

Conversations on Four Cybernetic Approaches to Embracing Uncertainty

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> Context • In 2024, we celebrated the 60th anniversary of the American Society for Cybernetics (ASC). In more than eighty, mostly participatory, sessions, the conference stretched over five days. Under the overarching theme “Living Cybernetics Playing Language,” the conference encouraged participants to reflect on cybernetics in everyday contexts, ranging from academic research to the building of communities. This special issue of *Constructivist Foundations* contains four target articles that emerged from this conference, and their related discussions. **> Problem** • Sixty years after the foundation of the ASC, defining cybernetics is still a challenge. Diversity, one could say, has haunted cybernetics since its inception. There are many practices that refer to cybernetics in many disciplinary fields and contexts, but do these different practices share anything or do they rely on different aspects of (historical) cybernetic practices? **> Method** • I present the contributions to this special issue as case studies of cybernetic practice and diversity and expose them to the questions mentioned above. **> Results** • Cybernetic practices are as diverse in their methods as the disciplines to which they relate. And yet, as the study of the four target articles and the related commentaries show, these practices all embrace uncertainty. This embrace is the foundation for a particular technicity in which formation and reflexivity become intertwined and co-evolve. In its engagement with contemporary challenges, cybernetic technicity introduces recursive links setting relations across boundaries. Contemporary cybernetic practice, through varied approaches, is a living tradition of enacting open futures. **> Implications** • Cybernetic thinking does not necessarily become detectable through a common vocabulary or set of references, but rather through a particular inherent logic, which links thinking and doing in a recursive co-evolving relationship. **> Constructivist content** • The editorial discusses second-order approaches to cybernetics. **> Key words** • American Society for Cybernetics, co-evolution, complexity, cybernetics, recursivity, reflexivity, second-order, uncertainty.

Introduction

« 1 » The 60th Anniversary Meeting of the American Society for Cybernetics held in Washington DC in June 2024 was designed to celebrate the rich histories of cybernetics, engage in its multiple presents, and reflect on its possible futures. Under the umbrella of “Living Cybernetics Playing Language,” the conference encouraged explorations of cybernetics as a practice of everyday doing and reflecting, weaving together diverse approaches to cybernetics across generations and disciplines.

« 2 » Since its founding in 1964, the American Society for Cybernetics (ASC) has evolved alongside cybernetic practices in and across various disciplines. What began as an interdisciplinary gathering of researchers from government, academia, and the private sector has transformed into a community dedicated to advancing cybernetics as “a science, a discipline, a meta-dis-

cipline, and a practice.”¹ The ASC’s journey reflects the broader evolution of cybernetics itself – from its early focus on feedback mechanisms and circular causality to more reflexive considerations of observation, language, and knowing. This evolution is not a linear progression but a continuous process of engagement with emerging challenges and opportunities across diverse fields.

« 3 » Sixty years after the ASC’s founding, cybernetics remains notoriously difficult to define. Already in the mid-1960s, faced with diverse practices across various fields, scholars struggled to define cybernetics (Rosenblith 1965; Kline 2020) and the diversity has only expanded.² The definitional challenge is not incidental but essential to cybernetic being. The field’s diversity – spanning applications from cognitive psychology to management science, from po-

litical systems to artistic practice – emerges from its fundamental concern with understanding complex relationships and the processes through which systems adapt, learn, and evolve. While this diversity might appear as a weakness precisely because it defies easy definition, it fosters the development of a practice of connecting across traditionally separated fields and contexts.

The contributions

« 4 » This special issue of *Constructivist Foundations* captures a selection of four contributions to the 60th-anniversary conference of the American Society for Cybernetics. These contributions, each of which has now been developed into a target article, along with their accompanying commentaries and author responses, engage with key questions and challenges facing cybernetic thinking today.

1 | <https://asc-cybernetics.org/by-laws>

2 | <https://asc-cybernetics.org/definitions>

«5» Their diverse approaches – from mathematical explorations to the modelling of management practices, from analyses of research practices to creative engagements with cybernetic artifacts – exemplify the richness of contemporary cybernetics. They illustrate how living cybernetics involves both fidelity to core principles and openness to transformation, demonstrating that sixty years after the ASC's founding, cybernetics continues to evolve through the conversations it fosters and the problems it addresses.

A language of recursive forms

«6» In the first target article, Louis Kauffman explores the cybernetics of language with a focus on naming, self-reference, and their connection to Kurt Gödel's incompleteness theorem. Through elegant mathematical formalism, Kauffman demonstrates how the act of naming involves both the name and the observer in a dynamic process that reveals profound links between everyday language use and fundamental questions about meaning and formalism. Language, or better languaging, as Humberto Maturana (Maturana & Verden-Zöller 2008) emphasized, is a practice of relating, but it entangles, in its acting, itself and the observer in a recursive and co-evolutionary relationship.

