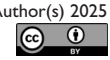
Article

new media & society
1–24



DOI: 10.1177/14614448251321439
journals.sagepub.com/home/nms


Explaining public communication change: A structure–actor model

Philipp Müller
University of Mannheim, Germany

Abstract

Public communication change (PCC) is often studied in communication research with a somewhat narrow conceptual focus, for instance, either on the contingency or on the determination of communication development. I argue that instead of considering the various extant theoretical approaches as competing and irreconcilable, the field should strive for a holistic understanding that helps integrate them. I consider PCC as a process that unfolds over time in complex multilevel dynamics between macro-level structural transformations and the decisions and resulting behaviors of individual and collective actors. I propose a structure–actor model of PCC that accounts for both, determined and contingent processes simultaneously. It is also able to explain the emergence of paradox phenomena and collective misjudgments despite better knowledge. I conclude by using examples from the context of the "filter bubble" phenomenon to illustrate the heuristic value of the developed model and sketch an empirical research agenda that follows from its arguments.

Keywords

Actors, communication change, filter bubble, new media, social structure

In popular discourse on the recent transformations of public communication, the infamous "filter bubble" metaphor (Pariser, 2011) has become an omnivore trope. It describes the assumptions that (a) algorithmic content selection on the Internet results

Corresponding author:
Philipp Müller, Institute for Media and Communication Studies, University of Mannheim, B 6, 30–32, 68159 Mannheim, Germany.
Email: p.mueller@uni-mannheim.de

in personalized, homogeneous opinion environments and that (b) exposure to such content repertoires promotes societal polarization. Empirical studies, however, found but mixed evidence on algorithmic polarization effects and raise severe doubts about whether real-world platform algorithms actually create homogeneous opinion environments at all (for an overview, see Bruns, 2021; Ludwig & Müller, 2022). Instead, evidence suggests that algorithmic content selection might even promote source diversity (Jürgens and Stark, 2022; Scharkow et al., 2020), and that if it increases polarization, this might occur via exposure to counter-attitudinal rather than homogeneous content selection (Bail et al., 2018). These empirical realities of public communication change (PCC) notwithstanding, the potentially misleading "filter bubble" trope continues to be massively "real in [its] consequences" (Thomas and Thomas, 1928: 572): It motivates legislative initiatives of platform regulation (Thune, 2021) and is cited as a primary reason for the founding of industry initiatives for a safer Internet (Borchert, 2017). Likewise, research indicates that fears about the massive distribution of disinformation online may be inflated pointing at a lack of success of strategic actors trying to harm democracy by spreading "fake news" (Miró-Llinares and Aguerri, 2021). At the same time, the societal discourse on disinformation might contribute to destabilizing democracy nonetheless, just as intended by these actors (Jungherr and Rauchfleisch, 2024).

If we want to understand how such paradoxes of communication change (Rice, 1999) are possible (and also how other non-paradox patterns of PCC emerge), the idea of the self-fulfilling prophecy formalized in the so-called "Thomas theorem" ("if men define situations as real, they become real in their consequences," Thomas and Thomas, 1928: 572) offers a good starting point. This notion suggests self-fulfilling prophecies are only possible in an interaction between individual actors ("men" in the original quote) and social structure ("situations" in the original quote). Thus, to explain the emergence of paradoxes and other surprising or seemingly irrational phenomena over the course of PCC, a conceptual approach will have to link these two levels and find means to formally describe their mutual relationship. This equals an attempt to overcome a previous schisma of PCC theory: We have to accept that two seemingly contradictory approaches to PCC, determination and contingency (Lievrouw, 2010), have to be thought of as jointly operating forces, rather than being mutually exclusive, competing concepts.

With the present contribution, I want to offer a heuristic framework that helps to formally describe, and thereby, better understand (and explain) the emergence of both real and seemingly real patterns of PCC (which then become real in their consequences). In this context, I understand public communication as any openly accessible exchange of messages between human communicators via media channels (as opposed to private communication, see Ford, 2011). As outlined by Jürgen Habermas (1989), public communication can be considered crucial to the emergence of modern, emancipated individuals and the functioning of democracy. Consequently, PCC extends beyond technological change and focuses on the whole social process of public communication, including the communicated message content and the communicative behaviors of societal actors. On that account, PCC encompasses such various phenomena as the broad diffusion of smartwatches (Chuah et al., 2016), the fragmentation of audiences (Fletcher and Nielsen, 2017), or the increasing representation of marginalized groups on TV (Garretson, 2015). Importantly, for phenomena to be considered part of PCC, it is

necessary for them to describe generalizable and lasting transformations. For instance, a technological media innovation that is not generally adopted and therefore has no sustainable impact on public communication, such as the first generation of smart glasses (Gvora, 2023), would not be covered by this understanding of PCC.

At its core, the model I propose conceptualizes communication change as a process that unfolds over time in complex multilevel dynamics between macro-level phenomena of structural transformation (which emphasize the determination of communication change) and the decisions and resulting behaviors of individual or collective actors (which emphasize its *contingency*). The driving thought behind this is to explain the emergence of PCC as both an actor- and a structure-driven process (Hedström and Bearman, 2011; Sewell, 1992). Importantly, this process can be prone to (communicative) steering by strategic actors (which can make contingent situations appear determined) and to developments caused by errors in human reasoning—both increasing the likelihood of only seemingly real patterns of PCC to have meaningful real consequences.

I will begin by reviewing some of the main arguments that communication scholarship thus far has stressed to explain the origins of and driving forces behind PCC phenomena. Based on this literature review, I will argue that even though almost all scholarship that underscores the importance of (determined) structural processes admits that there is also a role played by (contingent) individual actions (and vice versa). However, a conceptual perspective that integrates both on equal terms is still lacking. Second, I will present a structure–actor model of PCC that addresses this gap and can, thereby, help to make the emergence of PCC phenomena explicable. I will conclude by using example scenarios from the "filter bubble" context to illustrate the heuristic value of the developed model as a framework to explain the social dynamics of PCC as they unfold. Finally, I will sketch an empirical research agenda that follows from its arguments.

The role of structure–actor relationships in the study of PCC

In the academic investigation of causes for PCC, two prototypical lines of reasoning can be distinguished: approaches referring to the unfolding of PCC as determined necessity, and approaches underscoring its contingency (Lievrouw, 2010). The former are built upon an understanding of human history as continuous progress, borrowing from the idea of biological evolution (Ayala, 2007). Following this argument, communication development is seen as an evolutionary, innovation-driven process (Lehman-Wilzig and Cohen-Avigdor, 2004; Neuman, 2010; Scolari, 2013; Stöber, 2004). In this reasoning, (technological) media innovations drive communication change by unleashing novel communicative potentials which inspire new forms of media production or use in public communication. Efficiency is considered crucial for an innovation to succeed. Those means of communication that provide a more favorable input–output relation (in which the input are resources like time, money, or effort, and the output can be the fulfillment of basically any communicative function) will prevail (Stöber, 2015). The dissemination of media innovations that provide such an efficiency gain for society will follow a

specific predetermined form that is described in the diffusion of innovations theory (Rogers, 1983)—which is, however, not limited to describing the diffusion of technological innovations. Judged against that light, the invention and broad global adoption of the Internet appears as a historic necessity, as its efficiency gain for message distribution has been enormous.

