about how organisational decisions can only decide the undecidable, and it also connects with the work of Chester Barnard, who explicitly held the reconciliation of incompatible perspectives to be a key task of management (see Valentinov 2022b; Valentinov and Roth 2021, 2022).

Another major take-away of this article is that moral judgements and ethical considerations about the adequacy of organisational attempts at managing these multiplicities and conflicts must themselves reflect the complexity of the matter. This implies that these judgements and considerations clearly flag out their own preferences for one or several function systems of society or otherwise represent the plurality of perspectives within the process of their formation and justification. One such approach is presented in Table 4.

Table 4 shows that moral judgements about and ethical considerations around an issue or concept such as PCA trading strongly depend on the functional value domains such judgements are associated with. From a political perspective, PCA trading might appear as a necessary and feasible strategy to achieve certain policy goals. From an economic perspective, however, the judgement might be more ambivalent as PCA policies might not only open up new opportunities for investment and trade but also curb economic development in certain industries. From a scientific perspective, the issue might appear similarly ambivalent as even if there were a unanimous scientific consensus regarding the need for urgent and radical climate mitigation measures, there would still be need for discussion as to whether PCA trading qualifies as one such measure or rather creates undesirable side effects such as large-scale reactance or new forms of inequality and thus be bad from a legal justice-perspective. As we consider artistic or sportive perspectives on PCA, we also find that some function systems might be rather indifferent if it comes to the implementation of a PCA scheme in a given country or region.

The cases provided in the paper therefore also highlight the potential challenges in implementing non-economic/economic commensuration processes, which may depend on different stakeholders' identifications with values associated with the various function systems of society.

Developing a broader understanding of management and organisation in terms of commensuration requires the analysis of larger scales and scopes of cases, particularly those involving non-financial forms of commensuration. The empirical challenge associated with this endeavour is then the identification of pertinent cases. To facilitate their detection, one might assume that most representations of commensuration adopt a tabular format. Therefore, the quest would be for commensuration tables. Potential avenues for future research therefore include explorations of additional contexts where tacit or apparent tabulations of non-economic metrics play a central role, such as in the realms of social justice, environmental conservation or public health. In these contexts, investigating the plurality of values and factors that influence public acceptance of non-economic/economic commensuration schemes could provide valuable insights into how these processes can be better implemented. This also implies a need for further studies that examine how the inclusion of non−/economic values in commensuration affects organisational decision-making processes, particularly in terms of multifunctional concepts of long-term sustainability and stakeholder management.

Given the complexity of non-economic/economic commensuration processes, interdisciplinary research that combines insights from sociology, economics, political science and environmental studies could offer a more holistic understanding of how diverse value systems interact within organisations and society. The case of the SCS, with its far-reaching implications, underscores the need for such interdisciplinary approaches to fully grasp the ethical and practical challenges involved.

Last but not least, comparative research across different countries, cultures or industries should shed light on how different societal contexts influence the commensuration of values and the resulting outcomes.

Similar to the case of the coronavirus crisis, where public focus was directed to a small set of now largely irrelevant health indicators, the pressing concern with climate change risks driving us towards over-reliance on yet another narrow set of metrics or values such as carbon emissions or 'planetary health' to which all other metrics or values should subordinate. Whereas the issues surrounding the perceived financialisation of all social domains have been widely discussed, the potential dangers of replacing financial metrics with natural scientific indicators, health metrics or algorithmically driven measures have remained underexplored. This lack of scrutiny is partly due to the morally charged separation between economic value and social and environmental values. Although economic metrics, such as those developed by financial experts like Damodaran (2012), are indispensable for corporate valuation and financial analysis, they also exemplify the broader trend of reducing complex social and organisational values to monetary terms. This approach, while rigorous, often overlooks the multifaceted nature of value in modern society, where non-economic values such as social

TABLE 4 | Ethical considerations in the context of functional differentiation (own table).

	POL	ECO	SCI	ART	REL	LAW	HEA	SPO	EDU	MME
+	1	1	1	0	1	0	1	0	1	1
−	0	1	1	0	0	1	0	0	0	1

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responsibility, environmental impact and cultural significance play crucial roles. However, a society in which every aspect of social life is assessed solely on its carbon footprint—even to the extent of influencing decisions about bringing new life into the world—is no more inherently better than a society ruled by financial indicators or religious doctrines.

Reckwitz (2020) highlights this tension in his discussion of the 'society of singularities', where contemporary culture increasingly values uniqueness and distinction. This societal shift towards singularisation poses a direct challenge to the homogenising tendencies of systems like the SCS and other algorithmic governance frameworks. Luhmann's (1995) theory of functional differentiation further contextualises this challenge by illustrating how modern societies manage complexity through autonomous systems that commensurate values according to their internal logics. However, Reckwitz's focus on singularisation suggests that the current cultural emphasis on uniqueness resists such systemic reductions, underscoring the importance of maintaining a plurality of values. Taking value plurality seriously, therefore, requires consideration of whether our future lies in a society of organisations—each pursuing their economic, political, legal, artistic, religious or other social missions with the corresponding strategies of commensuration—or in an organised society dominated by one sufficiently universal metric or standard of commensuration, defined by a priestly caste, a Politburo, a club of global healers or a subfield of the natural sciences.

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RESEARCH ARTICLE

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Willing unwillingness. A Luhmannian perspective on followership and leadership in organizations

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Abstract

This paper examines how organization theorists within social systems theory in the tradition of Niklas Luhmann view hierarchical steering and seek to adapt Luhmann's ideas to the complexities of contemporary organizations. We contribute to this debate by linking it to leadership and followership literature, introducing the paradox of 'willing unwillingness' to describe personal engagement in organizations. From this concept, we develop a typology of organizational roles: leaders, role shifters, followers and outsiders. Through in-depth interviews with Brazilian public servants and thematic analysis, our findings reveal that these roles are shaped by emotional experiences and variable psychic engagement, rather than hierarchical structures, offering new insights for systems-theoretical exploration of organizational roles.

KEYWORDS

deparadoxification, false distinctions, membership, social systems theory, tetralemma

1 | INTRODUCTION

Niklas Luhmann is renowned not only as a prominent sociologist and systems scholar but also as a significant figure in organization theory (cf. Luhmann, 2018). His understanding of organizations is embedded in his broader view of social systems distinguished by operational closure. As operationally closed systems, organizations do not include human beings. Instead, their boundaries are tied to the notion of membership: human individuals become members by consenting to meet specific behavioural expectations, such as adherence to the organization's rules. The exclusion of human beings means, among other things, that organizations cannot be supposed to 'automatically satisfy personality needs' (Luhmann, 2020, p. 426). Another implication of operational closure of organizational systems is the impossibility of hierarchical steering (Luhmann, 1997; Luhmann, 2018). Accordingly, to Luhmann, organizations are self-steering systems. Especially in view of the voluntary nature of membership in organizations, the conventional top-down view of hierarchy becomes something of an illusion. Notably, Luhmann's critique of hierarchical steering predates his systems-theoretical work and goes back to his early volume exploring how employees master the art of directing their superiors,

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which he called 'Subtervision' (Luhmann, 2018/1962). As Seidl and Mormann (2014) acknowledge, these tenets of the Luhmannian view of organizations break with a lot of widely held assumptions, and remain subject to critique as well as misunderstandings.

The present paper is concerned with how these tenets continue to be debated within the circle of Luhmannian scholars. One of such debates centres on the applicability of Luhmann's understanding of membership within formal organizations. Luhmann's understanding, some argue, may not fully capture the dynamically evolving nature of contemporary organizations. Grothe-Hammer (2020) takes aim at this perceived shortcoming, contending that Luhmann's model struggles to account for modern organizational forms like activist groups, hacker collectives and tech startups. These entities often forgo traditional membership structures, opting instead for inclusive decision-making processes that bypass preselection of participants (Grothe-Hammer, 2020). Consequently, Grothe-Hammer (ibid) calls for a more dynamic and process-oriented approach, urging the adaptation of Luhmannian organizational concepts to reflect the fluid realities of today's organizational life.

This emphasis on fluidity in modern organizations finds resonance with Stenner and Andersen (2020) as well as Andersen (2013), who argue that as societal complexity increases, traditional bureaucratic organizations are seeking greater flexibility to enhance their environmental sensitivity. Drawing on Andersen's (2013) notion of organizations as 'intensity machines' powered by psychic systems, Stenner and Andersen (2020, p. 452) discuss 'the change in the form of membership... as a move from formal membership to membership by self-enrolment'. They posit that 'the person is expected to enrol herself and to do so recurrently within an organizational context framed as ever-changing' (Stenner & Andersen, 2020, p. 452). In this context, human emotions acquire a newfound significance as a source of motivation, responsiveness and vitality, defying the Luhmannian distinction between role and person (Stenner & Andersen, 2020). As Andersen (2013) proposes, this harnessing of emotions within psychic systems generates novel organizational semantics, including play, pedagogy and love (Stenner & Andersen, 2020). Further enriching this discussion, Valentinov and Roth (2021) explore how a Luhmannian perspective on membership can be productively informed by Whiteheadian organismic philosophy emphasizing the embeddedness of individual members within their broader social life context, which often presents multiple and potentially conflicting moralities (ibid).

Overall, we see a broad consensus within Luhmannian scholarship about the continuing need to adapt the Luhmannian organization theory to the complexities of a knowledge-based society defined by globalization, technological disruption and a dismantling of traditional hierarchies (Roth et al., 2017; Uhl-Bien et al., 2007). Stenner and Andersen's (2020) concept of 'self-enrolment' certainly presents a promising adaptation strategy, aligning with Luhmann's critique of rigid hierarchical authority. On the one hand, as Stenner and Andersen (2020) argue, self-enrolment blurs the lines between role and person, ushering in a renewed 'emphasis on authenticity' that compensates for the diminished authority (Stenner & Andersen, 2020, p. 452). On the other hand, these authors (ibid) promote a predominantly positive view of authenticity, which prioritizes emotions as a source of unwavering motivation and engagement. We are however reminded by Luhmann (2020) that organizations cannot be expected to universally fulfil individual needs. We therefore argue that self-enrolment's authenticity might not always translate into positive emotions and that the spectrum of emotional associations could range from highly positive to deeply negative. Therefore, we want to examine the implications of this understanding of authenticity for the nature of organizational roles, revealing how these roles mediate the range of positive and negative emotional connections with the organization.

Toward this end, the present paper will leverage the rich scholarship on leadership and followership within organizations. Given that leadership and followership embody authentic forms of organizational engagement, they offer a potentially versatile semantic framework for analysing a diverse array of organizational roles. Building on this foundation, we propose a Luhmannian perspective on leadership and followership, examining their place within the context of the modern functionally differentiated society, which inherently challenges hierarchical structures. Our framework is supported by an empirical study utilizing a series of in-depth interviews with public servants from a Brazilian federal agency, followed by thematic analysis. The narratives captured regarding leadership and followership experiences illuminate the individual challenges associated with authentic engagement within organizations, lending fresh insights to Luhmann's assertion that organizations cannot universally fulfil individual needs (Luhmann, 2020, p. 426).