«7» The commentaries on Kauffman's target article provide insight into the rich implications of his conceptualization across diverse fields. Christina Weiss examines the transcendental nature of the problem of self-reference, contrasting Ludwig Wittgenstein's say/show distinction with Kauffman's meta-naming operator and questioning whether meaning-constituting functions can be formalized. Clarence Lewis Protin explores the philosophical underpinnings of Kauffman's work and investigates the relation of names to expressions and descriptions. Diego Rapoport presents a Klein Bottle onto-epistemology, suggesting that torsion geometries embody a supradual logic of signification that surmounts the dichotomy between lived experience and formal systems. Andrey Druzhinin and Diego Ramírez apply Humberto Maturana's (1980) biology of cognition to analyze the name-named-namer relationship, arguing that the namer can only be consistent with

the name, not with the named that arises as a consequence. Art Collings draws parallels between Kauffman's indicative shift and everyday language play, showing how the shifting of meanings operates in humor and jokes. Mark Johnson considers naming processes that emerge without prior names, relating self-reference to early language development and suggesting three-dimensional topology might provide deeper insights into Gödelian incompleteness. Kate Doyle extends Kauffman's analysis to the realm of music and sound, exploring how musical exchange adds complexity to naming through shared artistic experience and revealing the visceral dimension of self-reference in sonic practices.

«8» In his response to these commentaries, Kauffman embraces the transdisciplinary potential of his work while acknowledging the challenges of translating formal concepts across domains. He emphasizes how self-reference arises through personal experience of naming, the spatial and topological dimensions of reference, and the limitations of formalism in capturing the meaning-making functions that make mathematics possible in the first place. The exchange between the target article's author and the commentators demonstrates how mathematical formalism, often perceived as abstract and detached, can serve as a source of ideas across multiple fields when approached through a cybernetic lens that recognizes the central role of the observer.

Brand management as cybernetic practice

«9» Seiichiro Honjo examines, in his contribution, brand management through a cybernetic lens, developing a framework for understanding how brands operate as dynamic systems shaped by multiple stakeholder interactions and feedback loops. Honjo shows how cybernetic principles can be applied to understand complex social and economic processes, and how the application of different models to the practice of brand management leads to valuable insights.

«10» The commentaries on Honjo's article demonstrate the transformative potential of applying cybernetic thinking to business practices. Maia Gould draws atten-

tion to the increasing complexity of modern brand management, highlighting how hyper-personalized digital marketing challenges the idea that ethical practices may be achieved through additional circular causality in brand relationships. Allenna Leonard raises concerns about the prevalence of brand identity and activism in society, questioning when such approaches are appropriate and when they might constrain adaptability or limit agency in non-commercial domains. Alfonso Reyes connects Stafford Beer's Viable System Model with second-order cybernetics, suggesting how specific relationships within the VSM could improve marketing research and communication. Juliana Mariano Alves develops a parallel between brand management and water governance, demonstrating how variety engineering and balancing complexity through attenuation and amplification could benefit both fields. Peter Hayward Jones contributes a media ecology perspective, proposing that brands function as media carrying messages rather than merely as content, and suggesting that the Tetrad of Media Effects (McLuhan & McLuhan 1988) could provide insight into brand dynamics in contemporary media ecosystems.

«11» In his response to these commentaries, Honjo acknowledges the ethical concerns raised, emphasizing that recognizing brands as cybernetic systems should not imply uncritical acceptance of corporate practices but rather offers tools for more thoughtful engagement with market dynamics. In his view, cybernetics can provide frameworks for analyzing commercial practices without necessarily endorsing the values that often drive them, highlighting the critical potential of cybernetic analysis.

Research practices and methodological reflexivity

«12» In their contribution, Guillermo Sánchez Sotés, Thomas Fischer, and Christiane Herr examine the gap between research "as done" and research "as reported," focusing on how architectural and design researchers often post-rationalize their messy, non-linear processes into orderly, logical accounts. By juxtaposing the first author's PhD journey with its formal report, they demonstrate how academic conventions frequently obscure the uncertainties,

deviations, and serendipitous discoveries that characterize authentic inquiry.

