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ARTICLE

Political ideas of the network society: why digitalization research needs critical conceptual analysis

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Abstract In this article, I argue for an interpretive approach to digitalization research that analyzes the concepts, narratives, and belief systems in digitalization debates. I illustrate this methodological proposal by assessing the spread of network ideas. Many political actors and digitalization researchers follow network ideas, e.g. by claiming that the rise of a network society must lead to network governance. In contrast to this narrative, I argue that there are multiple visions of the digital society, each of which follows a specific pattern of epistemology, social imaginary, and political proposals. These competing self-interpretations must be investigated by digitalization research in order to map and evaluate different pathways into a digital society. For doing so, critical conceptual analysis draws on political theory, critical conceptual history, and the sociology of knowledge. It offers two major benefits for digitalization research. Firstly, it provides a systematic overview of competing governance rationalities in the digital society, enabling a critical evaluation of their potentials and proposals. Secondly, it enhances the methodological rigor of digitalization research by reviewing the narratives researchers themselves tell. I substantiate these claims by analyzing and historicizing the above network narrative. Tracing it back to cybernetics, I show that it has been used multiple times in efforts to reshape the way we think about society and politics, including our concepts of subjectivity, power, and governance.

Keywords Network · Cybernetics · Digitalization · Governance · Networks · Public policy · Interpretive social science · Methodology · Social imaginaries · Critical conceptual history · Sociology of knowledge · Political theory · Boltanski · Bevir · Foucault · Floridi · Wicked problems · Intellectual history · Knowledge order

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1 Introduction

Digitalization is permeated with multiple visions of social regulation. They make powerful assumptions on the fabric of the social world, the forms of subjectivity we can or must take, and the supposed role of political institutions. We can already find this in early self-descriptions of Internet pioneers who attacked political sovereignty in both its monarchic tradition and its modern version of representative democracy. David D. Clark (1992, p. 19), for instance, famously refused political sovereignty when proclaiming that "we reject kings, presidents and voting" as "we believe in rough consensus and running code." Clark justified his rejection of political jurisdiction over the Internet with reference to technology itself. As the Internet is a decentralized and deterritorialized point-to-point network of peers, it relies on self-regulation and must be kept free from centralized governance, which—according to Internet pioneers—included representative democratic institutions (Pohle and Thiel 2019, p. 60).

Despite the strong political commitments in such statements, digitalization research has barely started to investigate the social imaginaries and political ideas present in the discourse on the digital transformation. After the early phase was dominated by utopian and dystopian narratives, digitalization research in the social sciences has shifted towards sophisticated empirical analysis (Borucki et al. 2020). Discussing the impact of digital technologies on democratic participation yielded ambivalent results and disqualified many utopian and dystopian visions. Investigating the impact of democratic institutions on digitalization, on the other hand, showed that development and social functioning of digital technology depends on the legal frameworks set by politics.[1] Kaufmann and Jeandesboz (2017) and Berg et al. (2020) have therefore argued to think of the "digital constellation" in terms of its affordance for *divergent* political pathways.

In this article, I argue that a systematic and historical analysis of the concepts, narratives, and belief systems at play is crucial to understand this contingent relationship of digitalization and governance. Such critical conceptual analysis is usually associated with political theory, conceptual history, or the sociology of knowledge. Incorporating it into digitalization research promises major advances in two areas. On the one hand, analyzing the concepts, narratives, and belief systems will provide an *overview of the competing visions of a network society* we encounter in political debates. By historicizing these visions, we can denaturalize the rationalities for proposed governance arrangements and unlock the rich experience we have with many of them. On the other hand, a critical analysis of the metaphors and narratives in digitalization debates will also enhance the *methodological rigor of digitalization research itself.* While the methods of empirical analysis are advanced, scholars often unconsciously draw on long-standing metaphors and narratives to interpret their data. Critical conceptual analysis will help to reflect these interpretations, thus assur-

[1] In this direction, the imaginaries concept has sometimes been applied. Very recently, a *Media & Society* special issue analyzed how imaginaries of the future influence the making of digital technologies (Mager and Katzenbach 2021).

ing that the narratives they tell are not simply echoes of the visions they encounter in their field.

To illustrate these arguments, I will analyze the rise of network concepts and narratives, since they inspire a socio-political imaginary that is particularly close to digitalization. In public debate and in digitalization research, political actors and scholars often argue that the rise of network technologies caused a structural transformation (Castells 2009; Barney 2013), turning our society into a "network society" that needs "network governance". Legal scholar Thomas Vesting (2018, p. 56), for instance, says the rise of computer networks results in a cultural change "from hierarchical-centralist to a heterarchical-acentric culture" that overcomes representational politics and installs "self-organization in network-like contexts" (p. 162; See Berg et al. 2020, pp. 13–14). Vesting's narrative only prolongs earlier demands and diagnoses by organizations, such as the OECD (Michalski et al. 2001), political scientists (Sørensen and Torfing 2008b), and influential political consultants (Eggers 2008). All of them claim that for "thriving in the network age [...] we need to update our thinking" (Eggers 2008, pp. 27–28).

I argue that this kind of narrative is rooted in a cybernetic imaginary of the world that uses a specific set of technological metaphors to interpret the social and infer suitable governance styles. Cybernetics had been calling for a "new way of thinking" to substitute a representational world view for "more complex" models that would also redefine regulation in terms of networks and systems, information and communication, circulation and codes. After cybernetics developed the conceptual resources, intellectuals and experts deliberately used them in their attempts to reshape the way we think about society and politics. Neither the network society nor network governance are therefore a direct result of technological artefacts; rather, network technologies and network ideas are separate outcomes of cybernetic reasoning. However, in the social realm, and in politics in particular, other rationalities compete with the network paradigm and its aspiration to shape the future of the digital society.

The article proceeds in two parts. In the first part, I introduce an interpretive approach to digitalization research that analyzes the concepts, narratives, and rationalities employed in debates on digitalization. I briefly explain the methodology behind such critical conceptual analysis and discuss its merits for analyzing governance rationalities and enhancing methodological reflexivity. I also present two examples that digitalization researchers may turn to for exploring critical conceptual approaches, Mark Bevir's *decentered theory of governance* and Boltanski's, Chiapello's, and Thevenot's *pragmatic sociology.* In the second part, I then illustrate my methodological proposal by investigating the history, rationality, and consequences of network ideas.

2 Introducing *critical conceptual analysis*: an interpretive approach to analyze concepts, narratives, and belief systems

2.1 Social self-interpretations and governance rationalities

Digitalization research can draw on interpretive approaches to map political rationalities, including their social imaginaries and their divergent use of digital technologies. A well-established methodology, interpretive social science argues that social actors co-constitute the social world by interpreting the reality they encounter (e.g. Bevir and Blakely 2018; Rosa 2004; Keller 2013; Fuist 2020).[2] The core idea is that the way people locate themselves in the world shapes how they perceive events, evaluate the opportunities to interfere, and design political protest, institutions, or reforms. "What is meant by self-interpretation thus is a certain sense of what we are [...], of what society is, of what our relations in and towards society are like, and a sense of what truth, time and eternity might be, of what a good life consists in, etc." (Rosa 2004, p. 694).

In short, social actors construe their reality through the practices and institutions they infer from the interpretations they make. In social science, as in neuroscience or psychology, cognitive building blocks of these self-interpretations go under a diversity of names, such as frames or schemes. They "are generative and subjective knowledge structures" that "can contain and process mental representations about the self, culture, abstract concepts, political ideologies, social norms, material entities, meanings of words, or experienced and imagined events etc." (Leyva 2019, p. 252; see also Fuist 2020). In contrast to psychology or neuroscience, however, social science scholars are interested in the social order of knowledge. They investigate (1) the divergent patterns of interpretations, (2) their historical origins and transformation, (3) the negotiations and power struggles among those interpretations, and (4) their practices and consequences in a given realm of a society (Rosa 2004; Keller 2013).

In many ways, governance styles provide an outstanding area for analyzing social self-interpretations. The reason for that is that "political orders, including their governance styles, devise themselves with regard to societies—not the other way around" (Schimank 2006, p. 240; my transl.). In consequence, we cannot talk about governance without imagining a certain kind of society, a certain relation between society and politics, and a certain role for the individual in this setting. Moreover, we can expect that there are rather different social imaginaries that compete with each other for social hegemony, each devising a specific set of governance procedures and institution that fit their social imaginary.