2 | CONCEPTUAL FRAMEWORK

2.1 | Leadership, followership, and the Luhmannian critique of hierarchy

While scholarship on leadership and followership is extensive and proliferating, one of its key messages is the

mutually constitutive relationship of these phenomena. Leadership, as DeRue and Ashford (2010) posit, arises from a shared interest among those who follow, encompassing dynamic social interactions between leader and follower identities. These interactions are forged through the interplay of socially constructed claims and the granting of legitimacy by followers. Followership, in turn, is defined by a similar confluence of shared interest and the conscious choice of who (or what) to follow, when and where (Bastardoz & Van Vugt, 2019). Just as leadership is shaped by follower response, follower behaviour is influenced by the leader's claims and actions. This recognition underscores the inadequacy of studying leadership in isolation. Followers have now come to be widely understood as the essential partners in the pursuit of organizational goals.

Followership studies remain nascent compared to the vast literature on leadership, yet the field has made significant strides. Recent scholarship (Aghaei et al., 2023; Carsten et al., 2010; Carsten et al., 2018; Matshoba-Ramuedzisi et al., 2022; Stegmann et al., 2020; Uhl-Bien et al., 2014) has shed light on the crucial roles followers play, the contextual factors that shape their behaviour, the diverse styles of followership and the social construction of these dynamics within organizations. This newfound emphasis on followership promises a richer understanding of leadership itself, revealing it not as a singular force, but as a product of the complex interplay between leaders and those who choose to follow. From a Luhmannian perspective, broad streams of current scholarship on leadership and followership are remarkable not only for their recognition of the inherently relational and communicative construction of these phenomena but also for their critique of hierarchical authority (cf. Luhmann, 1997).

With regard to leadership studies, we want to mention several key contributions emphasizing the relational and discursive construction of leadership and adding valuable substance to the Luhmannian critique of hierarchical authority. Central to these contributions is the idea that, rather than being vested in a single individual, leadership emerges from the collective agency of individuals engaged in ongoing interactions. This idea is vividly illustrated in Raelin's (2016) concept of collaborative agency, which reimagines leadership as a shared endeavour where authority is dispersed across the system. Similarly, Clarke's (2018) relational leadership framework posits that leadership is embedded in the network of relationships and cannot be reduced to the actions of a singular leader, being instead the product of the continuous and reciprocal interactions that define the social fabric of the organization. Spillane's (2005) distributed leadership model articulates how leadership tasks and responsibilities are spread across various actors within the organization. This model aligns closely with Luhmann's idea of operational closure, where the system sustains itself through a web of communicative acts rather than relying on hierarchical commands. Pearce and Conger (2002) exploration of shared leadership similarly challenges the hierarchical paradigm by demonstrating how leadership can be effectively exercised by teams rather than by individuals. Denis et al.'s (2012) concept of plural leadership exemplifies how leadership is distributed among multiple actors, further questioning the efficacy and necessity of hierarchical authority. In their view, leadership emerges from the collaborative efforts and interactions of diverse individuals, each contributing their unique perspectives and skills. This plurality of leadership mirrors Luhmann's critique of centralized authority, highlighting the strengths of a self-steering view of organizational governance. Alvesson's work, combining institutional theory with discourse analysis, also supports the critique of hierarchical authority by revealing that leadership is not merely a function of individual authority but is deeply influenced by the communicative processes that occur within and around the organization (cf. Alvesson & Spicer, 2019). Langley's process-oriented studies further dismantle the notion of hierarchical leadership by focusing on the emergent and adaptive nature of leadership processes (cf. Langley et al., 2013).

The Luhmannian theme of the critique of hierarchical authority is even more clearly expressed in the burgeoning field of followership studies. Traditionally, the leader–follower relationship has been painted in stark hierarchical strokes, with leaders wielding authority over their subordinates. However, a growing body of research (Carsten et al., 2010; Uhl-Bien et al., 2014; Blom & Lundgren, 2020) exposes the limitations of this hierarchical view. Studies have shown that followers, far from being passive recipients of orders, can exert influence through feedback, dissent or even resistance (Carsten et al., 2010). Furthermore, follower–leader interactions can forge shared meaning and identities, fostering a more dynamic relationship (Uhl-Bien et al., 2014). Blom and Lundgren (2020) further challenge the notion of fixed leader and follower roles, suggesting that they are instead fluid and situational, shaped by context and communication. Importantly, this emerging scholarship compels us to differentiate between followers and subordinates, a distinction often blurred in earlier works (Hersey & Blanchard, 1982). Conflation of these terms is not only misleading but also problematic, as it implies a passive or obedient follower who simply complies with directives. The reality, as recent research suggests, is far more nuanced.

Recent scholars have proposed different definitions and criteria to distinguish between followers and subordinates, based on their behaviours, attitudes or motivations. For example, Kellerman (2008) defines

subordinates as those bound by formal power structures, typically, but not always, falling in line with superiors. Followers, on the other hand, are seen as active participants, wielding influence and shaping the dynamics of the leader–follower relationship (Kellerman, 2008). Building on this distinction, Bastardoz and Van Vugt (2019) define followership as a strategic approach to solving coordination problems, involving conscious choices about who (or what) to follow, when and where. Followers, in this view, are individuals who actively coordinate actions with others, including leaders and fellow followers, to function effectively within a group. Unlike subordinates, followers are not necessarily confined by formal hierarchies; rather, as Plachy and Smunt (2022) suggest, 'as goes leadership, so goes followership'.

The distinction between followers and subordinates mirrors the one between managers and leaders. Managers are traditionally seen to wield legal and formal authority, granting them superiority. Leaders, in contrast, draw on social, personal and moral authority, inspiring recognition and identification. While managers can occasionally act as leaders, their primary role is defined by their formal position (Plachy & Smunt, 2022), obliging them to plan, organize and deploy resources to achieve organizational goals (Plachy & Smunt, 2022). The literature often equates leadership with the formal leader's ability to influence goal achievement. We argue, however, that 'formally designated leaders' are essentially managers, whereas leadership emerges through personal interactions and an initiating communication style that fosters the accomplishment of organizational vision, goals and processes (Valentinov & Roth, 2024). Thus, we see managership to be associated with 'supervision, bosses and budgets', while leadership is linked to 'inspiration, encouragement and guiding' (Kniffin et al., 2020). This reframing suggests that leadership may be less about formal authority and more about the informal aspects of a manager's role, those that extend beyond budgets and planning, as highlighted by Kniffin et al. (2020). In our interpretation, managership prioritizes the formal position, whereas leadership prioritizes the informal, potentially connecting to the notion of authenticity explored by Stenner and Andersen (2020).

2.2 | The paradox of 'willing unwillingness'

The interplay between followership and leadership highlights that these concepts must be understood as constituting a voluntary partnership between leaders and followers (Plachy & Smunt, 2022). Voluntariness is the essential characteristic here. Followership has been defined as a voluntary deference process, wherein individuals possess a flexible followership psychology, enabling them to make choices related to leadership, including who or what, where and when to follow (Bastardoz & Van Vugt, 2019). Being a follower is widely considered a voluntary decision (Lapierre, 2014), free from fear-based or blind obedience (Blom & Lundgren, 2020; Matshoba-Ramuedzisi et al., 2022). However, some scholars question the voluntariness assumption in followership, arguing that the interplay between followership and leadership emerges within social interactions that construct new meanings potentially undermining voluntariness (Carsten & Uhl-Bien, 2012). For example, Blom and Lundgren's (2020) constructionist approach to followership problematizes the nature of voluntary compliance, acknowledging different degrees of compulsion, ignorance and obligation. They admit that modern organizations usually contain elements of these factors, pushing subordinates towards compliance, which is often mistaken for followership.

We see a possibility for the debate about the voluntary nature of followership to be enriched by Luhmann's understanding of the paradoxical nature of decision-making in organizations. To Luhmann, every decision implies alternatives, leading to a recursive need for further decisions. Traditional bureaucratic organizations have historically managed this paradox through rules, norms and hierarchical structures (cf. Andersen, 2013). However, as societal complexity increases, these methods become less effective (ibid). Post-bureaucratic organizations, as studied by Andersen (2013), use self-enrolment and new semantics—play, pedagogy and love—to manage the paradoxes of decision communication, offering greater flexibility and responsiveness. But we see this self-enrolment and its semantics to suggest an overly positive view of authenticity within organizations. To balance the positive and negative dimensions of authenticity, we introduce the paradox of 'willing unwillingness', illustrating the complex nature of voluntary followership. This concept captures the dual nature of human engagement in organizations, where individuals voluntarily join and participate, yet their experiences and emotional responses can range from highly positive to deeply negative. 'Willing unwillingness' specifically problematizes the notion of voluntariness, aligning with the constructionist approach of Carsten and Uhl-Bien (2012), as well as Mingers' (2003) argument, that, by voluntarily gaining organizational membership, individuals sacrifice aspects of their individuality and autonomy. Finally, Uhl-Bien's shift from traditional leader-centric models to complexity leadership and followership theories underscores the evolving nature of leadership as a relational and adaptive process within dynamic systems, which aligns

with our analysis of contemporary organizational contexts.

The key implication of willing unwillingness is that authentic self-enrolment in organizations, while fostering a sense of autonomy and engagement, can lead to a spectrum of emotional experiences, encompassing both positive and negative emotions. These experiences may arise due to unmet expectations, conflicts or organizational pressures. The paradox of 'willing unwillingness' reflects that while individuals voluntarily choose to become members or followers, their experiences are shaped by the organizational context, which includes both empowering and constraining elements, and this may hold for leaders as well as followers.

2.3 | From deparadoxification to cross-tabulation

Luhmann (2018) argues that organizational paradoxes are pervasive, but must be deparadoxified if organizations are to remain viable and capable of action. We suggest that leadership and followership provide semantics that serve to deparadoxify the paradox of 'willing unwillingness' by constructing a narrative of voluntary engagement that conceals the reality of non-voluntariness. This deparadoxification process maintains a coherent organizational narrative, allowing organizations to function effectively despite the tensions following from the paradox. This deparadoxification works through framing followership as a voluntary process where individuals choose to follow based on respect and recognition of the leader's abilities, and can adapt their level of engagement and deference based on the context and their own judgment. The semantics of followership construct a narrative of willing engagement, emphasizing positive aspects such as trust, respect, and mutual goals, and obscuring the less voluntary aspects of organizational life, where individuals might follow due to fear of repercussions, social pressure, or lack of alternatives.