Now, these approaches are, of course, far from neglecting human contributions to the process of PCC. While they are deterministic, they are not theories of technological determinism. They require individual or collective human actors as inventors (sometimes romanticized as "tinkerers, without a master plan, often working in isolation"; Stöber, 2004), distributors, opinion leaders, adopters, and so on of PCC. However, even co-evolution approaches that account for societal influences on the tangible configurations of communication structures (Bauer and Latzer, 2023) see humans' corridors of agency as pre-structured by technological developments, thus pushing forward a development that is largely inevitable. Seen through this theoretical lens, changes of public communication structures occur through the actors, not because of them. They remain a process of "design without designer" (Ayala, 2007).

Challenging this take, the sociology of technology offers approaches such as the social shaping of technology (SSOT; Williams and Edge, 1996) or the social construction of technology (SCOT; Bijker et al., 1987). Following these approaches, PCC is still a primarily technology-focused process—but, particularly in SCOT, it is fully contingent which specific societal patterns of communication follow from technological innovations. This is determined in social negotiations during a period of "interpretative flexibility" in which societal actors communicatively raise and elaborate on problems and conflicts that a technological innovation comes along with. This contingency is afterwards rhetorically closed by defining problems and conflicts as solved in one way or another. Therefore, communication change is by itself a communicatively established phenomenon.

Despite criticisms of SCOT, for instance, for ignoring power constellations, long-term cultural influences (which, both, can be deterministic for the outcome of technological change), or for disregarding unheard voices in the process (Winner, 1993), approaches underscoring the contingency of technological change remain impactful and have inspired a vast array of PCC scholarship (e.g. Flanagin et al., 2010; Fulk, 1993; Rice, 1999). Concerning the global diffusion of the Internet, for instance, it has been argued that this process was far from being without any alternative and has been massively steered by governments and companies which were pre-invested in the technology at a very early stage of the diffusion process (Flichy, 2008; Mickey, 1998; Pärna, 2010).

Notably, while the SSOT/SCOT approaches put a lot of emphasis on macro-level societal developments conceptually, empirical research stressing the contingency in PCC, often operates on the micro level, investigating how individuals make use of, domesticate, or appropriate communication technology and, thereby, contribute to PCC (see, e.g. Hartmann, 2023; Rice et al., 2018; Wirth et al., 2008). It, thus, appears as if contingency in PCC cannot be studied without considering the micro level of individual or collective actors. By studying individuals' decisions and their alternatives, both contingency and determinism can become graspable, or at least shine through, in empirical research. The assumption that there were (no) alternatives to a historical development as

it took place is logically impossible to falsify. Only by documenting concrete situations in which actors' decisions set the direction for further PCC, its contingency (or: determinism) can become tangible. A study by Kreiss and McGregor (2018), for instance, assessed how employees of big tech firms served as advisors for political parties during an election period and, thereby, shaped changes in political communication. By exposing these mechanisms, the study helps to develop a sense of the ways in which political communication on social media platforms might look differently without political actors' reliance on said advise—even though it cannot, of course, offer an empirical assessment of such an alternative reality.

In spite of the fact that almost all scholars cited up to this point acknowledge that communication change emerges as a conglomerate of structural developments and individuals' actions, an attempt at integrating both levels on a par in one conceptual approach is still lacking in PCC scholarship thus far. By considering both, actors' free decision corridors as well as their structuration through the macro level (DeSanctis and Poole, 1994; Jones and Karsten, 2008), such a model would necessarily have to integrate the impact of (determined) technological efficiency as well as (contingent) social constructions of communication change. Therefore, by finding a means to formally describe the structure–actor relationships involved in the emergence of PCC, also the seeming opposition of contingency and determinism could be overcome. This would make the complex processes underlying communication change not only describable, but actually explicable. Moreover, it could help to understand the emergence of paradoxes and irrationalities that appear to persistently occur as communication change unfolds (Rice, 1999) without having to conceptually discard evolution-inspired explanations of change altogether (which would expect the occurrence of irrationalities to be minimal).

Conceptualizing public communication change: a structure–actor model

Individual or collective actors' decisions and subsequent actions play a crucial role in changing structures of public communication within societies. Persons or collectives within the tech industry decide on the design of communication infrastructures, media organizations (and individuals working embedded in their structures) invent message formats and produce message contents, media politicians and jurists provide regulatory frameworks, users make attention, buying, and appropriation choices (and, in the Internet era, increasingly become message producers themselves). These decisions and behaviors are embedded in a social environment of public communication that emanates from a conglomerate of technological possibilities, affordances, and limitations, aggregated previous actor decisions and behaviors (which may have been more or less strategic), and a meta-discourse on PCC and its societal impact. Furthermore, we have to assume that the well-documented psychological mechanisms of human judgment and decision-making which include an illustrious set of heuristics and biases (Gilovich et al., 2002), motivated reasoning (Kunda, 1990), or the need for cognitive closure (Webster and Kruglanski, 1997). These can help explain the occurrence of paradox or seemingly irrational developments in PCC which may countervail the patterns of developments that evolutionary theory would expect to occur based on its efficiency argument (Stöber, 2015).

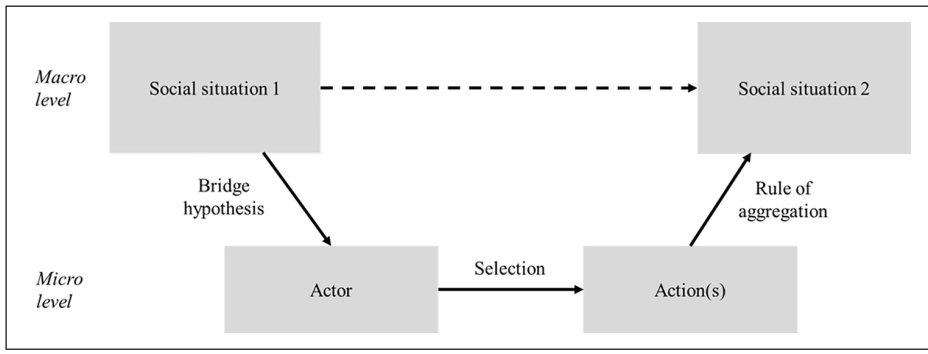


Figure 1. Structure–actor model of social change. Own adaptation of works by Coleman (1990) and Esser (1993, 1999).