Digitalization research has a special "fondness" for governance, too, since many of its research questions deal with the alteration of societal governance through digitalization. Researchers ask how algorithms "govern" our decision-making, how wearables entice new ways of self-governance, or how government institutions and

[2] The interpretive methodology is not limited to a narrow set of methods. While often associated with discourse analysis and participant observations, other qualitative and, indeed, quantitative methods can be applied.

procedures change in response to digitalization efforts (e.g. open government, data exchange infrastructures etc.). Moreover, the policy field of Internet regulation and digitalization has itself a governance structure that was pioneering network governance forums, but is now subject to criticism (Pohle and Thiel 2020). In all of these cases, we may therefore ask for the divergent imaginaries of society and democratic governance, engaging with at least three dimensions: the *metaphors and narratives* that describe reality; the linked *concepts of subjectivity, society, technology, and politics*; and the *proposals and practices* derived from this kind of reasoning.

Starting from a similar set of questions, Dahlberg (2011) already argued that there are conflicting views on what constitutes a desirable digital democracy. What he found in an unsystematic review ranged from a liberal-individualist project to deliberative and counter-public approaches to anarchist-Marxist designs. His review has the merit of pointing out that both democracy and digitalization are actively designed in relation to each other, and that those designs differ significantly. Thus, it ventures beyond a fascination with cyber-exceptionalism, the only set of political ideas digitalization research addressed in some depth (Barbrook and Cameron 1996).

Yet, Dahlberg's analysis is somewhat unbalanced. It positions an amorphous hegemonic block of liberal individualism against rather minor academic alternatives. At the same time, it misses much more influential political traditions, such as political sovereignty or network-like forms of governance, a pair which, as we have already seen, is pitched against each other in debates about political institutions in the digital era. Finally, Dahlberg focusses on concepts of democracy alone, while leaving aside the adjunct political concepts of governance and the larger social imaginaries grounding them.

For a more comprehensive analysis, digitalization research can draw on interpretive approaches that addresses the link of social self-interpretations and governance practices through critical conceptual analysis. To better grasp how such an approach may enhance our understanding of competing governance rationalities in the digital society, let us have a look at two standing proposals that combine political theory, intellectual history, and the sociology of knowledge—the *decentered theory of governance* by political theorist Mark Bevir (2010, 2013, 2020; Bevir and Rhodes 2003) and the *pragmatic sociology* proposed by Luc Boltanski and Laurent Thévenot (1999, 2000, 2006) and continued by Boltanski and Chiapello (2005).

2.2 Two exemplary approaches

The *decentered theory of governance* is strongly committed to an interpretive and post-foundational analysis of governance.[3] Rather than viewing governance styles as fix models, the decentered theory argues that governance practices and institutions emerge from the competing beliefs of the actors involved. Bevir et al. (2003, p. 4) suggest that social scientists usually invoke people's beliefs to explain actions, but they simply deduct these beliefs from supposedly objective theories (such as rational

[3] Bevir goes beyond a methodological program by defending the interpretive approach as a philosophical principle. Also, despite an explicit focus on analytics, Bevir (2013) acknowledges that a normative turn is feasible.

choice) or facts (such as social status or social norms). In contrast, Bevir et al. (2003, p. 4) demand from the social sciences to actually "explore the beliefs and meanings" if they want to explain actions and institutions.

In practice, the *decentered theory of governance* proposes four main concepts to decipher governance institutions and practices: beliefs, traditions, dilemmas, and actions. *Traditions* are "sets of understandings" that have been inherited from generation to generation (Bevir et al. 2003, pp. 6–9). They connect *beliefs* about the purpose of government, including historical knowledge about its institutions, with preferable practices of governing (Bevir and Rhodes 2003, p. 43). Individuals then inherit these conceptual sets during their socialization and apply them to understand political events, evaluate their experiences, and derive suitable *actions*. Yet, confronting inherited traditions with new circumstances can produce *dilemmas*, for instance when actions or beliefs do not adequately respond to "worldly pressures" or moral reasoning (Bevir et al. 2003, pp. 10–11). Dilemmas therefore lead to innovation in individual beliefs, transforming the traditions as well as the governance types in a given society.

With this set of analytical concepts, the decentered theory allows for different research foci. On the one hand, it is possible to *unpack governmental institutions or specific policy reforms* "in terms of the disparate and contingent beliefs and actions of individuals" (Bevir 2010, p. 85). Even the failure of governance reforms can then be explained by referring to diverging beliefs, which either cause open resistance or ignorance, for instance when street level actors see no need to change their actions after the policy is introduced as they are convinced that they have always been following this policy (Bevir 2010, pp. 241–242). On the other hand, the analytical tool box enables researchers to *track divergent "patterns" of beliefs, knowledge, and practices* and how they changed over time when confronted with new challenges (Bevir and Rhodes 2003, p. 42).[4] For instance, Bevir and Rhodes (2003, p. 42) analyzed the "British political tradition" by first unpacking "the" British political tradition in a rather diverse set of distinct traditions (Tory, Whig, Liberal, Socialist) and then unpacking the socialist tradition in "Old and New Labour", which could further be unpacked into divergent beliefs of groups and individuals.

Like the decentered theory, *pragmatic sociology* starts by criticizing approaches that explain the beliefs and practices of actors by referring to their so-called objective positions. Hence, pragmatic sociology also commits to investigating how actors in fact apply traditions and beliefs to navigate social situations. In contrast to Bevir, however, they do not focus on the realm of administrative reforms and institutions, but rather suggest that people invoke some kind of general principle in *any* social situation that demands from them a justification of their own actions or a critique of other people's justifications (Boltanski and Thévenot 2000, p. 208).[5]

[4] In Germany, the so-called challenge-and-response approach to the history of ideas proposes a similar model (Münkler and Rzepka 2015; Straßenberger 2018).

[5] As many interpretivists, pragmatic sociology does not demand from people to reason coherently (that is, by always referring to the same line of justification).

When Boltanski and Thévenot (2000, p. 213–216) explored these justifications, they recognized that people appeal to specific visions of the common good.[6] In everyday conflicts, however, people rarely explicate the underlying principles of their justifications. Boltanski and Thévenot (2006, pp. 12–14, 66–63) therefore draw on the history of political thought to find more coherent expressions of the "kind of rationality" (2000, p. 210) on which people rely.[7] Reconstructing these rationalities, they recognize that the forms of a common good (or "polities" as they say) are always linked to very specific ways of constructing reality. People indeed live in different "worlds", each of which has its own concepts of what kind of subjects live there, what kind of objects and relationships exist, what counts as natural or valuable (see Boltanski and Thévenot 2006, pp. 140–144, for a full list of their analytical register).

For instance, Boltanski and Thévenot distinguish the "domestic world" from the "market world" (2006, pp. 164–178, 193–203, for the following). The domestic world is inhabited by great "personalities", typically figuring as "fathers" or "kings", and minor personalities, such as "children" or "women". Greatness here is construed by *Bildung*, steadiness and the trust higher ranking subjects place in you. The generalized principle organizing the social world therefore is tradition and heritage. It prefers hierarchies and gives prime attention to standing conventions, higher principles, and family. In contrast, the market world is inhabited by economic subjects, especially "men of business", but also "sellers", "buyers", and "customers". Their primary attention, thus, is not directed towards one's house or family but to the market, where people rival for greatness through "winning"—or they "fail" trying and "loose" their status. Obviously, the completely different vocabularies inspire very different rationalities. Accordingly, actors will respond to a critical situation in very different ways, proposing different institutional set-ups and rewarding other kinds of people and actions.

Of course, the presented approaches have strengths and weaknesses. For instance, the decentered theory of governance is restricted to administrative governance styles, whereas the pragmatic sociology investigates a larger chunk of the social imaginaries at play. Moreover, the traditions mentioned by Bevir are often rooted in national contexts (such as the British one) and/or philosophical schemes (such as modernism or developmentalism), making the decentered approach less sensitive to transnationally salient rationalities or to conceptual innovations from other realms, such as biology or physics.