In order to practically demonstrate how the semantics of leadership and followership can help to deparadoxify the paradox of 'willing unwillingness', we draw inspiration from Roth's (2024) suggestions on how deparadoxification can be supported by the method of cross-tabulation (see Roth et al., 2023). Building on Spencer Brown's and Luhmann's theories of distinctions, Roth argues that distinctions are fundamental systemic operations that create mutually exclusive and jointly exhaustive categories. According to Roth (2024), cross-tabulation involves the systematic juxtaposition of these distinctions in such a way as to turn 'false' distinctions, which are not mutually exclusive and jointly exhaustive, into 'true' ones which correspond to these criteria. In our present context, we acknowledge the distinction between leaders and followers as a false one and, accordingly, decompose it into the two true distinctions of 'leader/not-leader' and 'follower/not-follower'. This strategy coincides with the transformation of a dilemmatic binary distinction into a tetralemma (Fritzsche, 2024; Roth et al., 2023). A tetralemma is an ancient matrix structure used in traditional Indian logic (Jayatilleke, 1967), where was used as a framework to infer additional decision-making options when faced with dilemmatic decisions (see Roth et al., 2023; Sales et al., 2023).

The basic structure of a tetralemma is presented in Table 1.

Table 1 shows that a dilemma resulting from the tough choice between one option ('this') and another ('that') can be translated into two choices between 'this' and 'not-this' on the one hand and 'that' and 'not-that' on the other hand. As a result, an observer initially caught in the dilemma of having to in favour of either this or that option has now the additional choices of opting for 'both this and that', as well as 'neither this nor that' (and thus perhaps 'for something completely different').

This principle can be applied to any dilemmatic distinction, which is why Table 2 shows how the leader/follower distinction can be translated into two true distinctions, thus creating the *tetralemma of leadership and followership* (Table 2).

Table 2 shows that cross-tabulating the two true distinctions of follower/not-follower and leader/not-leader helps to infer additional role concepts beyond the binary leader/follower distinction, thus also highlighting the complex and often hidden dynamics between leadership and followership. This approach shows that individuals can occupy multiple roles simultaneously, experiencing both voluntary and non-voluntary engagement, while

TABLE 1 This/that tetralemma.

	This	**Not-this**
That	Both this and that	That
Not-that	This	Neither this nor that

TABLE 2 The tetralemma of leadership and followership.

	Follower	**Not-follower**
Leader	Both follower and leader	Leader (and not follower)
Not-leader	Follower (and not-leader)	Neither follower nor leader

mapping out different scenarios where individuals may identify as leaders, followers, both or neither. This nuanced understanding helps in identifying the conditions under which voluntariness is genuine or compromised, thus balancing the ideal of voluntary engagement with the reality of organizational pressures.

Table 3 then translates Table 2 into a typology of four distinct leadership/followership: individuals who encompass both leadership and followership, those who are exclusively leaders, those who are purely followers and those who fit into neither category.

This way, we identify four potential types of actors within the leadership/followership distinction:

1. Role shifters: These persons occupy boundary positions, exhibiting an in-between role. They transition between leadership roles concerning subordinates and followership roles concerning superiors in their daily activities. A typical case of this role profile are middle managers.
2. Primary leaders: This category includes persons who primary exercise leadership roles, such as founders, entrepreneurs, and senior level executives, to some extent.
3. Primary followers: These are persons in roles like entry-level staff or support staff positions who predominantly assume followership roles.
4. Outsiders: This category comprises persons within the organization who reject or transcend both leadership and followership roles. They neither lead nor follow and instead maintain a certain indifference or neutrality towards formal and informal manifestations of leadership and followership within organizations. (Temporary in-house) Consultants, rebels or work-to-rule-workers who have withdrawn from the organization within the organization, thus cultivating an attitude of 'inner immigration', belong to this profile.

Note that the positions representing these roles examples of organizational roles rather than an exhaustive list.

TABLE 3 Enhanced taxonomy of leadership/followership roles in a typical organization.

	Follower	Not-follower
Leader	**Role shifters** (e.g. middle managers)	**Primary leaders** (e.g. top management, entrepreneurs)
Not-leader	**Primary followers** (e.g. support staff, trainees)	**Outsiders** (e.g. consultants, rebels, work-to-rule-workers)

3 | METHOD

3.1 | The research design

We employed a qualitative theory–driven methodology, following a thematic analysis based on the systems theory and the paradox of 'willing-unwillingness' and a need for further investigation of the dynamics between leadership and followership. As such, the research was designed to investigate how public servants from Brazil can be described in terms of their expression of engagement (e.g. negative and positive emotions) along our proposed paradox of 'willing unwillingness', further leading to the proposed typology of organizational roles: top managers, middle managers, pure followers, and outsiders. The choice of this particular organizational setting was strategic. In the Brazilian public sector, the virtual impossibility of exclusion or dismissal for public servants minimizes the traditional pressures associated with authority. This unique environment allowed us to examine the dynamics of leadership and followership more accurately, without the confounding influence of job security threats.

Participants were sampled from two federal-level public organizations in Brazil related to general advocacy and control for the Union, which are known by its formality and hierarchic positions (AGU, CGU). The participant population were servants who have had assumed management positions within the past 4 years from 2018 to 2022 (a government cycle) or have declined the role, maintaining the original position. The criteria to participate were (a) having been or currently occupying a management position; (b) not being interested in returning to a management position, in the first case, and considering leaving the position currently occupied, in the second. Additionally, servants from other public organizations (state or municipal level) who voluntarily asked to participate were also included because they have similar work structure and demands.

Participants were recruited through institutional email and snowballing. Potential participants were given a letter of introduction of the research and detailed consent form including confidentiality and anonymity terms along with the absence of risks. No financial or institutional incentives were offered for participating in the study. Participants were requested to agree with the consent form prior to participation in this research. From the total of 112 servants, 31 decided to participate and 14 were interviewed. Individual interviews lasted between 48 and 74 min (average: 61 min), totalizing nearly 112 h of audio data for transcriptions. Participants consisted of 10 men and four women, seven currently in management positions, with ages ranging from 36 to 48.

3.2 | Data collection

A series of in-depth individual interviews were carried out at times and places convenient for participants, conducted between October 2022 and February 2023. Most interviews were conducted virtually, through Zoom platform. After participants had provided oral consent to participate, they were asked to inform basic demographic questions. The interview protocol consisted of nine open-ended questions, beginning with: 'Can you describe me what is your role, what you do today on a regular basis?', followed by 'How do you perceive the roles of leading and following in your reality?' and 'What do you think/feel about being a leader/follower?'. Other questions were designed to understand the participants behaviours in their specific roles, and what he/she thought about others' roles. For example, participants were asked about their decisions to accept, decline or resign the leadership position and also asked to further explore their own experiences of leadership and followership, providing as much detail in the narratives as possible in open discussion. Finally, they were invited to talk about their thoughts, perceptions, judgements and affective states, around their reality. The interview schedule was designed to provide guidance and structure for consistency in approach. Fist, we piloted the interview guide. Following the piloting, we adjusted some of the wording. All interviews were audio-recorded (with permission) and transcribed in its integral version.

The interview questions specifically asked participants about leadership and followership, which raises methodological concern. To mention the terms during the interview process might impose a particular frame of reference and influence participant responses and actually create new perceptions about the phenomena. Acknowledging that, while developing the interview guide and collecting data, we decided not to ask participants specifically about leadership and followership in the very beginning. Participants were asked about their experiences with management positions, to hierarchical roles with direct supervision, in both 'sides', and their perception of the roles leading and following.

3.3 | Data analysis

In this article, we seek to show that leading and following are expressed and perceived by public servants in different ways, at different levels, and demonstrate how this was identified in participant responses. First, we familiarize with the data by listening to the recordings while reading transcripts. We checked for accuracy, and added paralinguistic features (e.g. pauses, laughter). The analysis was conducted using pre-coding, by highlighting words or sections of text that appeared significant, triggering associations with leading and following. Then, a second step consisted of writing notes and suggesting connections about how the pre-coded text revealed categories. The analytical process involved a deeper reflection on how leadership and followership concepts emerged in the practical setting, comparing to the theoretical framework. The coding and reflection included both what participants said and how they said it. All possibilities of the 'false distinction' were considered main categories, which were coded as direct (when participants were asked to talk about leader/followership) and indirect (when participants included insights during their narratives). Such differentiation helped us to deeper explore explicit/conscious/ideal and tacit/unconscious/real understandings of the leadership/followership systems. Then, further analysis were used to answer the 'how' and 'why' the different categories can establish new understandings of the paradox of 'willing unwillingness'.

4 | DISCUSSION

The empirical findings of our study reveal a crucial insight into authentic human engagement within organizations: such engagement does not necessarily translate to uniformly positive emotions but instead encompasses a spectrum of emotional associations ranging from positive to negative. Among positive associations, we have identified personal satisfaction, empowerment, and a sense of purpose. Many participants articulated personal satisfaction by highlighting a sense of fulfilment and accomplishment stemming from their leadership roles. The ability to make decisions, inspire others and enact change fostered a sense of empowerment. Purpose emerged as a significant theme, with participants connecting their leadership roles to a larger legacy and personal values.

'Leading is also about personal satisfaction. I believe that when you are in a leadership position you have a little more power to take the projects you believe in and go for it. Engage people. It is also a matter of legacy purpose (...) of changing things'. (Leader).

Among negative associations, we have identified isolation, fear and detachment. Top managers, in particular, described feelings of isolation due to the high stakes and pressures of decision-making. There was a significant presence of fear among both leaders and followers, stemming from the responsibilities of leadership roles and the potential repercussions of decisions.

'Being a leader is terrifying. It terrifies anyone to assume any leadership (manager) role. It is all about

having to make decisions. Hard and difficult ones. All the time. People don't sleep to make the decision'. (Leader).

On the other hand, outsiders and some followers expressed a sense of detachment and lack of meaning in their roles, reflecting a disengagement from both leadership and followership dynamics.

'There is this idea of a guy who goes, sits down, makes that 'rice and beans' without committing to anything. When it is time to leave, he leaves and that's it, it's over'. (Outsider).

We see these negative emotional associations as providing a practical illustration of Luhmann's (2020, p. 426) argument that organizations cannot be expected to 'automatically satisfy personality needs'. The experiences of isolation, fear, and detachment among participants reveal that while organizations can provide a framework for engagement, they cannot ensure that this engagement will address the diverse emotional and psychological needs of individuals. In contrast, positive emotional associations, such as personal satisfaction, empowerment and a sense of purpose, are significant as they provide a novel substance to Stenner and Andersen's (2020) analysis of how authenticity compensates for the diminished role of authority in contemporary society. We interpret the responses of our interviewees as an indication that empowerment and personal satisfaction are derived from their authentic engagement, which compensates for the diminishing role of traditional authority. It is supposedly in view of this diminishing role that our interviewees find meaning and direction through their authentic engagement rather than through traditional hierarchical structures.