The biggest challenge for making explicable the causal trajectories involved in the emergence of PCC rests in conceptualizing the relationships between the macro-level structures of public communication and the collective and individual actors (who are simultaneously influenced by this macro-level setting and contribute to its emergent change). In the following, I will develop a conceptual framework that helps to formally describe these relationships, accounting for their procedural nature. Importantly, this model is applicable to all the aforementioned actor roles (i.e. engineers, media managers, media regulators, media producers, users)—and beyond them. To offer a coherent and comprehensive model, I borrow from and try to integrate the insights of various psychological and sociological schools of thought that have previously dealt with processes of communication change or broader social change in one way or another. Importantly, because it combines different theoretical approaches to PCC, the model I propose is not a coherent theory in itself that would allow to predict specific future outcomes of PCC. It rather should be read as a framework that allows to describe and explain PCC phenomena, either ex posteriori or while they emerge.

For the general form of the model (see Figure 1), I rely on structuration theory's "boat" scheme of sociological explanation (Coleman, 1990; Esser, 1993, 1999). It suggests that social change emerges from a three-step process that involves two shifts in levels: (1) the social situation structures judgments at the micro level—a step, which has to be described using a "bridge hypothesis." (2) Based on their assessment of the social situation actors make selection decisions for their subsequent actions. (3) These individual actions affect the social situation in an aggregated form—which has to be formalized in one or several "rules of aggregation."

Step 1: actors' observations of public communication change

To conceptualize the first shift in levels, I focus on actors' perceptions of change. By doing so, I follow the assumption that all human action is related to the (social) environment and that the concept of this social environment that is salient in an individual's cognitive apparatus in a given situation frames decisions and behaviors (Goffman, 1974). Psychological

research on social change has argued that perceived changes in the social environment are of particular relevance to human beings when making judgments (e.g. Silka, 1989; Watson, 1971). This is because changing environmental conditions suggest we might have to adjust our concept of the social consequences that can be expected from our actions and, subsequently, our internalized routines of decision-making and behavior. Importantly, the impact of social change on actors' decision-making does not take affect when social change has occurred and, consequently, *could* be observed, but only when it *is* actually observed.

This implies that a bridge hypothesis conceptualizing the step from the macro to the micro level of PCC has to focus on actors' *mental representations of public communication change*. It can be assumed that individual or collective actors (be that organizations, professional or private individuals) are likely to continuously monitor structural transformations of public communication, as a result of either *strategic or incidental observation*, and will try to adapt their communicative actions to the PCC they observe and their subjective judgments and evaluations thereof (see, e.g. Larsson and Skogerbø, 2018; Müller, 2016; Natale, 2016; Strycharz et al., 2022).

The notion of strategic monitoring has its roots in organizational research. Within organizations, established monitoring routines are developed to aid and improve decision-making processes and their outcomes (Van Meyel, 1979). For collective actors such as organizations, social movements, or groups, the strategic observation of PCC can be massively important. Irrespective of whether their organizational goal is selling goods or services, or whether it is promoting political ideas, public welfare or specific particular interests, engaging in public communication will be an important avenue for these actors in multiple different ways to achieve these goals. Thus, monitoring PCC seems crucial for them to gain competitive advantages or simply to not lose the means of promoting their causes. Individual actors may also develop routines of strategically monitoring PCC, particularly so if they deem it relevant for their future actions (see Devine et al., 1989). This can take the form of subscribing to newsletters on technological innovations, regularly talking to younger family members about their media use, or visiting community college classes on new means of communication.

However, it is also possible that collective and individual actors make incidental observations of PCC that happen by chance and are not rooted in monitoring routines (Tresselt and Mayzner, 1960). Such incidental observations may happen in all everyday contexts in which individuals or collectives are confronted with traces of PCC without a specific motivation. The degree to which monitoring of PCC is conducted strategically thus depends on (a) the degree to which an individual or a collective actor depends on public communication in achieving their goals and (b) the availability of cognitive or financial resources to set up such a strategic monitoring system. Against that backdrop, it seems more likely for individuals to predominantly rely on unstrategic, incidental observations of PCC—but it cannot be ruled out for collective actors as well.

Actors' incidental or strategic observations can both be informed by a variety of *traces of public communication change* observed from the macro level:

1. This includes own primary experiences of *technological, discursive, or organizational communication change*, such as getting in touch with a novel class of

electronic media devices in a shop, recognizing change in how a specific topic is presented in television news, or observing how the ads and posts in one's Twitter newsfeed have changed after Elon Musk's takeover. (For the sake of simplicity, I have only listed examples for individual actors here, but similar scenarios could be developed for collective actors.)

2. It also encompasses observations of *other actors' changing communicative actions* such as an individual noticing that family and friends have started sending voice instead of text messages in many cases, or a real estate agent realizing that competitors are increasingly advertising properties on online platforms instead of newspapers.
3. Finally, *the meta-discourse* on media and communication change plays an important role. This discourse can reach an individual in many forms. Typically, it establishes itself in the elite or journalistic discourse of public communication, for instance, in news pieces, talk shows, or blog posts that refer to a phenomenon of communication change (see, e.g. Arceneaux and Schmitz Weiss, 2010; Kristensen and Mortensen, 2017; Sun et al., 2020; Van Duyn and Collier, 2019). But, it can also manifest itself in interpersonal communication or internal organizational communication, for instance, in a younger person informing an elderly relative about what a social media shitstorm is, or in a political party's strategic headquarter briefing local candidates on how to use social media for campaigning.

As outlined by Müller (2016), actors' perception of PCC is a complex process that unfolds against the personal background of their internalized communication-related dispositions, that is, their normative and non-normative assumptions about and personal relationships with public communication at large, specific communicative phenomena, media, or communicative actors, that may have emerged from their media socialization (Müller et al., 2018; Notten and Kraaykamp, 2009) and their biographical experiences with mediated communication (Peiser, 1999; Ytre-Arne, 2019). The resulting dispositions form a reference framework against which PCC is observed and evaluated. The judgment formation process itself can then still take various forms depending on background factors such as personality traits, socio-demographics (age, class, gender, etc.), perceived social pressures, or social support. It is a well-documented pattern, for instance, that traditional gender-roles imply technology is more appealing to males than females (Bray, 2007). Consequently, empirical evidence suggests males report a higher affinity to media innovations, and, as a result of this, indirectly think more about and perceive stronger communication change than female individuals (Müller, 2016, p. 290). This relationship between gender and PCC perception, however, may be subject to the degree of individuals' adherence to traditional gender norms.

While these factors seem to predominantly describe influences on individual actors' perceptions of PCC, most of them are also transferable to collective actors. Just as for individuals, groups' or organizations' decision-making depends on their background and history and on the (shared) mental representations that are (collectively) held within a group or organization. Therefore, it seems fair to extend the framework of PCC observation to collective actors and assume similar mechanisms (without, of course, wanting to

imply that the specificities of reality construction and subsequent decision-making within groups or organizations can be neglected; see, e.g. Castor, 2005; Fulop et al., 1999; Hambrick and Snow, 1977).