«13» The commentaries expand this analysis in multiple directions. José dos Santos Cabral Filho questions whether even a “faithful” account of research can ever fully capture lived experience, suggesting that the pursuit of absolute correspondence between process and description is itself problematic. He proposes a more deliberate interplay between text and image that embraces circularity and recursivity rather than linear reporting. Diego Fagundes da Silva and Erica Azevedo da Costa e Mattos reframe the discussion in terms of the “context of experience” and “context of communication,” emphasizing that honesty in research reporting is not about precision but rather a deliberate and ethically informed choice about how to convey subjective experience. Mark Valentine Sullivan explores practical applications, asking how frameworks might be developed to preserve the distinguishing twists and turns of research processes, suggesting gamified platforms that could help researchers navigate the unpredictability of inquiry. Michael Hohl draws from his own doctoral experience to examine why designers overlook existing discourse on uncertainty in research, suggesting that education might better prepare students for the inevitably messy nature of inquiry. Eve Pinsker highlights a critical element largely absent from the original account – the social context and collaborative conversations that shape research trajectories, noting that research is fundamentally dialogical rather than a solitary endeavor.

«14» These diverse perspectives collectively emphasize that research methodology cannot be reduced to a linear application of predefined steps. Instead, it emerges from complex interactions between researchers, collaborators, institutional contexts, and the research subject itself, requiring both technical competence and the capacity to navigate uncertainty. The commentaries suggest that acknowledging this complexity in how research is reported could not only produce more honest accounts but also better prepare future researchers for the inherently unpredictable nature of genuine inquiry.

«15» In their response to these commentaries, Sánchez Sotés, Fischer, and Herr address two key themes that emerged across

multiple commentaries. Acknowledging the need for frameworks that trace the messiness of research through meaningful narratives, they emphasize that any such framework must recognize the inherently partial nature of research reporting and the choices involved in how one conveys experience. As the second part of the response shows, such choices are not always deliberate but might be part of a disciplinary bias. The authors acknowledge the fundamental influence the conversations with peers and supervisors had on shaping the first author’s research trajectory, which was not discussed in their target article.

Reimagining cybernetic artifacts

«16» In the fourth and last target article, Thomas Fischer and Hengjie Li examine the preservation and redesign of a pivotal cybernetic device – the Ashby Box. Their work bridges historical cybernetic concepts and contemporary technological contexts through a careful reimagining of Ross Ashby’s original non-trivial machine (NTM). The authors detail their design process for creating a handheld elementary NTM that maintains the conceptual foundations of the original while embracing modern manufacturing techniques and electronic components. Their proposal in turning the Ashby Box into an everyday companion as an agent for the enactment of cybernetic epistemology resonates with the tactics sometimes employed in contemporary media art and adjacent speculative design.

«17» The commentaries on Fischer and Li’s work explore multiple dimensions of this reimagining process. Larry Richards expands the discussion by considering how different versions of non-trivial machines might be designed to demonstrate various forms of complexity, suggesting possibilities beyond the incompletely observable system exemplified by the Ashby Box. Hugh Gash connects the elementary NTM to broader constructivist ideas, examining how the device relates to fundamental epistemological principles arising from Heisenberg’s uncertainty principle and Gödel’s incompleteness theorem, while questioning how cybernetic models might engage with contemporary artificial intelligence developments. Mateus van Stralen applies Vilém Flusser’s philosophy to analyze the

elementary NTM as an apparatus that encourages users to “play against” rather than merely “play with” technology, positioning the device as a pedagogical tool for developing critical engagement with today’s increasingly complex technological systems. Vivian Xu and Benjamin Bacon approach the artifact through Gilbert Simondon’s (2017) framework of technical objects and associated milieus, examining how the elementary NTM adapts to contemporary contexts while questioning what aspects of the original are preserved in translation. Anja Pratschke emphasizes the educational value of the NTM within a constructivist learning framework, highlighting its potential for fostering critical thinking about complex systems in educational settings. Tom Scholte offers a provocative reading of the project as signaling a potential shift in cybernetics from exploration to demonstration, questioning whether the field might benefit from embracing a primary identity as pedagogical rather than research-oriented.

«18» In his response, Fischer contextualizes their project within a longer trajectory of efforts to preserve, re-frame, and expand upon the Ashby Box, emphasizing that he sees the elementary NTM, not primarily as an attempt to demonstrate cybernetic epistemology with contemporary means, but as a political act. Fischer suggests that beyond its epistemological role in demonstrating the limits of predictability, the Ashby Box might serve as a discursive catalyst in contemporary discussions about technology and power. By demonstrating the unpredictability of even simple technical devices regardless of users’ expertise, the elementary NTM challenges exclusionary discourses around technology and offers a path for broader participation in critical conversations about technological control.

«19» As all these perspectives highlight, the restaging of cybernetic artifacts involves complex negotiations between conceptual fidelity and contemporary relevance. They demonstrate that cybernetic devices should not merely be seen as historical curiosities but as potentialities for engaging with fundamental questions about knowledge, learning, and our relationship with technology.