Our research adds yet another layer to the Luhmannian critique of hierarchical steering. The very typology we propose— 'Leaders', 'Role Shifters', 'Followers' and 'Outsiders'—might be seen to resemble classic hierarchical categories. However, the significance of our findings lies precisely in its ability to reveal the limitations of such a view, thus pushing the boundaries of established theoretical frameworks. These roles are not abstract theoretical constructs but are deeply rooted in the lived experiences of the individuals within these organizations.

Role shifters, for instance, are exemplified by persons who frequently oscillate between leading their teams and following directives from upper management. One participant described this dual role vividly: 'As a middle manager, I am constantly navigating between implementing the strategies set by our top leaders and managing the expectations of my team. It feels like walking a tightrope, where I must lead and follow simultaneously'. This quote underscores the fluidity of the Role Shifter category, highlighting how these persons embody both leadership and followership depending on the context.

Leaders were identified among top-level executives who consistently take on leadership roles within the organization. These persons, often founders or senior executives, described their roles as being heavily focused on strategic decision-making and vision-setting. One executive noted, 'My role is to guide the organization, setting the direction and ensuring we stay on course. It's about making the big decisions, but also about inspiring others to follow that direction'. This reflects the more traditional view of leadership but is contextualized within a dynamic organizational environment where even leaders must be responsive to their followers.

Followers emerged as those who predominantly engage in followership roles, particularly among support staff and entry-level employees. These persons often expressed a preference for stability and consistency, focusing on specific tasks rather than seeking leadership opportunities. A support staff member shared, 'I prefer to concentrate on my tasks, ensuring everything runs smoothly. I'm not interested in taking on leadership roles, as I find satisfaction in doing my job well and supporting the team'.

Outsiders represent a more complex category, including persons such as consultants or internal critics who neither lead nor follow in the traditional sense. These participants often described their roles as being on the periphery of the organization's core activities, allowing them to maintain a degree of independence. One interviewee remarked, 'I come in with an outsider's perspective, which means I don't get caught up in the internal politics. My role is to provide objective advice, not to lead or follow'. This role highlights the presence of persons who operate transcending conventional organizational structures, further challenging the traditional leader/follower distinction.

Namely, our findings show that what may appear as a clear-cut hierarchy is, in reality, a complex semantic construct shaped by variable levels of psychic engagement. These levels arise through the unfolding of the paradox of 'willing unwillingness', where individuals willingly take on roles but experience a range of emotional responses, from satisfaction to reluctance.

'"For those who are a little less knowledgeable than I am about certain limits, it is terrifying. People don't want to take on a leadership role, they don't want to take on a role... People think: 'I don't want a headache, so I'll avoid it'." (Follower).

We argue that the leader/follower distinction helps to unpack this paradox by providing a framework for analysing how individuals navigate their roles within the organization. In this way, the roles of primary leaders, role shifters, primary followers and outsiders are shown to arise from the relational and communicative dynamics

inherent in organizational life. For example, role shifters experience both positive and negative emotions as they navigate the dual roles of leading and following. Their satisfaction and empowerment from leading are often balanced by the pressure and isolation from following higher directives.

'As a middle manager, I am constantly navigating between implementing the strategies set by our top leaders and managing the expectations of my team. It feels like walking a tightrope, where I must lead and follow simultaneously'. (Role Shifter).

This quote encapsulates the simultaneous empowerment and pressure experienced, highlighting the paradox where individuals willingly assume roles that also bring about challenges and negative emotions. Additionally, we observed that authentic engagement can come from the sense of public interest and duty.

'I have a hard time influencing my peers, my day-to-day colleagues because they are all in the comfort zone. For me, I don't think it's even a comfort zone. For me, they are under the tree in the shadows waiting for everything to pass. I follow the public interest. I have my duties while leading'. (Role Shifter).

Primary leaders often feel empowered by their strategic decision-making roles but also isolated and fearful due to the high stakes and lack of clear followership support. Primary followers typically find satisfaction in their specific tasks and roles but may also experience fear and detachment when faced with the prospect of leadership responsibilities.

'I prefer to concentrate on my tasks, ensuring everything runs smoothly. I'm not interested in taking on leadership roles, as I find satisfaction in doing my job well and supporting the team'. *(Follower)*.

This quote demonstrates the willingness to engage in followership while expressing an unwillingness to partake in leadership, reflecting contentment coupled with avoidance of potential leadership-related stress.

In contrast, outsiders exhibit a high degree of detachment and lack of emotional engagement, focusing on routine tasks without the emotional highs and lows associated with leadership and followership. The semantics of these roles are not just about the tasks and responsibilities but also about the relationships and communications that define them.

'I come in with an outsider's perspective, which means I don't get caught up in the internal politics. My role is to provide objective advice, not to lead or follow'. (Outsider).

From a practical point of view, our reconstruction of an apparent hierarchy in terms of relational and communicative dynamics inherent in organizational life suggests several actionable insights for management practice. First, recognizing that organizational roles are dynamic and influenced by varying levels of engagement suggests that organizations should allow and promote role fluidity. Encouraging employees to move between leadership and followership roles as needed can enhance organizational responsiveness and innovation.

Also, leadership development programs should focus on building adaptive leadership skills that allow managers to navigate both leadership and followership dynamics effectively. This can help individuals manage the emotional complexities of their roles and foster a more resilient organizational culture. Second, managers should acknowledge the emotional spectrum experienced by employees in different roles. Providing resources such as counselling, peer support groups and open forums for discussing emotional well-being can help address feelings of isolation, fear and detachment. Also, creating an environment where authentic engagement is valued over strict hierarchical adherence can lead to higher job satisfaction and reduced stress. Encouraging open communication and providing opportunities for employees to express their concerns and aspirations can build a more supportive workplace. Finally, our findings suggest that collaborative models of management, such as holacracy or team-based structures, can align better with the semantic construction of organizational roles. Organizations should thus prioritize relationship-building activities and ensure that communication channels are open and transparent. Regular feedback and open dialogue about role expectations and experiences are practical ways to deparadoxify the 'unwilling willingness' paradox.

These practical implications are noteworthy as they abandon the assumption of self-interest and opportunism that underlies the principal-agent paradigm, which is widely applied to today's formal organizations. This paradigm assumes that the principal and the agent have divergent goals and preferences, and that the agent will act in his or her own interest at the expense of the principal unless properly incentivized or monitored. We found that none of the actors who were interviewed mentioned opportunism as a motive or a problem in their leader-followership relationships. Instead, they expressed various other factors that influenced their perceptions, feelings, and motivations, such as public interest, civic duty, quality of life, salary, responsibility, and fear.

'In fact, it is quite a myopic view, right? There is a myopia in people, they see only the position. Superficially and do not balance the interests. I see what I see about following the public interest, so let me do my job here and follow what I believe, my ethos, my motivations'. (Follower).

These factors suggest that the actors are not driven solely by self-interest, but also by other-regarding or pro-

social considerations. Therefore, these findings imply that the principal–agent paradigm may not adequately capture the complexity and diversity of the leader-followership relationship, underscoring the superior relevance of the Luhmannian approach, which sees leadership and followership as emergent and situational outcomes of the interactions and meanings created by the organizational system.

5 | CONCLUSION

Today's Luhmannian scholars share Luhmann's critique of hierarchical steering but seek to adapt his concept of membership roles to the increasingly complex and fluid realities of organizational life. As Stenner and Andersen (2020) aptly discern, the growing emphasis on authenticity in organizational life suggests that the increasing intensity of human engagement makes it more challenging to uphold a clear role-person distinction. We engage with this debate by connecting it to the literature on leadership and followership. This literature shares important parallels with Luhmann's thinking, such as questioning traditional hierarchical steering and emphasizing a relational and communicative understanding of organizational life. However, this literature has struggled with the issue of how voluntary followership actually is, given its influence by social pressures and structures.

We address this issue by drawing on Luhmann's ideas about paradoxical decision-making in organizations, suggesting the paradox of 'willing unwillingness'. This paradox indicates that even though people may voluntarily choose to take a followership or even a leadership role, they may still experience negative emotions like frustration or disappointment. We explore the deparadoxification of this paradox by cross-tabulating the distinction between leadership and followership, arriving at a typology of organizational roles, including top managers, middle managers, pure followers, and outsiders. We validate this typology through a series of in-depth interviews with public servants from a Brazilian federal agency, followed by thematic analysis. Our findings show that these roles are associated with a spectrum of emotional experiences, ranging from positive (such as personal satisfaction, empowerment and a sense of purpose) to negative (such as isolation, fear and detachment). As examples of authentic engagement, these roles highlight the practical sense in which authenticity takes the place of authority, shaped not by hierarchical structures but by variable psychic engagement associated with the semantics of leadership and followership. Our findings align with the main tenets of Luhmann's organization theory and open new avenues for systems-theoretical theorizing on how the definition of organizational roles may reflect the ambivalence of human engagement arising from the paradox of 'willing unwillingness'.

ETHICS STATEMENT

This manuscript has not been published and is not under consideration for publication elsewhere. Also, the data presented in the present article have not been examined in any previous or current articles. All authors have read and approved the final version of the manuscript. We also certify that we have complied with the APA ethical principles regarding research with human participants in the conduct of the research presented in this manuscript.

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RESEARCH ARTICLE

Sociological Perspectives on AI, Intelligence and Communication

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ABSTRACT

Introduction. This article presents a comprehensive theoretical model to understand the societal challenges posed by AI, examining AI as a unique form of intelligence—distinct from human cognition—that functions as a computational technology integrated into societal communication processes. Using educational systems as a key example, the article explores AI's implications for functional differentiation across society. Methods. The study applies Luhmann's systems theory, emphasizing communication, double contingency, and the transformative role of digital media and AI. A sociological analysis is conducted on how AI, through virtual double contingency, affects communication within interaction, organization, and functional systems, embedding values beyond negotiation. Results. Findings indicate that AI results in algorithmic differentiation which disrupts traditional communication structures, diminishing functional autonomy within systems like education and altering social structures with profound implications for individuals and society. This transformation is analysed within three societal models: authoritarian, market-driven, and democratic. Conclusion. While AI integration is essential to maintain European competitiveness alongside the USA and China, it also poses risks to functional differentiation and democratic principles. The article underscores the necessity of a robust regulatory framework and value-driven approach to responsibly leverage AI's benefits without undermining societal structures or the European democratic model.

1 | Introduction

We are witnessing a revolutionary transformation in society as digital media, and AI specifically, become integrated across multiple sectors. This spans from automated decision-making in both public and private realms, handling tasks like customer service automation to advanced applications such as predictive policing, prognostic medicine, social media behaviour analysis, and AI-supported education. AI's potential for surveillance and social control, particularly when linked with big data, is profound, while its ability to automate both manual and cognitive labour reshapes the labour market and educational systems.