Importantly, also public relations and advertising (and, therefore, the external strategic communication of organizations) play a role in this context. Organizations try to strategically shape discourse on societal and technological change in a way that is supposed to serve their own particular interests (Ansoff, 1987; Zerfass et al., 2018). It has been argued, for instance, that tech companies and governments strategically created an Internet hype in the late 1990s that was intended to make the triumph of the web appear inevitable (and, thus, determined) in order for their investments in the technology to pay off (Flichy, 2008; Mickey, 1998; Pärna, 2010)—despite it being far from clear at this stage that the Internet would ultimately draw a worldwide mass usership (and its development was, thus, in fact, contingent). More recently, Natale et al. (2019) argued that the ongoing digital transformation of the 2010s took place under an aura of "corporational determinism," that is the assumption that the central role of for-profit organizations in the emergence of new communication technologies was inevitable. The authors challenge this deterministic notion (and, thus, claim contingency for the role of tech and media companies in communication change) which, as they show, has strategically been created by the distribution of business-favoring narratives of media change. Drawing from these examples, it can be argued that whenever contingent situations of communication change are viewed as determined, strategic communication is likely to have played a role in this erroneous conclusion.

Considering the large variety of traces of communication change that individual or collective actors may incidentally or strategically observe, it should be clear that the perception of PCC has to be imagined as the result of a cumulative process over time. It emanates from numerous individual observations and exposure to various messages from different sources. These different observations and messages can be contradictory and have different probabilities of sustainably influencing an individual or collective actor's perception of PCC, depending on the ways in which they resonate with the specific actor's background (as outlined above).

Step II: actors' decision-making

If we want to understand the role of individual and collective actors in PCC, we cannot be satisfied by analyzing how they perceive and make sense of communication change. We also have to study the consequences of these perceptions for actors' *communication-oriented actions*, such as adopting a specific media technology or not, allocating financial and temporal resources among different media outlets or channels, actively participating in public communication in one way or another, talking to others about public communication contents or channels, boycotting specific communication arenas, and so on. These decisions to action can be spontaneous and situational, or they can be planned and strategic. They can affect only singular actions, or they can result in re-occurring or even habitualized behavioral patterns. Importantly, however, to be relevant in the context of PCC they have to contribute to sustainable (i.e. generalizable and lasting) changes in public communication. Moreover, against the backdrop of the

"resistance to change" phenomenon (Watson, 1971), it is important to acknowledge that "negative actions" such as omitting or refraining from action (Walton, 1980) may also be deliberate outcomes of actors' decision-making and can also massively impact PCC. They, thus, have to be considered on par with decisions to act.

In the original "boat" models from explanatory sociology (see Figure 1), the internal micro-level step of the model is typically conceptualized following a rational choice logic that understands actors in a predominantly economic fashion as utility-maximizing entities (Coleman, 1990; Esser, 1999). However, I would argue that maximizing individual benefit is only one specific type of a set of various *motivations* that underlie communication-oriented actions. Importantly, there can also be motivations to serve a greater common good or public value (which are, of course, not a bit less rational, and can also serve utility maximization), for instance, the fostering of democracy (Acevedo, 2018; Meynhardt, 2009). Furthermore, from a psychology perspective self-serving motivation does not necessarily evolve around economic or otherwise measurable individual profit. On the contrary, research from social psychology indicates that individuals (Leary, 1999), but also collectives (Crocker and Luhtanen, 1990), need to establish a positive self-image in order to maintain functionality. Therefore, seeing one's decisions in a favorable light, for instance, as judged against perceived social norms (Cialdini and Trost, 1998), is also an important dimension of motivation in actor's decision-making. Therefore, an important epistemic goal in the study of PCC should be to explore the involved actors' specific sets of motivations.

Moreover, a "rational choice" concept of humanity, while certainly not neglecting that actors can make rationally false decisions (i.e. decisions that will corrupt achieving the goals they intend to pursue), is limiting the perspective on the process of decision-making. It underemphasizes the likelihood of irrationalities of social (or, in our case, public communication) change. Therefore, I argue in favor of explicitly considering the irrationalities and heuristic fallacies that may result from varying combinations of *heuristic and systematic decision-making* (Gilovich et al., 2002; Keren and Wu, 2015). Cognitive psychology has shown that human reasoning can take the form of an intense, reflected examination of incoming arguments and observations, or, if the motivation or cognitive resources for this are lacking, it can judge new information following simple schemata or rules of judgment, the so-called heuristics (Chaiken, 1987). Importantly, some of these heuristics can be directly linked to human's judgments of change. For instance, it has been shown that individuals overemphasize potential losses over possible gains of changing social circumstances, which results in a status quo bias in decision-making (Samuelson and Zeckhauser, 1988). Less dependent on individual motivation, yet similar in its consequences, research has also discovered existence and longevity biases in which the mere existence or its duration are used as a heuristic cue for the quality of entities that are already in being over newly emerging ones (Eidelman and Crandall, 2014).

This duality of biases in favor of the status quo may help explain the frequently diagnosed human tendency to resist change (Watson, 1971). However, it also demonstrates that motivation cannot be overestimated as a factor in decision-making in light of perceived macro-level change. First, because motivation is a crucial factor in predicting to which degree actors' choices will be based on heuristic or deliberate reasoning, or a combination of both, in a given situation (Kruglanski et al., 2003, 2010) Second, because

considering motivation informs us that particularly uninvolved individual or collective actors are likely to react skeptically to perceived PCC (after engaging in a mostly heuristics-driven decision-making process) whereas we can expect those actors with higher stakes in public communication as a field to more systematically ponder possible positive or negative consequences to their potential reactions to perceived PCC. For collective actors, organization research offers additional frameworks for conceptualizing these decision-making processes (see, e.g. Shapira, 2011).

Step III: two routes of aggregation

From the considerations presented up to this point, it should already be obvious that actors' communication-oriented actions contribute to further *structural PCC* on the macro level in various ways. If users decide to dump their Twitter/X accounts in favor of other platforms, this provokes structural PCC. If the editorial staff of a nationwide television newscast decides to adopt the use of gender-sensitive language, this provokes structural PCC. If EU policymakers decide to introduce a new Digital Services Act, this provokes structural PCC. However, for an explanatory model of PCC, it is insufficient to merely name this relationship between actors' decisions and structural PCC. It also has to conceptualize the social processes at work. The original "boat" theories of social change (Coleman, 1990; Esser, 1993) consider aggregation of individual actions key for this second shift of levels. According to this outline, actors' decisions and actions accumulate and thereby merge to a greater whole which subsequently constitutes a macro-level phenomenon.