The pragmatic approach, on the other hand, is much less invested in actually historicizing the rationalities it refers to. Sometimes they even appear as transcendent

[6] As in Bevir's approach, these principles are tested in the situation at hand and may be altered or compromised with other lines of arguments. In contrast to Bevir, however, pragmatic sociology includes material artefacts into the analysis insofar as the reality test comprises a confrontation with the available objects.

[7] Indeed, they argue that political theorists do the same as "ordinary" people do, except for putting their rationality in a more formal, coherent form. This view is shared by many contextualist approaches, such as Bevir's.

models social scientist only layer over the utterings of the people.[8] Moreover, the multiple categories of their model are, in part, hard to distinguish and therefore less informative. Finally, the pragmatic sociology was developed to analyze the changing and conflicting ideas of *justice* in constructing *economic* conventions and institutions. Pragmatic sociology and the decentered theory are therefore only starting points to imagine the analytical gains possible when applying critical conceptual analysis to digitalization.

2.3 Gains for digitalization research: Analytical advantages and methodological reflexivity

Decentered theory and pragmatic sociology illustrate interpretive approaches that digitalization research can turn to for analyzing digital governance rationalities. Like many interpretive approaches, both argue that there is an inherent—albeit contingent and changeable—logic that compounds (a) frames of perceiving the world, (b) the evaluation of opportunities, risks, and challenges in this world, and (c) the design of practices and political institutions. Bourdieu (2008, p. 54) once called these logics "schemes of perception, thought and action". For tracing these schemes, critical conceptual approaches concentrate on the metaphors and narratives in use, analyze the linked notions of subjectivity, society, and politics, and they pay attention to the concrete proposals and practices inferred from them. After *tracing* a scheme that connects epistemological premises, social imaginary, and courses of action, critical conceptual analysis goes on by *historicizing* and *comparing* these rationalities.

This rather extensive endeavor requires competencies in systematic political theory, intellectual history, and the sociology of knowledge, but it promises a rich assessment of governance and democracy in the network society. Firstly, the synchronic dimension of analyzing governance rationalities can result in a systematic overview of competing visions of governance (or democracy), reconstructing the inherent links of otherwise seemingly unrelated statements and institutional proposals. Preparing this overview, researchers can also account for the dominance of a particular rationality in the analyzed discourses or situations. This, in turn, helps to assess the chances of a governance tradition and its proponents for shaping future institutions and practices.

Linking the synchronic analysis to a historical perspective then adds a layer that unlocks the rich historical experience we have with many of these rationalities. Drawing on these experiences allows researchers to scrutinize the potential pitfalls and blind spots of the aspiring proposals in digital governance. For example, they could ask if the proposed rationalities did actually achieve their proclaimed goals in the past (or in other fields); or they might investigate if they had unintended consequences, such as increasing inequality, bureaucratization, or social polariza-

[8] Quéré and Terzi (2014) even argue that the approach is overly structuralist because it focusses on a pre-empirical, generative structure that somewhat determines the actors ("langue" in contrast to "parole" in terms of structuralist linguistics).

tion. Comparative and historical reflection thus bolsters our evaluations of political proposals and social practices.[9]

Finally, next to the benefits of systematic and historical analysis, the approach also allows for innovation. Having a tableau of the current rationalities draws attention to potential rationalities from the past or other social fields that are missing in current debates. The "archive" of the history of ideas (Münkler 2003, p. 103) provides resources and opportunities to sketch out alternative approaches to occurring problems, for instance by linking a common-good-approach to digitalization to republican arguments. Both bolstering our evaluations and offering alternatives can directly contribute to policy debates beyond academic research.

Yet, especially due to the demand for scientific expertise in an expanding policy field such as digitalization, researchers must account for the narratives they tell. Interpretative approaches, including critical conceptual analysis, stress that the result of social research is also a narrative account of reality that is not essentially different from the perspectives of other social actors (Rosa 2004; Bevir 2013, pp. 12–13; Boltanski and Thévenot 2006, pp. 10–11). Researchers build social imaginaries by using metaphorical concepts, such as networks or social contracts, and linking them in plots to explain their observations. This even happens in rather tiny sequences, for instance when explaining that "artificial intelligence" is able to "learn itself" from "data" (Rehak 2021; for further examples Wyatt 2021). As digitalization research relates technology to social processes, it also carries specific ideas about the *general fabric of the social world*, its *transformation* over time, and the suitable forms of *subjectivity, politics, and power*.

This is most obvious with utopian and dystopian narratives of the digital transformation. In his bestselling book *Superintelligence,* Oxford researcher Nick Bostrom (2017) ponders the scenario of an artificial intelligence becoming an autonomous actor that plots to take over world domination from human beings. Bostrom's "control problem" iterates the *Kulturkritik* that already permeated technology debates of the 1920/30s and 1950s/60s, which in turn recycled motives and narratives of romanticist critique of automata (e.g. Sauer 1983).[10] Like Bostrom, the participants in these debates were already convinced that technology "has become autonomous" (Ellul 1964, p. 14). They also believed that technology effectively conditions its users, destroying their moral and political autonomy, until it finally assumes sovereignty

[9] To give an example, one could look into rational choice (RC) approaches to information. Here, a core belief is that more information yields more effective and better governance. This rationale dates back to Bentham's utilitarian model and builds on an enlightenment belief in the perfectibility of knowledge and human conduct. In its application, however, the RC approaches often failed. For instance, RAND's *Planning, Programming, Budgeting System* was designed to pool information, conduct cost-benefit-analyzes, and thus optimize governance performance (Seibel 2016, pp. 199–203). After its introduction by the Johnson Administration, it was suspended in 1971 due to its lack of efficiency. In a similar manner, neoliberal reforms promised more effective governance through more information, but many scholars observed that they often lead to bureaucratization and higher costs instead (e.g. Hood 2001; Hood and Dixon 2015). These historical insights may help to evaluate digital policies that rely on RC approaches.

[10] Techno-optimism, on the other hand, also recycles 18th and 19th century motives. Supp-Montgomerie (2021) analyzed the religious framing of the telegraph and suggested (without actually showing it) that American network culture still bears these religious traces.

over human beings (e.g. Marcuse 1982, 2002; Horkheimer 1967; Schelsky 1961; Savio 2014).

Today, this quest for humanistic sovereignty and its long-standing narratives reappear in many critical approaches. Similar to Bostrom, although more subtle, such dystopian narratives go from observing algorithms or filter-bubbles to envisioning a society in which the subjects are manipulated and conditioned, substantial democratic debate is undermined, and individual freedom and autonomy are destroyed (e.g. Helbing 2019; Pariser 2012; Morozov 2011). These dystopian imaginaries update the motives and narratives of the technocracy debate, and they often rely on the ontological distinctions that already grounded their forerunners, such as the essentialist distinction of human beings and technological artifacts or of substantial goals and instrumental means. In the following, however, I trace a completely different imaginary that rejects these ontological dichotomies and its notion of sovereignty, yielding another strain of scientific diagnoses and political demands in current debates on digitalization.

3 The network paradigm and its political ideas

In the second part of the paper, I illustrate the above methodological argument by analyzing and historicizing some aspects of the network paradigm, including its epistemological assumptions, social imaginary, and political proposals.[11] In contrast to the common notion that network society or network governance are consequences of computer technology, I show that the network rationale has been employed to bring the very change that has supposedly already happened. After tracing the concepts and narratives back to cybernetics, I present some examples of how the cybernetic imaginary fueled intellectual interventions in the crises of the 1970s. Finally, I argue that this cybernetic tradition is still echoed by digitalization researchers such as Luciano Floridi or Felix Stalder. This calls for a critical evaluation of their narratives.[12]

[11] The following history of network ideas is derived from my much more extensive portrayal (August 2021b). I want to highlight that there are *internal conflicts inside the network paradigm* that I cannot unpack here. For instance, while network governance is much closer to institutionalist public policy, Foucault and some activists used the network imaginary in a critical stance towards modernist governance institutions. In my view, this internal heterogeneity is constitutive for paradigms and a source of transformation over time. Paradigms also compete with multiple other paradigms. Thus, I use "paradigm" similar to Bevir's "tradition" to aggregate multiple approaches that have a family resemblance in terms of their general concepts and imaginaries.