These transformative shifts in AI integration need not be inherently detrimental. For example, AI-supported personalized learning and continuous monitoring of citizens who require assistance can offer societal benefits. Additionally, the shift toward AI is essential to sustain Europe's global competitiveness, particularly with the United States and China. Yet, as this article's theoretical analysis reveals, the values guiding AI's integration will be critical for its broader societal impact.

This article aims to contribute a clear, theoretical model to understand these complex challenges posed by AI for society. AI, as a computational technology distinct from human intelligence, interacts through processes of virtual double

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Summary

1. **Learning from AI Integration in Education:** The example of AI in education demonstrates how AI can enhance profiling and efficiency within functional systems, yet these improvements also pose risks to the field's autonomy as well as to potential dehumanization and weakened democracy. Practitioners across sectors – such as politicians, public officials, social workers, and healthcare providers – should use this example to critically examine the fundamental values guiding AI integration.
2. **Impact on Societal Structures:** The use of AI through virtual double contingency reconfigures traditional societal structures by embedding non-negotiable values in communication, affecting decision-making and power dynamics across sectors beyond education. Practitioners should be aware of how these changes risk a societal shift toward market- or authoritarian-oriented governance, potentially at the expense of democratic values.
3. **Regulation and Ethical Considerations:** As the need for AI integration grows to ensure European competitiveness with the USA and China, effective regulation and development across sectors becomes crucial to maintain transparency and protect democratic values. Practitioners must advocate for policies that preserve functional systems' autonomy to ensure AI's potential benefits are balanced with ethical responsibility.

contingency, creating a communicative context where embedded values in AI are not open to negotiation. This unique structure subtly alters social structures, generating latent shifts with profound implications for individuals and society. This evolution, due to existing power structures, raises risks for functional differentiation and the democratic model in Europe. Thus, how AI integration unfolds in this context requires careful and critical examination.

The article is structured in four parts:

The first part revisits the debate on AI, especially in light of advancements exemplified by ChatGPT. This discussion revisits philosophical insights by thinkers like John Searle, Thomas Nagel, and Hubert Dreyfus, examining intelligence and cognition while distinguishing human intelligence from artificial following Luhmann's theory of cognition. The section emphasizes that AI lacks ontology, intentionality, and an ability to attribute meaning, functioning instead within a computational framework. This analysis highlights issues such as classification and the conflation of correlation with causation.

The second part introduces Luhmann's theory of communication, discussing how interaction with AI is perceived as genuine communication. It explores the concept of virtual double contingency, where AI, though lacking human-like cognitive structures, participates in communication by exploiting humans' tendency to attribute intentionality to linguistic expressions. This section addresses how AI, perceived as a communicative agent, thus integrates into social processes.

The third part provides a theoretical model to understand the ongoing media revolution, highlighting how it unfolds latently as established structures dissolve and are gradually replaced by new ones. This structural transformation operates in latency, meaning social semantics struggle to keep pace with rapid changes, often leaving society unable to fully articulate or respond to the shifts underway. Controlled by powerful economic and political systems with global influence, AI acts as an active change agent in this transformation, amplifying and accelerating the drift away from inclusive citizen engagement while undermining functional differentiation. Through virtual double contingency, AI subtly guides individual behaviour according to its embedded values—unyielding in its influence and resistant to negotiation. This dynamic creates a reinforcing cycle, wherein AI not only drives societal restructuring but also solidifies a trajectory toward either an authoritarian or market-oriented state model. As societal structures adapt under the latent yet profound influence of AI-driven communication and decision-making, this evolving landscape challenges both democratic participation and the functional autonomy of societal systems.

The final part uses the education sector as a case study to illustrate the broader societal impacts of AI. Here, AI's role is examined as a means to understand the potential for preserving democratic values and autonomy within functional systems amidst digital transformation. The section analyses AI's role in shaping interaction, organization, and functional differentiation within education, offering insight into how these dynamics could play out across society.

2 | Intelligence, AI and the Environment

For centuries, humanity has grappled with epistemological and ontological questions. To begin from a classic standpoint, Thomas Hobbes (1588–1679) in 'Leviathan' postulated that only mass, acceleration, and motion exist. Ontologically, he was a materialistic monist and, epistemologically, a rationalist. He conceptualized that within our minds are tiny thought packets, set in motion by external movements in matter. However, this philosophical system falters as it cannot account for how these thought packets can possess meaning, allowing them to be distinguished from one another. René Descartes (1596–1650), also a rationalist but a dualist in contrast to Hobbes, proposed that our consciousness, unlike the external, extended material world (res extensa), mentally possesses a non-extended substance (res cogitans) that can represent the external world internally through meaningful manipulation of symbols. This idea, however, leads to a central question: What manipulates these symbols within consciousness, and how is meaning assigned to the world? Hume rejects Descartes' dualism as a metaphysical assumption lacking empirical evidence. Taking a more sceptical stance, he questions the concept of the mind itself, proposing that it is nothing more than a bundle of habits and associations. While acknowledging that all knowledge stems from sensory impressions, Hume emphasizes that we can never be certain that our experiences accurately represent reality. This fundamental uncertainty renders it impossible to establish absolute knowledge or confirm causal relationships with certainty. (Haugland 1985:44). With

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Immanuel Kant's (1724–1804) 'Critique of Pure Reason', we began to see that it must be our cognitive apparatus (the forms of cognition and the categories) that allows us to experience the world as we do (Kant 2002). This provides a form of media theory from which we cannot perceive the thing-in-itself but only what our cognitive apparatus allows us to recognize. In Edmund Husserl's phenomenology, human consciousness is incorporated and intentionally directed, so that reality always appears as a relation between us and it. Consciousness gives meaning to objects in the environment based on a distinction between the actual and the potential, such that the intentional object derives its meaning by not being something else - for example, a smile is meaningful precisely by not being a straight or downward-turned mouth.

In summary, the subsequent development after Kant was that the natural sciences followed a positivist and/or realist path that, though verificationist, continued a Cartesian representational paradigm, while the humanities and, to some extent, the social sciences, followed a more hermeneutic phenomenological path. In the former paradigm, one might say that we approach an understanding of and adaptation to the environment with every experiment and newly developed technology, whereas in the latter, following Heidegger, one would think that this reflects modernity's pervasive calculative culture, which Heidegger (1999) called "das Gestell" (the framework). We are thrown into the world, language, history, and technology and can only understand the world through language. We cannot get behind the world or perceive it directly through calculation (Heidegger 2007).

According to the German sociologist and systems theorist Niklas Luhmann, it is our consciousness, through socially constructed semantics, that gives meaning to our experiences. Following Husserl's definition of meaning as the distinction between the actual and the potential, for Luhmann (1995) it is the socially developed semantics that guide the production of meaning. Luhmann does not deny scientific developments and technology, but only that these developments could adapt humanity and society to the world we live in. In Luhmann's (1995) communicative systems theory, a distinction is made between three different levels of system formation: the biological, the psychic and the social. These are structurally coupled (they condition each other) but are each operationally closed around their different fundamental processes, through which they observe the environment and maintain themselves (life, consciousness, and communication). The systems are defined as autopoietic (self-producing) and always already adapted to their environment in the sense that they, at the time of their emergence, can maintain themselves in this environment; however, in the long term, most systems are eliminated by evolution (Luhmann 2009:36). Luhmann is a radical and operational constructivist and asserts that the systems' knowledge of the environment is entirely internally produced: "Cognition is possible not despite, but precisely because the system is unable to establish contact with the environment" (Luhmann 1992a: 16). Social and psychic systems are blind and deaf; only the biological system can perceive, but it is not a system of meaning. This means that the social can only communicate, and the psychic can only be conscious—they are connected through meaning but are in a situation where they must attempt to give meaning to the sensory impressions received by the biological system using their own resources (socially constructed semantics). Furthermore, Luhmann (1995, 2012) describes modern society as functionally differentiated into systems such as politics, economy, law, and science, and that these systems are operationally closed around their respective communication codes, where the scientific system, for example, is differentiated to communicate what is true and what is false (Luhmann 1994). However, the point is not that one cannot calculate and experiment toward innovations, etc. The point is that these calculations and inventions do not make us more adapted to the environment (consider the climate crisis, see Tække 2024). We do not have cognitive access to the environment (the thing in itself), and technology cannot change this condition.

Let us now return to the problem of human intelligence versus AI. "Research into *artificial intelligence* is concerned with the manipulation of *symbols*, not with the forming of meaning" (Luhmann 2012. Vol 1:315). The classical texts first assert that one cannot externalize something that cannot be accounted for, including how we think (Dreyfus 1972). Moreover, human intelligence is embodied, and it is this embodied nature that gives us the ability to experience meaning. In other words, it is our biological corporeality that provides us with intentionality (ibid). Secondly, Searle (1980), with his famous thought experiment, the Chinese Room, demonstrates how computing based on rules is not the same as understanding, and therefore, cannot give meaning to a phenomenon. The experiment involves an English speaker inside a box, where a Chinese speaker inserts a piece of paper with a task written in Chinese. Using a set of formulas, the English speaker can return a correct response to the Chinese speaker, who is amazed and concludes that the box can think and is thus intelligent. The point is that the English speaker understands nothing but has merely followed instructions. This is akin to Descartes' problem, illustrated by the idea that there must be a little man (a manipulator) inside one's head, who thinks (manipulates symbols), and who must, in turn, have a little man inside his head, and so on. Similarly, Jackson (1986), with another thought experiment, casts doubt on the meaningfulness of computational calculations. In this experiment, we imagine a researcher, Mary, who knows all the physical and functional facts but has lived her entire life in a black-and-white cell. The question is whether Mary will learn something new about the world if she is released from the cell. The answer is yes, as she will now be able to perceive colours. Analogous to Jackson's experiment, Nagel (1990) argues that there is a subjective experience of what it is like to be a bat. However, as humans, even if we knew all the facts about a bat's physiology and behaviour, we could not imagine navigating the world through echolocation. These analogies highlight that AI, or any technology, under a computational paradigm, cannot give meaning to what it is like to be human, or even to experience what it is like to be alive. AI has no ontology, no understanding of the world. AI does not understand what, for example, water is but is instead relegated to statistical calculations about what syntax a series of words related to water should have in a specific context. In contrast, within evolutionary theory, it is assumed that humans, like other animals, have an innate conceptual cognitive structure that precedes language (Fitch 2010:402), or what can be referred to as a cognitive semantic capacity (the ability to conceptualize—which is also found in other primates, such as understanding water) according to Lakoff and Johnson (1980).