Complex, networked dynamics. In the digitalized lifeworld of the 21st century, we have to imagine the aggregation of individual actions to a macro-level phenomenon as a process that is shaped by *complex, networked dynamics* that lead to *actual patterns of change*. For instance, the growth of a social media platform can be broken down into an increasing number of users joining said platform which accumulates to its breakthrough. However, this accumulation cannot solely be described by adding up the numbers of users having made the decision to join the platform. These decisions depend upon each other, can be coordinated among specific groups of users, and constitute an interrelated network without which no actual PCC would take place. Take, for instance, the social media platform *Google Plus* launched in 2011. This platform saw a record-growth in users in its first months of existence (Tsukayama, 2011) without, however, ever having a substantial impact on public communication processes. Users simply did not actively post on the platform to an extent that would substantially alter the course of PCC. A number of reasons can be cited for the lack of user activity that followed the mass adoption of the platform, for instance, that users perceived no actual advantages over Facebook, were lacking information on the new platform, were skeptical about Google collecting too much of their personal data, or perceived no peer pressure to switch (Landeweerd et al., 2013). Thus, Google Plus's failure to succeed can only be understood if we account for the complex, networked dynamics that followed the millions of individual users' adoption decisions.

This example illustrates that the actual structural changes to which individual actors' decisions aggregate are not predetermined by one isolated decision (such as the adoption of a platform). Rather, they unfold over time in what is best described as a complex, networked dynamics, an aggregation of numerous consecutive, intertwined decisions by a multitude of actors. Complexity theory can help understand these aggregation dynamics. According to Waldherr (2017), complex systems are coined by a number of characteristics, namely their network structure, self-organization, nonlinearity, heterogeneity, and their potential to create emergent macro-level phenomena. Importantly, describing emergence in the sense of complexity theory means to accept the paradox notion that the emergent (macro-level) phenomenon is both dependent and independent of its (micro-level) components at the same time (Sherry, 2015). *Google Plus* might have had a breakthrough success if some social media influencers with large follower numbers had decided to exclusively switch to the platform. Yet, such a success could never have been explained ex post solely by looking at the individual adoption decisions of single high-profile influencers. Consequently, complex dynamics may at the same time be deterministic and unpredictable (Sherry, 2015). This raises doubts about the validity of deterministic catch-all theories that suggest one singular mechanism (such as efficiency) could explain all of PCC. Following complexity theory, conceptualizing PCC as determined is not at all wrong. However, it appears determined in infinitely complex terms.

Objectivation. What complexity theory alone cannot explain, is the emergence of paradoxical PCC phenomena such as the "filter bubble," or the inflated fear of disinformation online. These previously mentioned examples have both developed into highly influential tropes of PCC discourse despite their inconclusive empirical substance. These phenomena—which I call *quasi-actual patterns of change*—require a more specific aggregation rule. To explain how they can emerge from communication-oriented actions at the micro level, I borrow from the sociology of knowledge, namely the work of Berger and Luckmann (1966) which evolves around the question: "How is it possible that subjective meanings become objective facticities?" (p. 18). They argue that, first, people's subjective ideas about the world manifest themselves in their actions and thereby become "visible" to others, a process the authors call "externalization." Second, because these actions are perceived and interpreted by other individuals, their underlying assumptions acquire a quasi-objective character ("objectivation"). Third, cumulative observation of certain patterns of action leads to the internalization of the assumptions underlying these actions among individuals who had not previously held them ("internalization")—which can then become a starting point for their own actions.

Thus, the notion of *objectivation* describes a social constructivist process by which mental representations of PCC can become manifest, seemingly factual, or quasi-actual, phenomena. This may evoke a sequence of intertwined misperceptions and erroneous judgments which can lead to patterns of structural transformation that factually occur despite not being based on empirical realities initially, and are, thus, paradoxical. While objectivation is also a networked process, it is a contingent one that may occur in various different ways depending on a multitude of factors at the actor level, as outlined in the section on Step I of the structure–actor model described here. Therefore, by considering both, complex, networked dynamics from which actual

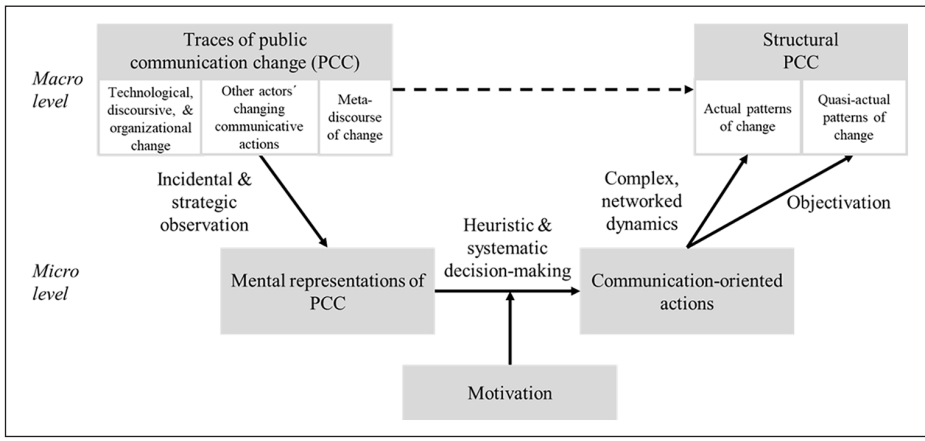


Figure 2. Structure–actor model of public communication change.

patterns of PCC emerge and objectivation dynamics from which quasi-actual patterns of PCC emerge, the structure–actor model of PCC accounts for both, determined and contingent processes simultaneously.

Discussion

With the three steps described above, a full "boat"-like structure–actor model of PCC can be sketched (see Figure 2): (1) An individual or collective actor incidentally or strategically observes traces of PCC at the macro level (which may have themselves emerged from other actors' strategic actions) and forms mental representations of PCC phenomena based on these observations. (2) Against the backdrop of their individual motivation, the actor will then engage in heuristic and/or systematic decision-making that leads to their communication-oriented actions. (3) From communication-oriented actions on the micro level, further structural PCC at the macro level can emerge, either via complex, networked dynamics that spawn actual patterns of change or via objectivation that produces quasi-actual patterns of change. The two routes of this last step complete and break up the resulting "boat" model at the same time. Both complex, networked dynamics and the process of objectivation require that other actors perceive the micro-level communication-oriented actions one actor performs and take them up in their own communication-oriented actions. One individual or collective actor alone will never be able to reach macro-level structural PCC. Thus, in the third step of the structure–actor "boat" scheme additional "boats" are necessarily woven-in. The "boats" are inextricably convoluted and cannot exist on their own.