[12] The following account of cybernetics is unduly abbreviated to stay within the scope of the article. It does not discuss the significant disputes inside cybernetics and the decisive distinction of first-order and second-order cybernetics. I hope that cybernetics experts will also apologize some simplifications I made for the sake of intelligibility for non-experts. For the history and concepts of cybernetics, see e.g. Dupuy (2000); Kline (2015); Pickering (2009); Hayles (1999); for some aspects of its cultural impact e.g. Rid (2016), Medina (2011).

3.1 Cybernetic origins: Historicizing network concepts and narratives

From the brief examples in the introduction, two major aspects of the network paradigm are already evident: (a) The network ideas have an inherently political dimension as their proponents deny the sovereignty of politics and reject representative institutions, including the state, political parties, and sometimes even voting. This political stance is accompanied by a new vision of governance that rests on self-regulation among the autonomous yet interconnected peers/actors of a network. (b) For justifying the turn to a new kind of governance, the proponents of network ideas refer to a structural transformation that necessitates a "new kind of thinking". The only viable option is to switch to network-appropriate forms of conceptualizing *and* regulating social interactions.

Linking network metaphors with a call for "a new way of thinking" (Bateson 1987, p. 1), a "new point of view" (Ashby 1956, p. 1), or a "new world view" (Ackoff 1979) is a rhetorical trope originating in cybernetics. It is, thus, older than both current diagnoses and technologies. Cybernetics was a heterogeneous research endeavor of the post-war years that aimed to find a universal theory of regulation by investigating "communication and control in the animal and the machine" (Wiener 1948). Developing a new epistemology, it laid the groundwork for current network technologies. But due to its highly interdisciplinary cast, its conceptual innovations also spread to many other areas of knowledge, such as biology and genetics (Fox Keller 2003), earth system science (Schellnhuber 1999), cognitive science (Dupuy 2000)—and social science.

This diffusion in mind, it comes as little surprise that interpretive approaches have noticed the spread of network ideas in their respective social fields. In public administration, Bevir (2010, pp. 199–226, 2013, pp. 89–94) observed a second reform wave that, following the failure of neoliberal reforms, propagated collaborative network governance. Boltanski and Chiapello (2005) went further in arguing that a new "polis" emerged in economics that does not fit any of the justifications they described in earlier studies. The "network polis" propagates a model of subjectivity characterized by "communicating", "connecting", and "flexible" users (Boltanski and Chiapello 2005, pp. 114–115). And it promotes flat, network-like organizations and short-term projects, while attacking the inflexibility and coercive force of hierarchies and moral principles, just like the introductory examples did.

Initially, in cybernetics, the call for a new age referred to shifting the epistemic apparatus from an ontological and representational world view to an operational one. As Ross Ashby (1956, p. 1) put it in its seminal introduction, cybernetics "does not ask 'what is this thing?' but 'what does it do?'". With this shift from being to doing, cybernetics antagonized the humanistic belief systems dominant in post-war years. Post-war humanism argued that machines and human beings belong to *essentially* different ontological realms. Human beings, here, would have a sovereign role as they are capable of instrumental and moral reasoning. For cybernetics, in contrast, machines, cells, or animals are analogous in *how* they do something. For instance, it posited that machines can think and learn just like brains do. Many cyberneticians therefore saw themselves as a forth insult to mankind after Copernicus, Darwin, and Freud (Hagner 2008, p. 38).

Next to humanism, cybernetics' call for a new thinking had another adversary in Newtonian physics and modernist sciences in general (Wiener 1948, pp. 48–49, 1954, pp. 7–27; Ackoff 1979; Bateson 1987, pp. 7, 255–270). According to cybernetics, Newton's invention of mechanics was at the bottom of understanding regulation in terms of linear causality, such as action and reaction, stimulus and response, or motivation and action. Cybernetics criticized linear cause-effect variable testing because it deliberately ignores the actual "complexity" of the world (Ashby 1956, p. 5). This complexity is illustrated by the network metaphor. It stresses the multiplicity of connections that renders all elements in the network co-dependent and highlights that, next to actualized connections, there are many potential connections that could be actualized in the next moment. As mechanistic and humanistic ontologies simplify their reality by ignoring these complexities, they are outdated and insufficient, cybernetics argued.

This pitch allowed cybernetics to call for and propose a new conceptual apparatus that stars networks but also systems, diagrams, and electric circuits, information, communication, and code, machines, games, and strategies. They form a pattern that permits to define one concept by referring to the other, re-describing reality without reference to an ontological paradigm. Stafford Beer (1967, p. 95), for instance, argued in a single paragraph that "a machine is a system, a set of points joined together", which is perfectly modelled as a "network" and illustrated with a "schematic diagram" that "will bear a marked resemblance to [...] an electric circuit".

These cybernetic metaphors then have a profound impact on how regulation is conceptualized. In contrast to modernist models of linear causality, hierarchical coercion, or command-and-control steering which cyberneticians deemed "naïve" (Beer 1967, p. 21), the defining characteristic of the cybernetic concepts is the "connectivity" among any arbitrary assembly of elements (Beer 1959, p. 3, 1967, p. 9). Tracing how the elements connect and reconnect to each other in a given moment, is the starting point for cybernetics' understanding of regulation—or governance, which is what cybernetics literally refers to (Wiener 1948).

For cybernetics, control or regulation is nothing else but a *circular process of self-organization* in which elements of a system relate to each other (Beer 1959; Foerster 1984, 2003; Scott 2004, p. 1369). Again, the network metaphor illustrates the idea of *mutual connectivity and interdependence*. As all elements operate in a single space, the opportunity of one element to connect to another depends on the choices of other elements in the network. Network elements are no sovereign arbiters nor atomized individuals; they are *connected relays, nodes, or players*, to use circuit and game metaphors from cybernetics. They are controlled by the incoming flow of information and simultaneously exercise control by re-directing the flow. Thus, regulation in a network functions without a "head", "center", or determined "goal", as it is the *permanent, real-time process* of "communication" among the elements.

Self-organization, however, happens in a complex and volatile environment. Each network is itself an element in a network of networks, each system part of another system. When it comes to dealing with the environment, Ross Ashby's famous *law of requisite variety* stated a core belief of cybernetics: only complexity can absorb complexity (Ashby 1956, pp. 202–213). While any system responds to its ever-changing environment by rearranging its own internal connections, highly *diverse*

and *flexible* systems have an advantage as they have more opportunities to reconnect and create new internal patterns of regulation. Diversity and openness, thus, boost the capacity to find creative solutions. Whereas modernist approaches would argue for *one best way*, "design and invention are emerging as the principal modalities of the Systems Age" (Ackoff 1979, p. 101).

In sum, the *cybernetic narrative* is that the "old" models are insufficient and under-complex to adequately describe reality, because they fail to acknowledge its "complexity" and "connectivity". The *cybernetic metaphors* of networks, systems, machines etc. set up an epistemology different from humanistic or mechanistic models of reality that inspired, for instance, the political idea of a sovereign state and the adjunct philosophical idea of a sovereign subject. Elaborating and linking these metaphors, the cybernetic imaginary spanned a frame to describe the fabric of the world (overtly complex, interdependent networks), subjectivity (connected, communicative, active etc.), and governance (decentralized, circular, self-regulation, flexible etc.).

3.2 The rise of network ideas: Cybernetically inspired self-interpretations of society

While cybernetics initially intended to provide a more accurate empirical description of regulation processes in neurophysiology, mathematics, engineering, or linguistics, their account is easily turned into a normative statement that answers to perceived social problems with pleas for self-organized networks and their flexibility, diversity, openness, and creativity. This is what happened in the 1970s and 1980s when Western post-war societies went into a deep crisis fueled by economic stagflation, beginning post-industrialization, terrorism, and inner conflicts about issues such as civil rights, rearmament, warfare, or the role of women and gay people (Turner 2008; Wirsching 2011; Rosa 2015, pp. 211–223; Bösch 2013; Raphael 2019).