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Building on the limitations of AI's meaning-making capabilities, the evolution of AI from transparent systems like Deep Blue to opaque models like AlphaGo illustrates a fundamental shift in how artificial intelligence operates. As Bridle (2018) notes, this transition from transparent algorithmic operations to AI functioning in a 'black box' mode signals an epistemological challenge: modern AI systems operate beyond traditional human comprehension, making it difficult to anticipate their behaviour or assess decision-making criteria. This shift underscores a move toward models that complicate our understanding of AI and its problem-solving capabilities, challenging assumptions regarding transparency and predictability in AI-driven processes.[1]

Beyond this challenge, the shift in AI's development also raises other epistemological problems about how we conceptualize and discuss artificial intelligence. Lucy Suchman (2023) argues that AI functions less as a coherent entity and more as a "floating signifier"—a concept imbued with power precisely because of its ambiguity within public and academic discourse. However, Suchman critiques such anthropomorphisms, suggesting they often result in circular arguments and visions that are either utopian or dystopian.[2] Suchman argues that it is more accurate to view AI as a project based on classification: AI is the name for computational processes that detect statistically significant patterns, essentially a machine that calculates correlations based on classifications. In recent years, AI has accomplished incredible feats, as seen when ChatGPT functions as a self-writing encyclopaedia, adapting its output based on how and what questions are asked. Suchman (2023) points to the risk associated with AI's application with machine learning. She highlights that the techniques used, through their reliance on historical classification systems, can reproduce and reinforce discriminatory practices. She particularly refers to the problem of confusing correlation with causality, a fallacy that is especially problematic in predictive contexts (see also Han 2016). This can be observed when output from statistical models, designed to extract patterns from training data, is used to automate the classification of patterns or predict the likelihood of pattern recurrence in future data (Suchman 2023). From an STS (Science and Technology Studies) perspective, an important consideration is that technologies will always be designed to materialize certain norms and values (Winner 1980, see also Tække 2022a). For example, an automatic door closer installed on classroom doors materializes the norm that teaching takes place behind closed doors. When it comes to AI and machine learning, where customers, citizens, and students are profiled, this is always done with a purpose in mind, but also based on an underlying scaffold of norms and values (this is not a controversial description of AI, see e.g., Damsgaard 2023). In a democratic state, the technology could theoretically be developed to enhance justice and timeliness in systems such as healthcare and social services, but in an unregulated market model or an authoritarian state model (see later), the technology could present significant risks of marginalization, exclusion, discrimination, and oppression.

In summary, it can be concluded that AI has nothing to do with embodied, intentional, human, meaning-making intelligence even in versions where the calculations are opaque. Instead, AI is based on statistical calculations, incomprehensible strategies, and predetermined classifications, values, and norms. There is no reason to doubt that ChatGPT, trained on hundreds of millions of tweets (and other texts), can calculate which word statistically follows best in a sentence (without, however, having semantics itself). The doubt is directed at classification problems, norms, and values from those who provide and/or control the technology, as well as the risk that AI may repeat existing patterns in future datasets in a way that unjustly, undemocratically, or manipulatively stigmatizes individuals, social and ethnic groups. In the next section, the topic will be how such a *statistical cogito* can become part of societal communication.

3 | Communication, Double Contingency and AI

The question explored in this section is how AI can be integrated into and connected with societal communication. This aspect is crucial for understanding AI's role and potential in society. First, the section describes how social systems, including society, consist of communication according to Luhmann, and then how communication, and therefore social systems, depend on double contingency as a foundational condition. The discussion then moves to how AI can be coupled with societal communication, along with the theoretical and practical implications. The section delves into the mechanisms through which AI can connect to and influence societal communicative processes, including how AI systems can understand (calculate) and respond to human interaction, thereby impacting the social.

In Luhmann's theory, the social consists of communication, which is the process through which the social is produced. Luhmann defines communication as the synthesis of three selections: information, utterance and understanding (Luhmann 1990). The recursive selection of understanding is crucial, as it implies that communication cannot be directed from the outside or established by a single individual. Each time there is understanding, it adds an element to the communication process, making communication a chain of processes (elements) that connect backward in time to previous processes (elements). A new utterance must therefore connect to what has been said earlier before a contribution can be considered part of the social. Such connections mean that an utterance's meaning proposal is either accepted or negated. Communication in the form of these connections produces a system with a history of accepted and negated meaning proposals, which differentiates the system from other social systems (Luhmann 1995).

Society, as a system in its own right, would not be possible without spoken language, which as a medium opens up communication about communication and thus allows the social to emerge as an autopoietic system (Luhmann 1995:193; Luhmann 1992b: 33). With the linguistically based re-entry of communication into communication, the social differentiated itself from its non-communicating environment, including psychic systems. However, it is the psychic systems that contribute to communication, so social systems are produced from the bottom up by psychic systems but conditioned from the top down by the receiving social system.

According to Luhmann (1995: 105), psychic systems can connect to communication and thus to the social because we perceive others as independent persons with free will. The mutual unpredictability – contingency – becomes a motivating problem

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known as double contingency, which is crucial for the formation of social systems. Contingency means that something is neither necessary nor impossible. To constitute social systems, the parties in interaction must perceive each other as infinitely open and unpredictable in their choices and actions (ibid). In the encounter between two individuals, a state of double contingency arises according to Luhmann (1995), characterized by mutual uncertainty, as each person has their own will and thoughts that the other cannot access directly. Unpredictability initially serves as a barrier to communication, as each party faces another whose intentions and reactions are unknown. To break this impasse, an action is necessary. Luhmann (1995: 104) describes how one person (Alter) can take the initiative in the form of a linguistic utterance, cautiously defining the situation and awaiting the other party's (Ego's) reaction. Each subsequent action, whether positive or negative, contributes to reducing contingency by clarifying and determining the direction of the interaction. Even after the initiation of communication, contingency remains a constant factor. Each action or utterance opens up a range of possible responses, making communication a dynamic and evolving (system-producing) process. Contingency is essential for communication, as it not only initiates but also continually drives the development of communication. Mutual uncertainty is crucial for creating shared meaning and is a fundamental condition for the formation of social systems. Through double contingency, communication becomes a process that continually creates and develops social structures.

From a media perspective, language, by opening communication about communication, provides the necessary complexity that is the starting condition for double contingency. Later media such as writing, printing, analogue electronic media, and digital media expand the possibilities for societal complexity (Luhmann 1990:100) and differentiation (Tække 2022b).

While double contingency in human interaction involves a mutual recognition of contingent selections and responses, the concept is challenged and transformed in the encounter with AI (Esposito 2017). Even the most advanced AI systems fundamentally lack the self-awareness and intention that characterize human cognition and decision-making (see Part 1). This creates an asymmetry in communication between humans and machines. In this context, double contingency can be seen as *virtual*.[3] While the human actor relates to AI based on an understanding of double contingency – acknowledging potential variations in an AI's response based on programming and learning – this recognition is not mutual. An AI responds based on algorithms and data, without an actual understanding of the human actor's contingent nature. This creates a situation where the human actor projects a form of virtual contingency onto the AI and adapts to and reacts to the AI's output as if it were the result of contingent choices, even though it is determined by algorithmic processes. This asymmetry raises questions about how humans adapt to and interpret utterances from an AI. In the absence of genuine double contingency, how do humans construct and navigate this seemingly dialogic interaction?

First, humans may over-attribute intention and understanding to AI, leading to an anthropomorphization of the technology. Second, this perception of AI as a contingent other may enable more flexible and creative uses of the technology, as human actors experiment with different inputs to explore the AI's response patterns. Moreover, the AI in this process is also trained, and new social structures are made possible through the structural coupling (AI) between the psychic conscious and the communicating social (the article will return to AI as a structural coupling in Part 3). Third, humans may be interpellated, i.e., subjectified through AI, to accept knowledge and social norms, as AI ultimately lacks an ontology that allows it to understand the doubling of contingency but instead executes the knowledge and norms and values it is programmed with. Ultimately, the virtual double contingency challenges our understanding of communication and interaction. While the classical notion of double contingency in social systems is fundamental to our understanding of human interaction, the integration of AI forces us to reconsider these dynamics. It opens a discussion of how technical systems can participate in, influence, and transform the social systems they interact with by introducing new forms of interaction that extend beyond traditional human communication models. As AI integrates into communication processes through virtual double contingency, it operates without the ontological basis inherent in human interactions, instead functioning within a computational framework of statistical optimization and pre-encoded classifications. Bridle (2018) describes how the 'incomprehensible strategies' in modern AI, such as AlphaGo, highlight a deep opacity in AI's decision-making process, making its influence difficult to interpret and almost impossible to negotiate.

In summary and as a lead into the next section, it should be noted that as humans, we are attuned to double contingency and communication, and through this, we are led to experience interactivity as interaction. Additionally, the digitally based communicative infrastructure, like AI, is constructed based on specific values and norms for how communication and other social processes (e.g., economic transactions) can proceed (see van Dijck, Poell, and de Waal 2018; Han 2016; Zuboff 2019). Technologies such as big data, machine learning algorithms, profiling, etc., delineate the frameworks and possibilities for connecting to the social in the digitalized society, binding interactions to predefined values and norms, unmodifiable by users. That is, in communication, in the broadest sense of the term, as in all transactions (education, politics, health, dating, buying, selling, etc.), we are compelled to conform to predefined values and norms for this interactivity, which we, due to the virtual double contingency, experience as communication.

4 | Societal Differentiation and Media

This section focuses on the structural relationship between media and society, both in a general theoretical sense and in light of the growing influence of digital media, including AI. The section builds on the operational perspective developed in Part 2, aiming to provide a deeper understanding of the underlying structural societal dynamics and consequences. The key question is how our society is structurally changing now that communication is conducted through digital media and is coupled with AI.

All historical societies can be observed as both information and media societies (Finnemann 2005). As discussed in the previous

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section, society was initially made possible by spoken language. Luhmann (2007: 251) writes that language is the mechanism behind the structural coupling between psychic and social systems. This means that language functions as a bridge or mechanism that enables interaction between these two different types of systems, even though they remain operationally distinct. Language can do this because it operates both in consciousness and in communication (Luhmann 2002). Norms are formed in communication under conditions of double contingency and subsequently function as expectations of behaviour as part of the structure of social systems. Structures change over time through constant communicative reproduction.[4] When psychic systems participate in communication, they do so within the framework of a social system, where they become personified and must respond to the system's norms (drawing on Foucault (1982), one could say that individuals are subjectified). While language enables the formation and conditioning of social norms, the later development of writing opens new horizons for societal development, as writing extends the linguistic structural coupling and paves the way for more complex forms of organization and administration.

This development culminated during the Renaissance and the Enlightenment, as highlighted by Elizabeth Eisenstein (1983) in her analysis of the significance of the printing press. The printing press revolutionized access to and the dissemination of knowledge, making it possible to distribute ideas, knowledge, and standards to a much larger audience than before, and eventually led to demands for participation and democratization in society in the West (Habermas 1976). Bruno Latour (1990) extends this understanding by arguing that the printing press was not only a catalyst for the Renaissance and the Enlightenment but also laid the foundation for a new form of knowledge technology for mastering the world. This technology encompassed both the physical aspects of printing and the conceptual frameworks that made it possible to systematize, categorize, and manipulate information (inscriptions) in ways that transformed previous knowledge and power structures. Before the article can move forward to discuss society in structural coupling with digital media and AI, it must briefly explain how, sociologically, societies can be described in their deepest structures using differentiation theory.