Applying the structure–actor model of PCC

Admittedly, the notion of inextricably convoluted "boat" schemes remains somewhat abstract without practical application. For demonstration purposes, I will therefore

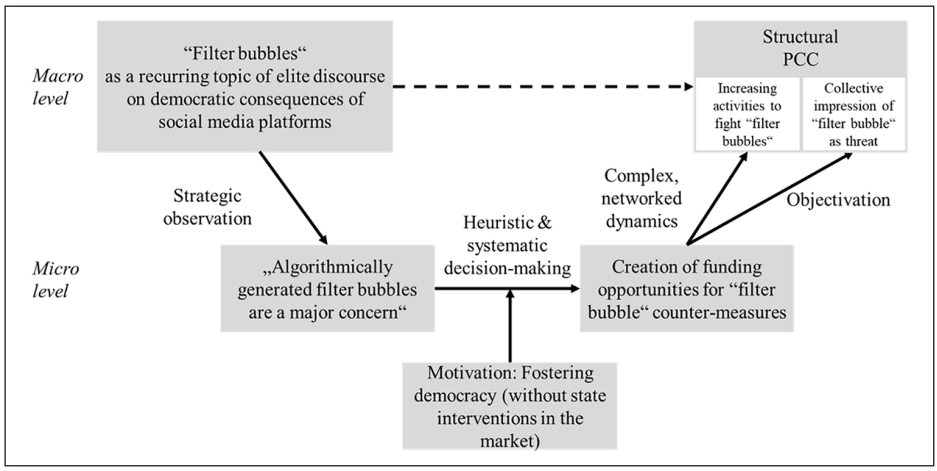


Figure 3. Application of the structure–actor model of public communication change to a fictitious media politician.

continue by presenting three tangible fictitious examples of "boat"-like processes that may or may not have occurred in similar ways during the emergence of the "filter bubble" phenomenon.

First, imagine a national politician of a government party specializing in Internet regulation in the year 2011 (see Figure 3). Their back office is strategically monitoring the Internet meta-discourse and reports on the increasing attention that Eli Pariser's (2011) "filter bubble" argument currently receives. The politician's staff recommend to keep an eye on this issue as it seems that algorithmically created "filter bubbles" might turn into a major concern for democracy. The politician's motivation is pro-democratic and they intend to do something against this seemingly growing threat to democracy, yet they oppose strong market regulation. Consequently, the politician decides to address the "filter bubble" issue whenever possible and to recommend countering it by funding research and media literacy interventions focusing on "filter bubbles"—with some impact on the actual establishment of such funding programs. At the macro level, the politician's actions (a) foster increasing activities evolving around the "filter bubble" phenomenon in academic circles and (b) contribute to the collective impression that "filter bubbles" pose a serious threat.

Second, think of an internationally renowned researcher in the field of political communication who chairs a large university department and is eager to secure their academic field's future within the university structures by continuously reeling in major research grants with their colleagues (see Figure 4). Our scholar therefore strategically monitors funding opportunities within their field and thereby recognizes, say around 2014, an increase in calls for proposals addressing algorithmically created "filter bubbles." Because of their twofold motivation (a) to contribute to the solution of critical societal issues and (b) to achieve good working conditions for their department colleagues, the department chair decides to establish a task force within the department to

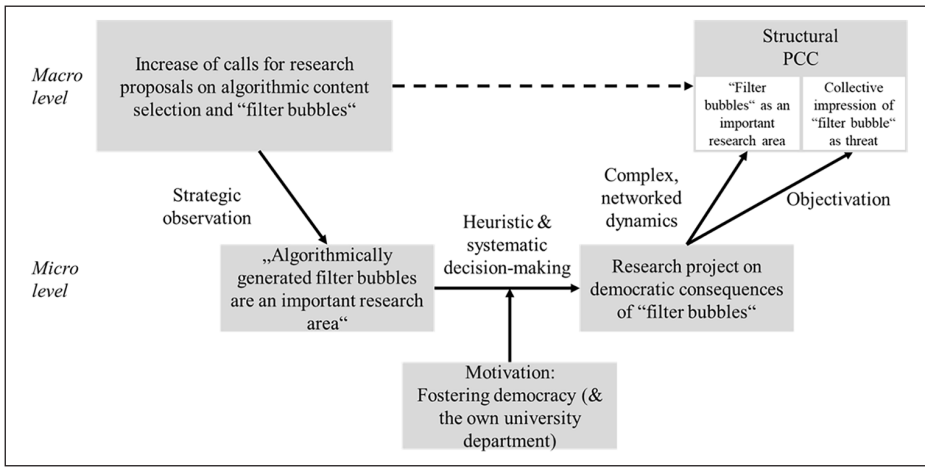


Figure 4. Application of the structure–actor model of public communication change to a fictitious communication researcher.

develop grant proposals addressing the "filter bubble" issue, answering the calls from funding institutions. The group successfully applies for funding in a research line established with the help of our politician and starts a large-scale collaborative project to study the democratic consequences of "filter bubbles" which yields in various PhD students focusing on the issue, a number of conference talks, publications, and so on. At the macro level, the researcher's actions contribute (a) to the establishment of "filter bubbles" as an important research topic in political communication research and (b) solidify the collective impression that "filter bubbles" pose a serious threat.

Third, picture a citizen only mildly interested in politics who happens to be the neighbor of a PhD student working in the "filter bubble" project initiated by our communication researcher (see Figure 5). One day, in 2018, the PhD student forgets their door key and asks their neighbor whether they can wait for the lockout services in their apartment. The two start a conversation over coffee, and the PhD student tells their neighbor everything they know about the "filter bubble" phenomenon. This rings a bell with the hairdresser who has heard about "filter bubbles" previously without ever spending too much thought on it. After the conversation, the neighbor does some research about "filter bubbles" on the Internet and arrives at the conclusion that they can manipulate users to become more polarized. Because of their motivation not to get manipulated on the Internet, our citizen decides to use alternative, non-algorithmic platforms. They drop their Facebook account and start following numerous chat groups on the messenger platform Telegram instead, some of which promote populist political messages. Plus, they talk to others about how "big tech's" algorithms may manipulate us. On the macro level, the citizen's actions contribute (a) to a growing success of populist political communication and (b) foster the establishment of tech conspiracy narratives that align with the overall populist narrative of an elite conspiracy against the people.