By then, cybernetic ideas had already disseminated. Some cyberneticians, such as Stafford Beer (1967), had exported the ideas into public and private management. Social scientist had adopted the cybernetic imaginary to develop new research methods (network analysis), new social theories (e.g. structuralism, systems theory), or to analyze organizations and political processes (e.g. Deutsch 1976). Finally, the highly critical attitude of cybernetics towards modernist rationalities, including their hierarchical, punitive concept of control, had resonated with the counterculture (Turner 2010). Many tech pioneers, such as Douglas Engelbart, were strongly inspired not only by cybernetics itself, but also by the counterculture's interpretation of it advocating a cultural turn towards decentralized networks via technological tools (e.g. Turner 2010, pp. 106–110).

In the crises of the 1970s, intellectuals then drew on the cybernetic framework for pleas to abandon the modernist social imaginary of the post-war period. For instance, when facing the heavy protests and conflicts in Berkeley, local political scientist Todd La Porte (1975, p. 4) argued "that the degree of social complexity [...] has seriously eroded the quality of our traditional conceptions about social and political realities." Further echoing the cybernetic narrative, he called into question the plausibility of "our cause/effect beliefs" and demanded to re-think politics and

policy analysis in terms of cybernetic complexity theory (La Porte 1975, p. 4; see Leendertz 2016).

In a similar vein, planning and design theorists Horst Rittel and Melvin Webber (1973) exposed the failure of post-war planning. Their famous paper on "wicked problems" shaped policy research for decades and inspired new government programs (Australian Public Service Commission 2007; Crowley and Head 2017). In the paper, the authors repeated the cybernetic narrative, suggesting that modern sciences, economics, and politics since Newton were guided by a mechanistic world view and its promise of causal steering (Rittel and Webber 1973, pp. 155–156). In this perspective, one would be able to compute the effects of variables, solving planning problems rationally. Post-war planning, however, did not fail due to a lack of calculating capacities but because of an insufficient "rationality", Rittel and Webber (1973, p. 160) claimed. Planning must shift its entire approach to considering social problems as "wicked problems" that lack a definite description and cannot be solved by calculating one best way.

Given the cybernetic framing of the problem, policy research today unsurprisingly argues that network governance is the most promising response to wicked problems (Ferlie et al. 2011). The network frame, however, has already been used in the 1970s to interpret societies and suggest political remedies for the crises. Again drawing on the cybernetic narrative, Michel Crozier argued that the crises of the Western world in the 1960s and 1970s are the result of "a certain model of rationality" that prevailed in science, politics, and economics since the beginning of modernity (Crozier 1975, p. 40). Despite being productive for a long time, "this kind of rationality" was now rendered useless and even harmful because it fails to acknowledge the rising complexity, "the explosion of communication and social interaction" (Crozier 1975, p. 50).

Crozier made two major proposals. Firstly, he called for social scientists to abandon rational choice and institutionalism in favor of a "systems approach of interorganizational networks" that redefines concepts of power and government in a "cybernetic sense" by referring to regulation as interconnected games, systems, or networks (Crozier and Thoenig 1976, pp. 561, 564). Secondly, in his famous report for the Trilateral Commission, he advised the political actors "to accelerate the shift away from their old model [of rationality] [...] and experiment with more flexible models" (Crozier 1975, pp. 54–55). They must develop "a broader kind of rationality" that overcomes traditional camps, such as conservatism and progressivism, and provides "useful tools" such as self-organization (Crozier 1975, p. 43).

Another proponent of network approaches was Michel Foucault, as I recently demonstrated elsewhere (August 2021a, b). Despite profound differences in personal habitus and social theorizing, Foucault attacked sovereign forms of power just like other intellectuals inspired by cybernetics. Calling for a "much more complex" perspective (Foucault 1978, p. 90), he rejected sovereignty as both analytical model and material complex of knowledge/power. In his early years, he undermined the humanist idea of a sovereign subject by importing the systems concept (Foucault 1994, I, p. 514) and arguing for defining "the social" as "an assembly of codes and information" (p. 826). In the 1970s, he then utilized cybernetic metaphors of

networks and games to develop his theory of power as a centerless "self-reproducing" network (Foucault 1978, p. 93).

This imaginary led to a familiar narrative when responding to the crises of the 1970s. Like other cybernetically inspired authors, Foucault (1994, IV, p. 368) diagnosed the end of an era because the "political, economic, and social rationality of modern societies stumbles". Criticizing the hierarchical, representational post-war institutions, Foucault called for decentralization and flexibilization (e.g. Foucault 1994, IV, pp. 368–375). This would enable people to experiment with new forms of subjectivity and rationalities. Facilitating this "new age of curiosity", Foucault (1994, IV, pp. 108–109) proposed to proliferate "networks", diversify the "communication channels", and free "information" from any form of moral "protectionism" that restricts social experiments.

3.3 The network paradigm in digitalization research: Governance rationality and scientific narrative

The above examples are, of course, only teasers for a more comprehensive portray of the rise of network ideas, which would have to include closer examinations of the contexts, beliefs, and their variations. The purpose here is to illustrate that it was possible to cast society in network terms even before computer networks such as the Internet took off. Coming from cybernetics, the narrative of "a new way of thinking" is a rhetorical device employed in the 1940/50s, the 1970s/80s, and today to bring about the very change that supposedly has already happened. Thus, the "network society" is not (only) the result of technological advances but (also) of interventions by consultants and intellectuals who pushed cybernetic network ideas to reshape the way we view society and politics, including our concepts of subjectivity, power, and governance.

In this final section, I discuss the merits of this insight for the dimensions advanced above, that is, the analysis of governance rationalities and the methodological reflexivity of digitalization research. Regarding the latter, it is obvious that cybernetic network metaphors and narratives have been entertained frequently.[13] In his bestselling book *The 4th Revolution*, Luciano Floridi declares that current technology initiated "a new era" in which the impact of information and connectivity requires to "update our philosophy" (Floridi 2014, pp. 23, viii). His version of a new kind of thinking goes on by framing subjectivity in technological terms. Iterating cybernetic ideas, he thinks that our self-understanding of subjectivity leaves the modernist, Cartesian and Newtonian framework behind, abandons humanist distinctions, and acknowledges the "intrinsically informational nature of human identity" (Floridi 2014, pp. 95–98, quote on p. 96). Floridi repeats the cybernetic narrative when stating that *this* is the "forth revolution" after Copernicus, Darwin, and Freud.

[13] While my examples are larger social self-interpretations, digitalization research should not be calmed because it turned to detailed empirical studies. Often, mini-narratives prevail in these contexts, for instance when declaring that the digital world cannot be explained by older democratic theory or when arguing that the surplus of connectivity through social media would generate a completely new phenomenon.

In another contribution, Stalder (2018) employs cybernetic concepts and narratives to explain the digital society. He, too, declares a new "culture of digitality" is coming, while diagnosing an "erosion of old cultural forms, institutions, and certainties" (Stalder 2018, p. 3). This cybernetic motive comes as no surprise, as Stalder draws heavily on cybernetics enthusiast and counterculture icon Marshall McLuhan. In contrast to Floridi, however, Stalder does not refer to technology as the sole cause for the spotted transformation. Rather than using this shortcut, he draws on the original narrative and refers to an explosion of diversity and complexity that undermines the old rationality (Stalder 2018, p. 4). The new cultural forms nevertheless depend on the rise of network technologies, and they are inspired by the beliefs of the tech community (Stalder 2018, pp. 48–57). Perpetuating this technological tradition, Stalder then uses cybernetic vocabularies such as referentiality to describe the social world and argue that the digital condition is characterized by openness, connectivity, and networks: It offers "new possibilities for constituting and connecting various human and nonhuman actors" (Stalder 2018, p. 9).

These diagnoses from digitalization research often include a political prognosis that mirrors cybernetics' idea of diverse, flexible, and self-regulated networks. Legal scholar Thomas Vesting, whom I mentioned in the introduction, argues that the rise of computers networks results in a cultural change that will overcome representational politics for self-organization in networks (Vesting 2018, p. 162). Likewise, Floridi (2014, pp. 176–178) states that the digital revolution yields a "networked idea of political interactions" in which "agile, temporary" forms of aggregation transform democracy. Despite the state's efforts to keep his "sovereign" position, the digital transformation leads to a "flexible multi-agent system". This system accommodates the rise of consensus-based project groups that overcome "old, rigid boundaries, represented by social classes, political parties [...], physical barriers, and so forth".