Differentiation theory can be traced back to the dawn of sociology in the late 19th century when Durkheim (1960) introduced it as a general theoretical explanatory model, which was later developed by Parsons (2005) and, subsequently, by scholars such as Habermas (1997). Luhmann (2012; 1995; 1977) also built on this theory, according to which social evolution since the emergence of spoken language can be seen as a movement through different phases that reflect the handling of increasing complexity (Luhmann 2012). According to Luhmann (1977: 33), society employs and combines two dichotomies in its differentiation, both of which are asymmetrical: system/environment and equality/inequality (see Tække 2022b). The earliest form is segmentary differentiation, where society is divided into similar segments such as families, tribes, or clans. In this form, all segments are alike in structure and function. Next follows centre-periphery differentiation, where society begins to develop a more distinct structured inequality between a 'centre' – often a ruling class or political elite – and a 'periphery' of less powerful groups. Stratificatory differentiation supplements the centre-periphery model in societal development. Here, society is structured into hierarchical layers based on class, estate, or caste, where each layer has its own role, status, and power. In this form, an individual's position is determined by birth and affiliation with a particular social layer. Luhmann (2012; 1995) describes contemporary society as functionally differentiated, meaning that society is divided into different functional systems such as politics, law, economy, science, and education. Each of these systems handles a specific function and operates within its own boundaries. The different functional systems in society are unequal in their functions and structures, but the environments in which they operate (e.g., individuals seen as voters, legal subjects, customers, or students) must be treated as equals. This means that although the systems have different functions and structures, they should not discriminate against or favour groups or individuals. Any attempt at discrimination must be justified by functional needs and not by rank; otherwise, the functional differentiation would short-circuit, for example, by buying scientific results or voters (Luhmann 1977:36).[5]

Historically, segmentary and centre-periphery differentiation coincide with the oral media society, where the advent of writing marks a gradual transition to stratification, and the invention of the printing press ushers in the functionally differentiated society (Tække 2022b). Each new form of differentiation underlies the previous ones as the fundamental structure of society, so that in the functionally differentiated society, for example, we find stratified organizations with equality within the individual strata and centre-periphery differentiation between the headquarters and branches around the world. Tække (2022b) argues that society, with digital media, tends toward an algorithmic differentiation that underlies the others as the new fundamental form of differentiation. Here, the relationship between system/environment (including between the functional systems themselves) and equality/inequality (including the distribution of privileges such as the right to speak, access to the healthcare system, and education) is regulated through algorithms. This is not to propose a technologically deterministic theory but rather to emphasize the interaction between technology and society. Luhmann (2012 vol. 1: 249) points out that society itself selects and conditions its structures. Social evolution, in this context, is seen as a process occurring within a space of possibilities for structural coupling, which is extracted and developed through social processes in media evolution. Social processes are not determined by media, but they would not have been able to develop without them either. The fact that media have enabled increasingly complex and precise administration, leading to very diverse developments around the world – from inhumane tyranny to more democratic, just, and solidaristic societies – demonstrates that there is no inherent society-determining force in a given medium, only potentialities that are actualized in vastly different ways.

According to Luhmann (2012), there is a transitional period when new communication media begin to be adopted, leading to emerging structural changes, but without societal self-descriptions keeping pace. The new communication opportunities that a new medium brings influence both social structures by making new connections possible, and the medium

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itself, which thereby develops (decoupling from the specific functions it was originally intended for). In the initial period, society's self-descriptions and explanations do not show how society is beginning to function in new ways (Luhmann 1995:343 ff). It is only later, and perhaps only after a new form of differentiation has taken over, that society begins to understand its new structures (ibid). This may only be possible through the new medium, which is now more developed and coupled into societal communication.[6] Gradually, the new media society decouples from both old structures and old self-descriptions and begins to understand itself more in line with its new form of differentiation.

Regarding digital media, many old structures have now been replaced by new ones. Consider, for example, the postal system, the banking system, the healthcare system, and organizational systems. These systems not only use digital media as distribution media but also show a development (decoupling) of digital media, which now already function through machine learning algorithms, big data, and AI. In the new media society, subsystems have developed enormous capacities for calculation, surveillance, prediction, distribution, nudging, etc., so that in our time we are experiencing an enormous structural drift, where systems, through their internal structural development, constitute a constantly changing structural environment for each other. This development takes place partly gradually and unnoticed due to virtual double contingency, and partly authoritatively, as the systems' chatbots and machine learning algorithms do not compromise their values (see e.g., Zuboff 2019; Han 2016). We do not yet have a clear picture of what the new algorithmic differentiation will mean for the system/environment and equality/inequality relations in society (see Tække 2022b for a discussion). However, it is possible to outline different scenarios for how the new differentiation appears to be developing in various parts of the world. Thus, the following will distinguish between an authoritarian state model, a market model, and a democratic state model, with inspiration from Paulsen and Tække (2022).

The authoritarian state model, inspired by China, can be seen as a totalitarian surveillance state where citizens are nudged and coerced through the recording and calculation of a form of social credit, which determines the privileges, opportunities, and punishments that citizens receive. In this model, it is the Communist Party that controls the digital media, including AI, with the values and logics that govern inclusion and exclusion in society (Xu and Zhu 2022). China has never been truly functionally differentiated, as the political system in the form of the Communist Party controls the other systems such as the economy, law, and media. This means that digital media, including AI, can be integrated into society as an automation of the party's control, surveillance, and intervention.

The second model is a market-driven corporate model, inspired by the U.S., which can be seen as both a neoliberal panopticon (Han 2016) and a form of surveillance capitalism (Zuboff 2019). The Big Five (Meta, Amazon, Apple, Microsoft, and Alphabet) control the apps, social media, shopping options, transportation services, and information resources available to citizens (van Dijck, Poell, and de Waal 2018). Societal institutions are overwhelmingly commercial enterprises, so the healthcare system, banking system, transportation system, and even the educational system operate through Silicon Valley with profit motives in mind. Citizens live in apparent freedom, but they are included and excluded, profiled, and nudged to an extent that rivals the authoritarian state model (Zuboff 2019; Han 2016). The U.S. has often been regarded as an example of a highly differentiated society, where the various functional systems operate with a high degree of autonomy. However, countless analyses show that economic resources play a crucial role in shaping and influencing other systems, challenging the autonomy of these systems. The power of the economy creates couplings between the economy, politics, the legal system, education, and media, leading to asymmetry and problems regarding the idea of full functional differentiation. Economic influence manifests itself through campaign financing, political lobbying, educational inequality, lawsuits, and dominance in the media landscape, raising concerns about the health of democracy and the autonomy of systems in the U.S. (see, for example, Gilens and Page 2014; Winters and Page 2009).

The third model, inspired by the EU, is a democratic state model where big data and AI are sought to be used transparently and democratically. However, this is extremely difficult for several reasons, which have to do with the weakened position of mass media in the new media society and the yet-to-be-developed digital public sphere (Habermas 2023). In the initial phase of the media revolution, norms and a discourse culture that can regulate the new communicative situations have not yet developed (Tække 2022b). Thus, we see hate speech, fake news, and deepfakes, while the EU is subjected to hybrid warfare from Russia and must rely on American products, which the EU seeks to regulate through legislation such as the GDPR (General Data Protection Regulation) (Damsgaard 2023). The EU thus finds itself in an uncertain situation where the democratic use of big data and AI has yet to be realized. The Union struggles to develop a robust digital public sphere and effective regulatory mechanisms while facing both internal and external challenges. Despite legislation such as the GDPR and attempts to protect citizens' rights, the EU remains dependent on American technologies and vulnerable to hybrid warfare, undermining its ambitions for autonomy and functional differentiation. This leaves the EU in a precarious balance between innovation and regulation, where the outcome of digital integration remains uncertain.

As AI integrates further into societal systems, its capacity to reshape traditional structures through opaque decision-making raises pressing concerns. Operating without ontology, AI lacks the capacity for understanding or intention. Instead, it functions within a computational framework of pre-encoded classifications and statistical optimizations, structured around values and norms shaped by powerful economic and political systems. This setup establishes a form of virtual double contingency, where AI affects human behaviour without negotiation or compromise—an influence distinct from the reciprocity inherent in human communication. This opacity and rigidity not only challenge democratic accountability but also distance citizens from actively shaping the systems that govern their lives. As AI-driven decision-making embeds values defined by powerful interests, the risk grows that governance may prioritize efficiency

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and control over transparency and public agency, edging societal structures toward models that could undermine democratic principles.

5 | AI in the Education System – Toward Algorithmic Differentiation

In this fourth and final section, the article discusses AI in the education system to analyse how functional differentiation, as well as essential values such as democracy and Bildung, can be maintained in the new media society influenced by underlying forces of algorithmic differentiation.

Since there are values, norms, and interests behind the classification schemas on which an AI system is based, and AI lacks an ontological grounding akin to human intelligence, it functions as a computational tool reflecting specific programmed interests rather than an autonomous moral agent. As AI enters societal communication as both a distributor and content producer, those who control AI – typically powerful political and economic actors – also gain significant influence, if not outright determination, over the communication framework, dictating its values and norms. In the authoritarian state model, the state could directly intervene in the education system, impacting the broader societal discourse and the daily interactions and organizational structures of educational institutions through AI's role in virtual double contingency. A similar effect would emerge in a market-driven model, where corporate interests shape education to align with specific economic, political or ideological goals.

Ben Williamson, in his book *Big Data in Education*, describes how the development of big data in education is driven by a partnership between scientific research, Silicon Valley start-ups, and venture capital investment (Williamson 2017:12). Powerful lobbying efforts and political support reinforce this process (ibid: 15). According to Williamson, this combination has led to a "sociotechnical imaginary," a concept developed by Jasnoff (2015:5, cited in Williamson 2017:16), defined as: "collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology". This vision implies an end to the autonomy of education systems and aligns with a shift toward an algorithmically driven model of social and economic progress (ibid: 17). Through machine learning, educational AI can predict students' progress and direct learning paths using prescriptive analytics (ibid: 111–112). Additionally, behaviourist values are embedded in Anglo-American educational tools, promoting public rewards, sanctions, and nudging, as illustrated by systems like ClassDojo, which is used worldwide to monitor and influence student behaviour, normalizing surveillance and behavioural management through gamified interfaces (ibid: 141–143). This development has been linked to stress and anxiety among students due to a performance-focused educational ethos that combines pre-modern ideas of happiness with contemporary psychometrics (ibid: 146). Williamson (2017: 146–147) describes this trend as part of a biopolitical strategy designed to shape citizens' subjectivities according to economic and behavioural norms.