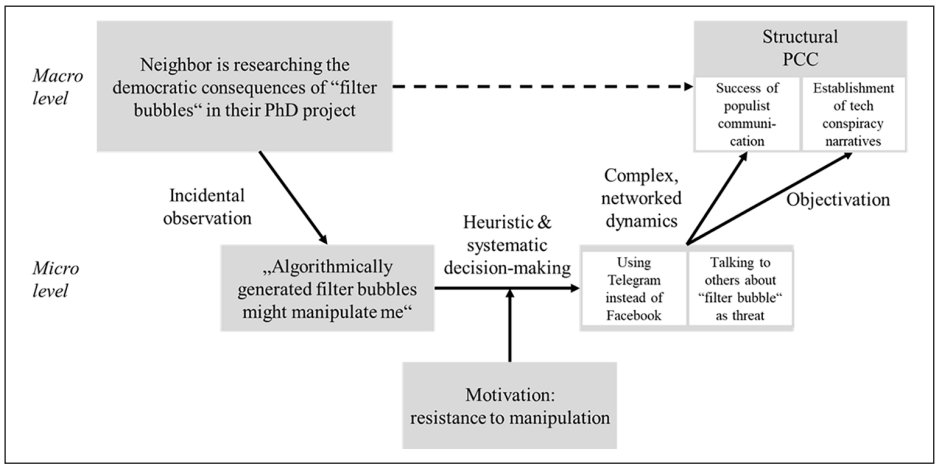


Figure 5. Application of the structure–actor model of public communication change to a fictitious citizen.

These scenarios are but three possible interrelated applications of the structure–actor model of PCC which come along with a plethora of limitations. The reality of PCC consists of a much higher number of such interwoven macro–micro–macro loops which, importantly, are highly unlikely to point in a uniform direction. There will always also be arguments in the existence of a phenomenon such as the "filter bubble" in public discourse. Actors will always make contradictory observations of the communicative actions of other actors and so on. Thus, the complexity of real-world PCC observation processes is much higher than these examples insinuate. However, the three examples hopefully have shown, how actor's mental representations of PCC are based upon strategic or incidental observations of traces of PCC, how they subsequently influence their communication-oriented actions, and how these decisions to action can jointly contribute to the emergence of further macro-level phenomena. They demonstrate how, in a society, each individual action is interwoven with the actions of other actors and can only exist in a complex network of interdependencies. Moreover, the examples illustrate how all actions necessarily have both actual and quasi-actual consequences on the macro level, the latter emerging from objectivation processes. They also exemplify how even rational, goal-oriented decision-making can contribute to the emergence of paradoxical phenomena of PCC (Rice, 1999). Both, our fictitious politician and our communication researcher may have been sincerely motivated to contribute to the flourishing of democracy by countering aberrations of PCC. Yet, in what can only be described as unforeseeable complex, networked dynamics the actions based on this motivation might have contributed to the exact opposite, namely the fostering of political populism and, thus, the erosion of democracy.

This is, of course, a speculative insinuation. Without empirical data, it cannot be seriously claimed that well-meaning media politicians and communication researchers might paradoxically have harmed instead of fostered democracy by spending a decade of

thought on the "filter bubble" metaphor. Yet, arguing for the realism of the three exemplary boat schemes sketched above is not my point here. The exemplary dynamics sketched above are not totally implausible. They *could* have happened in the described way. In fact, many other interwoven PCC macro–micro–macro processes are simultaneously taking place every day. Some of these might turn well intentions into normatively negative consequences. Others, however, might work in the reverse direction, transforming actions based on malintent into unforeseeable consequences that advance a greater good. Both are equally plausible. In both cases, applying the structure–actor model of PCC enables scholars to comprehend these dynamics in their interrelatedness and to formulate the right research questions for empirical studies trying to explain the emergence of PCC.

Empirically studying the structure–actor model of PCC

Two concrete empirical research desiderata follow from the structure–actor model of PCC: First, the model underscores the potential emergence of irrational, misled, or even paradoxical developments of PCC from objectivation processes. Scholars interested in PCC phenomena should therefore be skeptical about taking up arguments from PCC discourse to base their research on without putting them to an empirical test first. In our concrete example, this would have meant to first question whether algorithmic content selection actually produces "filter bubbles" and, if so, whether such homogeneous information environments actually have the assumed polarization effects on the populace before trying to empirically explore potential countermeasures to the alleged "filter bubble" problem. In the meantime, they should have emphasized the uncertainties associated with the "filter bubble" hypothesis in communication with all relevant societal stakeholders and within the academic community. For PCC research more broadly, it means that ongoing efforts to question the typical hype-like arguments of new media discourse that can be detected in each epoch of PCC (Wartella and Reeves, 1985) should be a dominant task. An institutionalization of efforts to debunk PCC myths seems desirable. Currently, the arguments made about so-called "artificial intelligence" probably deserve most attention in this respect (Jungherr and Schroeder, 2023).

Second, if researchers want to explain why specific PCC phenomena emerge, the macro-micro-macro dynamics formalized in the structure–actor model of PCC should be another major focus of empirical attention. Admittedly, the empirical assessment of multilevel dynamics is a complicated task, particularly so if these dynamics are complex and networked in nature. Empirical research tends to respond to this challenge with methodological individualism (Agassi, 1960), that is by focusing on the micro-level processes that can best be captured with the typical methodological repertoire of the social sciences (such as qualitative or quantitative survey research, observational studies, or controlled experiments). Indeed, the model developed here puts much emphasis on actors' observations, mental representations, decision-making processes—which can all be studied very well using these methods.

However, by empirically narrowing the focus on this part of the model, we run the risk of, conceptually, neglecting parts of the macro–micro–macro dynamics of PCC which would restrict the knowledge gained about PCC. I, therefore, pledge to closely

link actor-focused PCC research to content analyses of PCC discourse dynamics and case studies of strategic attempts to influence these discourses to get a full picture of the macro–micro link that constitutes the first half of the model. The most challenging empirical task, however, resides in studying the second half of the model, namely the micro–macro link. Network analyses could help to empirically assess the ongoing dynamics, while agent-based modeling could be employed to comprehend the complex interrelatedness of different actors' perceptions and decisions theoretically (Manson et al., 2012). It could also be employed to study the contingency in PCC, by simulating alternatives to the change dynamics that have taken place in reality. An ideal-typical empirical research program would focus on one phenomenon of PCC (such as algorithmic filtering) and combine multiple of the aforementioned approaches to make the macro–micro–macro dynamics at play comprehensible. The structure–actor model of PCC suggests that only by triangulation, research will be able to actually explain PCC.

Limitations and conclusion

Nonetheless, the model developed here certainly also has its limitations. Two (seemingly contradictory) lines of criticism are feasible: First, it could be argued that the model draws from too broad a set of theoretical approaches from the social sciences (such as Coleman's Boat Model, Social Constructivism, Complexity Theory, Technological Determinism, or Contingency Theory), integrating them in too coarse strokes, inconsiderate of the many of the details of the respective theories' arguments. Second, and somewhat contrary to that, it could be argued that the model needs to encompass even more conceptual approaches and examples than it already does to actually describe the full complexity of the ongoing real-world dynamics of PCC.