Finally, Stalder comes to a similar assessment. His diagnosis first reiterates the cybernetic conviction that the "overwhelming complexity" undermines any attempt of intentional steering (Stalder 2018, p. 175). Hence, representative-democratic institutions are largely absent in his examination of the digital society (Berg et al. 2020, pp. 15–16). Instead, he focuses on two different paths network forms can take, cautions against a manipulative use of monopolized networks, and strongly supports self-organized networks characterized by direct cooperation, tight social ties, and consensus (Stalder 2018, p. 153). This makes him a proponent of the countercultural "communalism" (Turner 2010, pp. 32–33, 256–257).

In all of these cases, the researchers present us with an evidence-based evaluation and prognosis, yet they interpret and extrapolate the evidence through the lens of cybernetic concepts and narratives. In consequence, they repeat rhetorical tropes such as "new age" and "new thinking" and they cast society in terms of complexity and connectivity or real time processing and networks. They also follow cybernetics' perspective when they declare representative, sovereign-centered models of government are outdated, while flexible models of self-organization are the suitable option for the future. As the researchers do not reflect critically on their own interpretive lens, it is perfectly possible that their diagnoses are only an artefact of the cybernetic concepts and narratives, and that they underestimate the plurality and merits of other pathways into the future.

Moreover, it takes no wonder that their political diagnoses are close to statements from activists, such as Clark, or management theorists. Network governance theory, for instance, prolongs the critique of hierarchical forms of regulation known from cybernetics. They repeat the causal argument that due to the "complexity, dynamics, and diversity" of current societies "governance itself should be dynamic, complex and varied" (Kooiman 1993, p. 36), which leads them to antagonize against sovereign politics: "Sovereign forms of regulation would inevitably undermine the self-regulating capacity of the networks" (Sørensen and Torfing 2008a, p. 169).

Put bluntly, these network governance approaches attempt a transformation of the state by re-interpreting the state as the "facilitator" of network self-regulation. State agencies are supposed to "design" and manage networks, in which stakeholders build "co-arrangements" and negotiate policies (Klijn and Edelenbos 2008; Sørensen and Torfing 2008a). Moreover, shifting the state's self-understanding is accompanied by a new self-interpretation of civil service agents. They should stop envisioning themselves to be "rule-following bureaucrats" and start to think of themselves "as creative, pragmatic, and engaged process facilitators" (Sørensen and Torfing 2008a, p. 171).

In practice, the Internet Governance Forum has been one of the most influential examples for this kind of network politics (Pohle and Thiel 2020). However, sovereignty is gaining supporters in digital politics, thereby questioning the discursive and institutional hegemony of network approaches. Pohle and Thiel name three main approaches applying the political tradition of sovereignty to Internet governance. The *first* focuses on "state autonomy and the security of national infrastructures" (2020, p. 8), refining the cybersecurity debate and strengthening the protective dimension of states. The *second* one stresses the relevance of digital technology for economic prosperity, reinstating the state as an economic actor. Finally, the *third* one stresses the individual self-determination, reviving the sovereign subject that may invoke the state to safe-guard individual autonomy.

Thus, all three approaches to digital sovereignty are firmly rooted in a different, ontological epistemology and a different vision of the core actors, dynamics, and political institutions of a digital society. As they diverge in terms of polity and politics, network and sovereignty rationalities also have different policy preferences. The network rationale often favors "open data" and weak copyright regulations as they provide unregulated data for the users to experiment and create innovations free from pressures of morals or profit (Ganz 2018, pp. 151–159). In contrast, sovereignty advocates tend to support the rights and autonomy of sovereign data subjects, for instance by data protection, upholding copyrights, or installing measures to counter hate speech or fake news (Pohle and Thiel 2020, pp. 10–11, 2019, p. 70; Hummel et al. 2021).

In many ways, the measures of digital sovereignty address un-intended consequence of early network approaches. Their proponents, such as Clark or even Foucault (see above), wanted information and, in consequence, the Internet and cyberspace to stay free from any protectionism, including moral evaluations of information as good or bad and accordant state interventions. In this perspective, only abolishing sovereign morals and interventions would unlock the creativity of self-regulation. Meanwhile, the experiences with hate speech, fake news, and electoral

interference have sparked the call for information supervision, usually exercised via the state. Thus, the new call for sovereignty seizes the frictions between network narrative and reality to present itself as the actual option for governance in the digital society.

4 Conclusion

In this article, I argued for an interpretive approach to digitalization research that analyzes the concepts, narratives, and belief systems in digitalization debates. Such critical conceptual analysis (CCA) adds to the growing body of research that stresses the contingent relationship of (democratic) governance and (digital) technology. This relationship is characterized by a double contingency as both technology and democratic governance can take different forms and develop in co-dependency. Social self-interpretations shape this relationship and thus the future of the digital society. Critical conceptual analysis helps to spot, compare, and evaluate social self-interpretations, including their take on technology and governance.

I showed that digitalization research will therefore benefit from incorporating critical conceptual analysis, a research perspective that draws on political theory, intellectual history, and the sociology of knowledge. Firstly, analyzing the connection of epistemology, social imaginary, and political proposals will yield a *tableau of the divergent visions of a network society*. Historicizing these belief systems criticizes supposedly self-evident assumptions and unlocks empirical experiences and intellectual reflections that offer insight into the blind spots and un-intended consequences of their governance rationales. Secondly, a critical conceptual analysis of the metaphors and narratives in digitalization debates enhances the *reflexivity of digitalization research.* It locates the narratives researchers tell and illuminates alternative hypotheses and explanations.

Further research will have to put flesh to the bones of this methodological proposal. Here, I outlined some aspects of a network paradigm that emerged from a cybernetic tradition. Appreciated by researches and political actors, it holds a social and political imaginary revolving around metaphorical concepts such as networks and systems, connectivity and complexity. From this frame of reference, it redefines subjectivity and develops a concept of governance that highlights the creativity of diverse self-organizing networks. Of course, this framework allows for variations in explaining the supposed necessity of a new governance and in the concrete design of it. Future research will have to account for the internal variety that is constitutive for any political paradigm (see for a start August 2021b, Stäheli 2021). Moreover, future research will have to trace the internal conflicts and transformations of the network paradigm suggested by developments such as the commons discourse, the digital detox discourse, or the platform discourse.

The common network narrative, however, is that hierarchical and representative, moralistic and rationalistic concepts of governance are outdated and must be replaced to adapt to the structural transformation of society. In my brief illustration, I questioned this narrative by historicizing its use in the debate on digitalization and by demonstrating the existence of other governance rationalities that follow

divergent patterns of epistemology, social imaginary, and political proposals. While sovereignty is an obvious alternative as network approaches antagonized against it since cybernetics, other candidates easily come to mind.

The rise of microelectronics and computer networks, for instance, also pushed the *neoliberal utopia of a transparent and rational society* (August and Osrecki 2019). Rooted in a mechanistic epistemology and rational choice reasoning, the liberal-economic tradition stresses the relevance of transparent information for steering the behavior of government officials and for rationalizing decision-making since the enlightenment. In the neoliberal approach, data availability therefore is means to a modernist idea of better governance, whereas the network paradigm favors "openness" for rather different reasons. Their shared interest in openness, however, can provide opportunities for either cooperation or contestation.

Further research will have to elaborate these sketches of governance rationalities beyond the network approach. Here, they merely suggest that, contrary to the claims of the network paradigm, there are other viable ways of envisioning the digital society. These divergent pathways provide affordances for coexistence, cooperation, and confrontation, further complicating the dynamics of the field. Digitalization research can tackle this challenge by turning to critical conceptual analysis, an interpretive approach to examine the schemes of perception, thought, and action in digitalization debates.

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References

Ackoff, Russel L. 1979. The future of operational research is past. *The Journal of the Operational Research Society* 30(2):93–104.

Ashby, W. Ross. 1956. *An introduction to cybernetics*. New York: John Wiley & Sons.