The question remains Can the EU's education system, exemplified by Denmark, maintain its functional autonomy while integrating AI in ways that advance both educational objectives and a democratic agenda focused on transparency and participatory values in the digital age? To explore this, the following sections more fundamentally examine how AI and an advanced digital communication infrastructure affect Luhmann's three types of social systems: interaction systems, organizational systems and functional systems. Interaction systems involve communication between individuals who are physically present. Organizational systems are decision-making entities with structured membership rules, and functional systems, such as education, use specific media and codes to coordinate communication across interactions and organizational contexts, ensuring functional differentiation.[7]

Interaction systems are closed to people who are not physically present (Luhmann 1995), but if the interaction takes place through a digital infrastructure that algorithmically monitors and regulates who receives which messages, questions, and answers, and if the behaviour of the contributing individuals is also monitored and influenced by the IT system, the interaction system no longer seems closed. Education has traditionally been based on a community between teacher and students, protected from disruptions and interference by the four walls of the classroom (Luhmann 2006:131). This physical boundary allowed for a self-referential and closed communicative context, where from the second half of the 20th century, a teaching community was developed in school classes with conversation, turn-taking, influence, responsibility, tasks, duties, etc. Already with mobile phones, laptops, and wireless networks from the beginning of the 21st century, this barrier was broken, and many disruptions from the outside occurred (Paulsen and Tække 2022). However, it is only with big data, machine learning algorithms, and AI that the possibility arises to monitor, control, and regulate teaching from the outside. Furthermore, due to virtual double contingency, teachers and students can be interpellated in communication with AI, which, combined with the digital algorithmically controlled communicative infrastructure, opens the teaching interaction to even more external interference.

Organizations are closed in the social dimension but open in the factual dimension, which means that only members can contribute to their communication, but they can (in principle) contribute to all kinds of topics decided within the organization (Luhmann 2018). Organizational systems are decision-making systems that carry out decision communication. The closure means that only members can participate in decision communication (ibid). For example, when a municipality decides to make staff cuts, it is the school itself that decides who will be laid off. And when an agency under the Ministry of Education issues a new regulation, it is again the school that decides how to implement it. The school's organization decides what didactics to follow and how to use its resources. However, in the new media society, it is possible to more or less control the school organization from the outside. For example, teachers could theoretically be profiled from the outside, and decisions made about who should be fired. Similarly, new regulations could now be implemented from the outside and compliance ensured through surveillance and automated sanctioning.

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Functional systems are closed in the factual dimension but open in the social dimension. An important aspect of the functionally differentiated society is that each of the functional systems can only observe from its own medium and codes. The economic system, for example, observes only through the code of payment/non-payment via the medium of money. Education, politics, religion, law, etc., are only observed by the economy in terms of what is considered profitable. Traditionally, education in the European tradition of Bildung is not conducted because it is profitable, but because education has its own justification, has value in itself, and functions as a system in its own right. However, there are strong structural couplings between education and the economy. To educate, money is needed, and to have, for example, bank personnel, we need education. The coupling primarily occurs through the political system, which both decides on the economy of the education system and, overall, what should be taught. However, politicians do not teach and leave this to the education system itself, just as the pricing of educational materials is regulated by the economy. Traditionally, the education system has had considerable autonomy at the organizational level in deciding what and especially how to teach.

For many years, there has been a state of inertia between the systems when it comes to the field of education. Decisions are made within the political system, scaffolded by the Ministry of Education, and then handled by the agencies that formulate more precise guidelines and send pamphlets to schools, where the management and teachers interpret the guidelines, and finally, when the classroom door is closed, it is only the teacher who changes or does not change the teaching. To illustrate this, political majorities have tried to intervene more directly in classrooms since the introduction of PISA tests by setting many and very detailed learning objectives that teachers were to shape their teaching around and monitor through ongoing tests. The sanction was to measure classes and schools against each other, creating transparency for both parents choosing schools and decision-makers regarding school funding (Rawolle and Lingard 2014). This intervention in school autonomy significantly impacted the school system and caused many problems, but it never worked as intended. One could say that there was no technology capable of supporting this remote control of the school. However, if one imagines the system implemented in a school with an advanced digital infrastructure, including AI, the picture would be different. With digital media, almost every step taken in the school could be decided, monitored, controlled, and sanctioned from the outside, automated through AI, as both the interaction and organizational levels could be controlled. Algorithmic differentiation reinforces structural couplings between education, politics, and economics, which can shape curricula, define educational goals and dictate the roles of teachers and students in ways that align more closely with external economic and political objectives.

In summary, AI poses a risk to the autonomy of education as an interaction, organizational, and functional system. In a democratic effort to utilize AI for public benefit, Europe may inadvertently adopt a communication infrastructure that conflicts with democratic principles, as American technology often embodies values that prioritize efficiency and profitability over transparency and participatory governance. Furthermore, Europe's inability to develop its own AI and digital infrastructure, aligned with European values, exacerbates the challenge, leaving European institutions dependent on foreign technologies that may undermine foundational principles of transparency, inclusivity, and democratic engagement.

6 | Conclusion

Both Niklas Luhmann and Jürgen Habermas witnessed World War II's totalitarian regimes and tragedies, which shaped their theoretical frameworks. For Luhmann, this experience underscored the importance of a functionally differentiated society, where autonomous functional systems (such as education, politics, economy, and law) maintain closure and independence. This autonomy is essential to prevent any one system (and thereby one rationality) from dominating others: political power cannot dictate scientific truth, economic interests should not buy political decisions, and education should retain its independence. Luhmann's description of a functionally differentiated society is not prescriptive but aims to provide a descriptive analysis of the post-war society he observed—a society that avoids central control through decentralized, functionally closed systems. Due to digital technologies, society is undergoing a period of continuous structural change – or "structural drift" – where individual system changes create new environments that demand further structural adjustments across all sectors. Luhmann's concept of a functionally differentiated society, based on the mutual closure of autonomous systems, no longer holds with certainty in the current media landscape. The gradual shift from functional differentiation as the guiding societal structure to one shaped by algorithmic differentiation introduces profound implications. Although it is difficult to predict the exact path of this transition, certain patterns suggest that code and medium, such as those underpinning education, will persist. This ensures that education – and other societal functions – remains communicable; however, digital infrastructure shifts control over communication, increasingly placing it in the hands of external systems with goals that may not align with the system's foundational aims, as demonstrated in the educational system case.

AI is more than a technical tool; it functions as a metaphor and agent of change, redefining societal expectations and setting statistical, ontologically-neutral standards for what it means to be human in a digitally-mediated society. This statistical model not only reconfigures communication and social interaction but also influences political, scientific, and economic semantics. It shifts structural expectations within systems, like education, embedding AI-driven norms into the fabric of communication and decision-making. As AI gains ground in areas such as finance, housing, and employment, the structures of society subtly gravitate toward models that could resemble China's authoritarian use of data and surveillance or the U.S. market-driven controls, where economic interests deploy AI to regulate access, opportunities, and social mobility.

In a society characterized by algorithmic differentiation and digital communicative infrastructure, AI will, through virtual

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double contingency, act as an agent of inclusion and exclusion within social processes. Although communication formally adheres to traditional functional codes, individuals are now frictionlessly distributed as resources based on complex, opaque computational processes and values that may be merely instrumental but could infringe upon democratic and legal rights as currently understood in the EU. Consequently, systems that were once autonomous within a functionally differentiated society risk being infringed upon by external system semantics and decision rationales. For instance, a teacher who would traditionally follow a holistic, Bildung-based approach that respects each student's unique interests, abilities, and needs may be compelled to align instruction with logics from other systems, which may be focused solely on nudging students toward predetermined worldviews and specific competencies. This approach, rather than fostering autonomy, knowledgeability, constructive engagement, individuality, and critical citizenship, reshapes the societal framework and fundamentally alters what it means to be a citizen. So AI can enter and regulate communication across various systems, making individuals, groups, and organizations subject to algorithmic governance.

Across Europe, the democratic state model seeks to empower citizens while regulating AI in line with public benefit. However, without its own strong AI infrastructure, Europe risks being overly reliant on foreign technologies that embed values potentially misaligned with its democratic ideals. While the EU has taken regulatory steps, such as the GDPR and AI Act, to set boundaries for AI, these measures alone cannot address the direct influence of US systems and the more indirect influence of Anglo-American norms and behaviourist values built into widely adopted platforms. If AI regulation limits European access to essential tools for navigating a digital society, European citizens may face the risk of falling behind in a world where others quickly adapt citizens to their digital environments.

Ultimately, the direction of algorithmic differentiation remains unresolved, and it is unclear whether functional differentiation, democratic participation, and critique can maintain their place in a society increasingly organized through AI.

Ethics Statement

This article does not contain any studies with human participants or animals. Thus, ethical approval was not required for the research presented.

Endnotes

[1] There is broad consensus in AI research that newer AI systems operate with an opacity not present in earlier algorithms, such as Deep Blue. This 'black box' effect has raised concerns around ethics and accountability, as thoroughly discussed by scholars such as Pasquale (2015) and O'Neil (2016).

[2] Anthropomorphisms, where we attribute human qualities and traits to AI, often lead to circular arguments. On one hand, we may end up with utopian visions where AI is seen as a perfect, flawless helper that can solve all human problems. On the other hand, we may fall into dystopian scenarios where AI is perceived as a threat that could take over and control humanity. Both perspectives rest on a mistaken belief that AI possesses human intentions and consciousness, which creates a self-reinforcing cycle of either excessive optimism or fear, without considering the actual technological realities and limitations.

[3] According to Luhmann (1995: 105), the encounter with writing (and other traces of psychic or social systems) acts as a catalyst for moving from virtual to actual double contingency. For Esposito (2017), we can assume that with AI, there is a shift where the encounter with a chatbot actualizes an experience in the psychic system of actual double contingency, but since AI lacks ontology and cannot perceive ego as an alter ego in a psychic sense, she terms it as virtual because the contingency is only experienced by one party, namely the human.

[4] Luhmann, drawing on Maturana and Varela (1987), speaks of structural drift, which describes the phenomenon that since systems create an environment for each other, the environment of a system will change when one or more systems in its environment change their structures.

[5] When Luhmann discusses these principles, it is not an expression of how he believes society should be organized, but rather an observation of how society actually functioned in his time.

[6] Meyrowitz (1985) describes such a transition process as occurring in a series of effect loops, but from an equilibrium theory perspective.

[7] In the school, the medium (the symbolically generalized communication medium) is the student, as it is the student who is being communicated about, while the code "Good teaching/poor teaching" functions internally to evaluate and improve teaching processes, and the code good/bad exam functions internally as an assessment mechanism, but externally in relation to society's recognition of competencies (Luhmann 2006).

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