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Living cybernetics in changing worlds

« 20 » As the texts in this special issue demonstrate, cybernetic thinking offers valuable resources for navigating complex contemporary challenges – not through simple solutions but by fostering approaches that embrace reflexivity in practice. The authors share a recognition that cybernetics functions as a living tradition with ongoing relevance. The discussions emerging in response to the target article and the commentaries show how contemporary cybernetic approaches share not necessarily a particular vocabulary or common references, but rather an inherent logic of doing/thinking, within which doing and thinking are recursively linked and co-evolve. Ranulph Glanville explained it in the following way:

“Second order cybernetics sees practice and theory (like action and understanding) as linked in [...] circularity with precedence given to neither.” (Glanville 2014: 50)

« 21 » Whether through formal exploration, the modelling of management practices, reflexive research methodologies, or the design of artifacts, the contributions reveal how cybernetics continues to offer valuable resources for navigating contemporary challenges. They exemplify cybernetic technicity – a way of engaging with places, which we imagine and construct and which make us who we are, that turns practices across disciplines into opportunities for embracing uncertainty while fostering responsibility. In a recursive relationship, these places involve a pluriverse of individual worlds

whose futures have not been fixed. Using the pronoun “we,” I suggest that individuals are always connected, whether processes of construction are reflected upon and coordinated or habitual. An example for the latter is the act of naming – discussed by Kauffman – whose recursive complexity humans embody, but whose significance has so far been an oblivion for theory. Honjo's reflection on brand-management, likewise, is a demonstration of a recursive evolutionary practice. As Honjo outlines (§30), Japanese brands are influenced by their linguistic context, which rejects simple subject-object relationships. The grammatical construct in the Japanese language that is referred to as “middle voice” incorporates a recursive relationship – an acting subject is affected by her action. Incorporating this recursive relationship, Japanese brands are considered evolutionary brands (§30). The problems discussed by Sánchez Sotés, Fischer and Herr in their contribution on the discrepancies between research and the reporting of research arise when the report denies the recursivity and evolutionary structure of the reported subject. Cabral Filho's proposal for presenting research through an interplay of different modes of expression (§11) and Sullivan's suggestion for a gaming platform integrating cybernetic play (§5f) both refer to the possibility of creating reports that are affirmative of the recursive relation of practice and reflection that Glanville (2014) highlighted as core to second-order cybernetics.

« 22 » As the discussion on the Ashby Box in the contribution by Fischer and Li shows, the interest in the unpredictable goes back to the first proponents of cybernetics.

Likewise, the included observer had been thought of by Norbert Wiener (1936) already before the well-known Macy Conferences, that are commonly seen as marking the beginning of cybernetics as an interdisciplinary field. Glanville can be cited for a confirmation of the insight that so-called first-order cybernetics was not the first to be invented but a reduction of the second invented first:

“[I]f one looks back at the early work for which cybernetics was named by Wiener, one sees the observer was often included, although sometimes implicitly rather than explicitly. In my view, the Macy conferences were already implicitly concerned with second-order systems, so cybernetics can be thought to have begun a second-order cybernetics. First-order cybernetics was a simplification that turned into a strategic error.” (Glanville 2014: 49)

Included observers, Glanville highlights, are observers who co-evolve with the theories and practices they conceive. The circular/recursive co-evolutionary principle is core to cybernetic technicity.

« 23 » As we face the complex challenges of the 21st century, the texts in this special issue show that cybernetics can be relied upon not for ready-made solutions but something perhaps more valuable: ways of thinking, conversing, and acting that embrace complexity, that recognize the observers' participation in the systems they observe, and that foster responsibility in worlds without certainty. This perspective aligns with my proposal of a “Cybernetics of Grace” (Westermann 2021) – a performative practice of integration that resists

the externalization of observers and re-appropriates experiences of living, resonating Andrew Pickering's (2015) earlier call to reconvene new conversations that embrace "unknowability as the over-arching bridge" (ibid: 38). Rather than seeking domination through knowledge, Pickering proposes to foreground "grace vs coercion" (ibid.), emphasizing adaptation to and engagement with the dynamics of the places we construct and inhabit. In an enactment of uncertainty, cybernetic technicity forms identities entangled in open futures. There is some urgency in embracing new ways of understanding and acting, conducive to making the pluriverse emerge.

« 24 » The 60th Anniversary Meeting of the American Society for Cybernetics embraced unknowability as this overarching bridge. Similarly, the contributions in this special issue navigate the productive tensions between what can be known and what must be engaged with. In this sense, cybernetics operates not merely as an academic exercise but as a vital practice for navigating our uncertain futures.

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