August, Vincent. 2021a. Network concepts in social theory: Foucault and cybernetics. *European Journal of Social Theory*. https://doi.org/10.1177/1368431021991046.

August, Vincent. 2021b. *Technologisches Regieren. Der Aufstieg des Netzwerk-Denkens in der Krise der Moderne. Foucault, Luhmann und die Kybernetik*. Bielefeld: transcript.

August, Vincent, and Fran Osrecki. 2019. Transparency imperatives: results and frontiers of social science research. In *Der Transparenz-Imperativ. Normen – Praktiken – Strukturen*, ed. Vincent August, Fran Osrecki, 1–34. Wiesbaden: Springer VS.

Australian Public Service Commission. 2007. *Tackling wicked problems. A public policy perspective*. Canberra: Australian Public Service Commission.

Barbrook, Richard, and Andy Cameron. 1996. The Californian ideology. *Science as Culture* 6(1):44–72.

Barney, Darin. 2013. *The network society*. Cambridge, Malden: Polity Press.

Bateson, Gregory. 1987. *Steps to an ecology of mind. Collected essays in anthropology, psychiatry, evolution, and epistemology*. Northvale, London: Aronson.
Beer, Stafford. 1959. What has cybernetics to do with operational research? *OR* 10(1):1–21.
Beer, Stafford. 1967. *Cybernetics and management*, 2nd edn., London: English Universities Press.
Berg, Sebastian, Niklas Rakowski, and Thorsten Thiel. 2020. *The digital constellation*. Berlin: Weizenbaum Institute for the Networked Society.
Bevir, Mark. 2010. *Democratic governance*. Princeton: Princeton University Press.
Bevir, Mark. 2013. *A theory of governance*. Berkeley: University of California Press.
Bevir, Mark. 2020. What is the decentered state? *Public Policy and Administration*. https://doi.org/10.1177/0952076720904993.
Bevir, Mark, and Jason Blakely. 2018. *Interpretive social science. An anti-naturalist approach*. Oxford: Oxford University Press.
Bevir, Mark, and Rod A.W. Rhodes. 2003. Searching for civil society: changing patterns of governance in Britain. *Public Administration* 81(1):41–62.
Bevir, Mark, Rod A.W. Rhodes, and Patrick Weller. 2003. Traditions of governance. Interpreting the changing role of the public sector. *Public Administration* 81(1):1–17.
Boltanski, Luc, and Eve Chiapello. 2005. *The new spirit of capitalism*. London: Verso.
Boltanski, Luc, and Laurent Thévenot. 1999. The sociology of critical capacity. *European Journal of Social Theory* 2(3):359–377.
Boltanski, Luc, and Laurent Thévenot. 2000. The reality of moral expectations: a sociology of situated judgement. *Philosophical Explorations* 3(3):208–231.
Boltanski, Luc, and Laurent Thévenot. 2006. *On justification. Economies of worth*. Princeton: Princeton University Press.
Borucki, Isabelle, Dennis Michels, and Stefan Marschall. 2020. Die Zukunft digitalisierter Demokratie – Perspektiven für die Forschung. *Zeitschrift für Politikwissenschaft* 30(2):359–378.
Bösch, Frank. 2013. Zweierlei Krisendeutungen. Amerikanische und bundesdeutsche Perspektivierungen der 1970er Jahre. *Neue Politische Literatur* 58(2):217–230.
Bostrom, Nick. 2017. *Superintelligence. Paths, dangers, strategies*. Oxford: Oxford University Press.
Bourdieu, Pierre. 2008. *The logic of practice*. Stanford: Stanford University Press.
Castells, Manuel. 2009. *The rise of the network society*. Oxford: Wiley-Blackwell.
Clark, David. 1992. A cloudy crystal ball. Visions of the future. https://groups.csail.mit.edu/ana/People/DDC/future_ietf_92.pdf. Accessed 19 Feb 2021.
Crowley, Kate, and Brian W. Head. 2017. The enduring challenge of 'wicked problems'. Revisiting Rittel and Webber. *Policy Sciences* 50(4):539–547.
Crozier, Michel. 1975. Western Europe. In *The crisis of democracy. Report on the governability of democracies to the trilateral commission*, ed. Michel Crozier, Samuel P. Huntington, and Joji Watanuki, 11–58. New York: New York University Press.
Crozier, Michel, and Jean-Claude Thoenig. 1976. The regulation of complex organized systems. *Administrative Science Quarterly* 21(4):547–570.
Dahlberg, Lincoln. 2011. Re-constructing digital democracy. An outline of four 'positions'. *New Media & Society* 13(6):855–872.
Deutsch, Karl W. 1976. *The nerves of government. Models of political communication and control*, 2nd edn., New York, London: The Free Press.
Dupuy, Jean Pierre. 2000. *The mechanization of the mind. On the origins of cognitive science*. Princeton: Princeton University Press.
Eggers, William D. 2008. The changing nature of government. network governance. In *Collaborative governance. A new era of public policy in Australia?*, ed. Janine O'Flynn, John Wanna, 23–28. Canberra: ANU Press.
Ellul, Jacques. 1964. *The technological society. With an introduction by Robert K. Merton*. New York: Vintage Books.
Ferlie, Ewan, Louise Fitzgerald, Gerry McGivern, Sue Dopson, and Chris Benett. 2011. Public policy networks and 'wicked problems'. A nascent solution? *Public Administration* 89(2):307–324.
Floridi, Luciano. 2014. *The 4th revolution. How the infosphere is reshaping human reality*. Oxford: Oxford University Press.
von Foerster, Heinz. 1984. Principles of self-organization in a socio-managerial context. In *Self-organization and management of social systems. Insights, promises, doubts, and questions*, ed. Hans Ulrich, Gilbert J.B. Probst, 2–24. Berlin, Heidelberg, New York, Tokyo: Springer.
von Foerster, Heinz. 2003. On self-organizing systems and their environments. In *Understanding understanding. Essays on cybernetics and cognition*, 1–20. New York: Springer.

Foucault, Michel. 1978. *An introduction*. The history of sexuality, Vol. Volume I. New York: Pantheon Books.
Foucault, Michel. 1994. *Dits et Écrits. 1954–1988*. Paris: Gallimard.
Fox Keller, Evelyn. 2003. *Making sense of life. Explaining biological development with models, metaphors, and machines*. Cambridge: Harvard University Press.
Fuist, Todd Nicholas. 2020. Towards a sociology of imagination. *Theory and Society* 50(2):357–380. [2021].
Ganz, Kathrin. 2018. *Die Netzbewegung*. Opladen, Berlin, Toronto: Barbara Budrich.
Hagner, Michael. 2008. Vom Aufstieg und Fall der Kybernetik als Universalwissenschaft. In *Die Transformation des Humanen. Beiträge zur Kulturgeschichte der Kybernetik*, ed. Michael Hagner, Erich Hörl, 38–71. Frankfurt am Main: Suhrkamp.
Hayles, N. Katherine. 1999. *How we became posthuman. Virtual bodies in cybernetics, literature, and Informatics*. Chicago: University of Chicago Press.
Helbing, Dirk (ed.). 2019. *Towards digital enlightenment*. Cham: Springer.
Hood, Christopher. 2001. Public Management, New. In *International Encyclopedia of the Social & Behavioral Sciences*, ed. Neil J. Smelser, 12553–12556. Amsterdam: Elsevier.
Hood, Christopher, and Ruth Dixon. 2015. *A Government That Worked Better and Cost Less? Evaluating Three Decades of Reform and Change in UK Central Government*. Oxford: University of Oxford Press.
Horkheimer, Max. 1967. *Zur Kritik der instrumentellen Vernunft. Aus den Vorträgen und Aufzeichnungen seit Kriegsende*. Frankfurt am Main: Fischer.
Hummel, Patrik, Matthias Braun, Max Tretter, and Peter Dabrock. 2021. Data sovereignty: a review. *Big Data & Society* 8(1):1–17.
Kaufmann, Mareile, and Julien Jeandesboz. 2017. Politics and 'the digital'. *European Journal of Social Theory* 20(3):309–328.
Keller, Reiner. 2013. *Doing discourse research. An introduction for social scientists*. London: SAGE.
Klijn, Erik-Hans, and Jurian Edelenbos. 2008. Meta-governance as network management. In *Theories of democratic network governance*, ed. Eva Sørensen, Jacob Torfing, 199–214. Basingstoke: Palgrave Macmillan.
Kline, Ronald R. 2015. *The cybernetics moment. Or why we call our age the information age*. Baltimore: Johns Hopkins University Press.
Kooiman, Jan. 1993. Governance and governability. Using complexity, dynamics and diversity. In *Modern governance. New government-society interactions*, ed. Jan Kooiman, 35–48. London, Newbury Park, New Delhi: SAGE.
La Porte, Todd R. 1975. Organized social complexity. Explication of a concept. In *Organized social complexity. Challenge to politics and policy*, ed. Todd R. La Porte, 3–39. Princeton: Princeton University Press.
Leendertz, Ariane. 2016. Das Komplexitätssyndrom. Gesellschaftliche ‚Komplexität' als intellektuelle und politische Herausforderung. In *Die neue Wirklichkeit. Semantische Neuvermessungen und Politik seit den 1970er-Jahren*, ed. Ariane Leendertz, Wencke Meteling, 93–132. Frankfurt am Main, New York: Campus.
Leyva, Rodolfo. 2019. Towards a cognitive-sociological theory of subjectivity and habitus formation in neoliberal societies. *European Journal of Social Theory* 22(2):250–271.
Mager, Astrid, and Christian Katzenbach. 2021. Future imaginaries in the making and governing of digital technology: multiple, contested, commodified. *New Media & Society* 23(2):223–236.
Marcuse, Herbert. 1982. Some social implications of modern technology. In *The essential Frankfurt school reader*, ed. Andrew Arato, Eike Gebhardt, 138–162. New York: Continuum.
Marcuse, Herbert. 2002. *One-dimensional man*, 2nd edn., London: Routledge.
Medina, Eden. 2011. *Cybernetic revolutionaries. Technology and politics in Allende's Chile*. Cambridge: MIT Press.
Michalski, Wolfgang, Riel Miller, and Barrie Stevens. 2001. Governance in the 21st century: power in the global knowledge economy and society. In *Governance in the 21st century*, ed. OECD, 7–26. Paris: OECD Publishing.
Morozov, Evgeny. 2011. *The net delusion. The dark side of Internet freedom*. New York: Public Affairs.
Münkler, Herfried. 2003. Politische Ideengeschichte. In *Politikwissenschaft. Ein Grundkurs*, ed. Herfried Münkler, 103–131. Reinbek: Rowohlt.

Münkler, Herfried, and Vincent Rzepka. 2015. Die Hegung der Öffentlichkeit. Der Challenge-and-Response-Ansatz und die Genese des Liberalismus aus der Krise des Republikanismus. In *Neue Perspektiven der Ideengeschichte*, ed. Helmut Reinalter, 49–74. Innsbruck: Innsbruck University Press.
Pariser, Eli. 2012. *The filter bubble. What the Internet is hiding from you*. London: Penguin Books.
Pickering, Andrew. 2009. *The cybernetic brain. Sketches of another future*. Chicago: University of Chicago Press.
Pohle, Julia, and Thorsten Thiel. 2019. Digitale Vernetzung und Souveränität: Genealogie eines Spannungsverhältnisses. In *Internet und Staat. Perspektiven auf eine komplizierte Beziehung*, ed. Isabelle Borucki, Wolf J. Schünemann, 57–80. Baden-Baden: Nomos.
Pohle, Julia, and Thorsten Thiel. 2020. Digital sovereignty. *Internet Policy Review*. https://doi.org/10.14763/2020.4.1532.
Quéré, Louis, and Cédric Terzi. 2014. Did you say 'pragmatic'? Luc Boltanski's sociology from a pragmatist perspective. In *The spirit of Luc Boltanski: essays on the 'pragmatic sociology of critique*, ed. Simon Susen, 91–128. London: Anthem Press.
Raphael, Lutz. 2019. *Jenseits von Kohle und Stahl. Eine Gesellschaftsgeschichte Westeuropas nach dem Boom*. Berlin: Suhrkamp.
Rehak, Rainer. 2021. "Action" and ascription: on misleading metaphors in the debate about artificial intelligence and transhumanism. In *Transhumanism: the proper guide to a posthuman condition or a dangerous idea?*, ed. Wolfgang Hofkirchner, Hans-Jörg Kreowski, 155–165. Cham: Springer.
Rid, Thomas. 2016. *Rise of the machines. A cybernetic history*. New York, London: Norton.
Rittel, Horst W.J., and Melvin M. Webber. 1973. Dilemmas in a general theory of planning. *Policy Sciences* 4(2):155–169.
Rosa, Hartmut. 2004. Four levels of self-interpretation. A paradigm for interpretive social philosophy and political criticism. *Philosophy & Social Criticism* 30(5):691–720.
Rosa, Hartmut. 2015. *Social acceleration. A new theory of modernity*. New York: Columbia University Press.
Sauer, Lieselotte. 1983. *Marionetten, Maschinen, Automaten. Der künstliche Mensch in der deutschen und englischen Romantik*. Bonn: Bouvier.
Savio, Mario. 2014. 'Bodies upon the gears'. Speech at FSM rally, Sproul hall steps. 2 december 1964. In *The essential Mario Savio. Speeches and writings that changed america*, ed. Robert Cohen, 185–190. Berkeley: University of California Press.
Schellnhuber, Hans J. 1999. 'Earth system' analysis and the second Copernican revolution. *Nature* 402(S6761):C19–C23.
Schelsky, Helmut. 1961. *Der Mensch in der wissenschaftlichen Zivilisation*. Köln, Opladen: Westdeutscher Verlag.
Schimank, Uwe. 2006. *Teilsystemische Autonomie und politische Gesellschaftssteuerung. Beiträge zur akteurzentrierten Differenzierungstheorie 2*. Wiesbaden: VS.
Scott, Bernard. 2004. Second-order cybernetics. An historical introduction. *Kybernetes* 33(9/10):1365–1378.
Seibel, Benjamin. 2016. *Cybernetic Government. Informationstechnologie und Regierungsrationalität von 1943–1970*. Wiesbaden: Springer VS.
Sørensen, Eva, and Jacob Torfing. 2008a. Theoretical approaches to metagovernance. In *Theories of democratic network governance*, ed. Eva Sørensen, Jacob Torfing, 169–182. Basingstoke: Palgrave Macmillan.
Sørensen, Eva, and Jacob Torfing (eds.). 2008b. *Theories of democratic network governance*. Basingstoke: Palgrave Macmillan.
Stäheli, Urs. 2021. Undoing networks. In *Undoing networks*, ed. Tero Karppi, Urs Stäheli, Clara Wieghorst, and Lea P. Zierott, 1–30. Minneapolis, London: University of Minnesota Press.
Stalder, Felix. 2018. *The digital condition*. Cambridge, Medford: Polity.
Straßenberger, Grit. 2018. Politikwissenschaftlicher Zugang zur Ideengeschichte. In *Handbuch Politische Ideengeschichte. Zugänge – Methoden – Strömungen*, ed. Samuel Salzborn, 2–8. Stuttgart: Metzler.
Supp-Montgomerie, Jenna. 2021. *When the medium was the mission. The atlantic telegraph and the religious origins of network culture*. New York: New York University Press.
Turner, Alwyn W. 2008. *Crisis? What crisis? Britain in the 1970s*. London: Aurum.
Turner, Fred. 2010. *From counterculture to cyberculture. Stewart Brand, the whole earth network, and the rise of digital utopianism*. Chicago: University of Chicago Press.
Vesting, Thomas. 2018. *Staatstheorie. Ein Studienbuch*. München: C.H. Beck.

Wiener, Norbert. 1948. *Cybernetics. Or control and communication in the animal and the machine*. New York: John Wiley & Sons.
Wiener, Norbert. 1954. *The human use of human beings. Cybernetics and society*. New York: Doubleday Anchor Books.
Wirsching, Andreas. 2011. The 1970s and 1980s as a turning point in European history? *Journal of Modern European History* 9(1):8–9.
Wyatt, Sally. 2021. Metaphors in critical Internet and digital media studies. *New Media & Society* 23(2):406–416.