For instance, the decision-making process of collective actors is certainly underdeveloped in this article. A deeper elaboration would have to consider how it unfolds in a tension between organizational rules and the degrees of freedom that its distributed nature offers individual members of an organization (Fischhoff and Johnson, 1996). It would have to consider organizations as fields in which power battles are taking place between different individual actors or groups which can affect decision outcomes (Pettigrew, 2014) and would have to describe the functioning of organizational governance mechanisms (and their potential failures) which are employed to grant decision outcomes that are in the interest of the organization as a whole (Klein et al., 2019). In a similar vein, it could be criticized that the examples referred to in the present article (the "filter bubble" and disinformation fear phenomena) are limited to the sphere of political communication and the applicability of the model to other, not primarily political phenomena of PCC, for instance, the emergence of "eSports" as a novel form of organized sports entertainment, or the impact of emerging online health forums on doctor–patient relationships, should also have been discussed in this article.

Both these potential lines of criticism of the structure–actor model of PCC are justified. They have valid points. However, their seeming contradiction (use less, but better integrated approaches and examples vs use more approaches and examples) point at a dilemma that studying PCC dynamics theoretically and empirically necessarily comes along with. I call this the breadth-depth dilemma of PCC research (see Müller, 2016,

p. 60). To understand the full complexity of PCC and make it explicable, scholars necessarily have to develop a broad conceptual understanding of various individual and social processes that each requires different theories to make them comprehensible. At the same time, in order to make specific phenomena of PCC tangible, research has to dig deep into concrete constellations and explore them in full detail.

Only the combination of these two perspectives will enable us as researchers to understand the combined contribution of deterministic and contingent factors within PCC and the dynamics by which they jointly spawn paradoxical and non-paradoxical phenomena of PCC. This means we will have to accept and live with making compromises between breadth and depth of our conceptual and empirical descriptions of PCC: The structure–actor model is no exemption to this rule. It tries to cover the full breadth of social and psychological dynamics involved in the emergence of PCC (yet, it could do so even broader) and goes into detail on selected aspects of these processes and their meshing (yet, it could do so even more detailed). Thus, the present holistic model has to be regarded as an imperfect compromise, but, hopefully so, as one that can nonetheless contribute to an improved integrated understanding of the processes behind PCC phenomena.

Finally, it has to be mentioned that the present form of the structure–actor model of PCC has been formulated with the context of present-day, democratic societies in mind. For instance, considering complexity theory as central for the model's final "aggregation" step is a direct consequence of today's networked social dynamics. Likewise, decision corridors at the actor level may be strongly limited within authoritarian systems in which typically a stronger regime of thought and action control exists. The model's heuristic value in non-democratic societies might therefore be limited. At the same time, the general macro-micro-macro scheme of the model should also be applicable to other epochs of PCC. However, the exact ways in which the different processes described within the model unfold might have to be adapted.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Philipp Müller https://orcid.org/0000-0002-5351-0608

References

Acevedo A (2018) A personalistic appraisal of Maslow's needs theory of motivation: from "humanistic" psychology to integral humanism. *Journal of Business Ethics* 148(4): 741–763.

Agassi J (1960) Methodological individualism. *The British Journal of Sociology* 11(3): 244.

Ansoff IH (1987) Strategic management of technology. *Journal of Business Strategy* 7(3): 28–39.

Arceneaux N and Schmitz Weiss A (2010) Seems stupid until you try it: press coverage of Twitter, 2006-9. *New Media & Society* 12(8): 1262–1279.

Ayala FJ (2007) Darwin's greatest discovery: design without designer. *Proceedings of the National Academy of Sciences of the United States of America* 104(suppl. 1): 8567–8573.

Bail CA, Argyle LP, Brown TW, et al. (2018) Exposure to opposing views on social media can increase political polarization. *Proceedings of the National Academy of Sciences of the United States of America* 115(37): 9216–9221.

Bauer JM and Latzer M (2023) *Co-evolution: Applications and Implications for Governance Research in Communication Studies* (SSRN scholarly paper no. 4433276). Available at: https://papers.ssrn.com/abstract=4433276

Berger PL and Luckmann T (1966) *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*. Garden City, NY: Doubleday.

Bijker WE, Hughes TP and Pinch T (eds) (1987) *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge, MA: MIT Press.

Borchert K (2017) *The Mozilla Information Trust Initiative: Building a Movement to Fight Misinformation Online*, 8 August. Available at: https://blog.mozilla.org/mozilla/mozilla-information-trust-initiative-building-movement-fight-misinformation-online/

Bray F (2007) Gender and technology. *Annual Review of Anthropology* 36(1): 37–53.

Bruns A (2021) Echo chambers? Filter bubbles? The misleading metaphors that obscure the real problem. In: Pérez-Escolar M and Noguera-Vivo JM (eds) *Hate Speech and Polarization in Participatory Society*. London: Routledge, pp. 33–48.

Castor TR (2005) Constructing social reality in organizational decision making: account vocabularies in a diversity discussion. *Management Communication Quarterly* 18(4): 479–508.

Chaiken S (1987) The heuristic model of persuasion. In: Zanna MP, Olson JM and Herman CP (eds) *Social Influence: The Ontario Symposium*, vol. 5. Mahwah, NJ: Lawrence Erlbaum Associates, pp. 3–40.

Chuah SH-W, Rauschnabel PA, Krey N, et al. (2016) Wearable technologies: the role of usefulness and visibility in smartwatch adoption. *Computers in Human Behavior* 65: 276–284.

Cialdini RB and Trost MR (1998) Social influence: social norms, conformity and compliance. In: Gilbert DT, Fiske ST and Lindzey G (eds) *The Handbook of Social Psychology*, vols 1–2. 4th ed. New York: McGraw Hill, pp. 151–192.

Coleman JS (1990) *Foundations of Social Theory*. Cambridge, MA: Belknap Press of Harvard University Press.

Crocker J and Luhtanen R (1990) Collective self-esteem and ingroup bias. *Journal of Personality and Social Psychology* 58(1): 60–67.

DeSanctis G and Poole MS (1994) Capturing the complexity in advanced technology use: adaptive structuration theory. *Organization Science* 5(2): 121–147.

Devine PG, Sedikides C and Fuhrman RW (1989) Goals in social information processing: the case of anticipated interaction. *Journal of Personality and Social Psychology* 56(5): 680–690.

Eidelman S and Crandall CS (2014) The intuitive traditionalist: how biases for existence and longevity promote the status quo. In: Olson JM and Zanna MP (eds) *Advances in Experimental Social Psychology*, vol. 50. Cambridge, MA: Academic Press, pp. 53–104.

Esser H (1993) *Soziologie: Allgemeine Grundlagen*. Frankfurt: Campus Verlag.

Esser H (1999) *Soziologie. Spezielle Grundlagen. Band 1: Situationslogik und Handeln*. Frankfurt: Campus Verlag.

Fischhoff B and Johnson S (1996) The possibility of distributed decision making. In: Shapira Z (ed.) *Organizational Decision Making*. Cambridge: Cambridge University Press, pp. 216–237.

Flanagin AJ, Flanagin C and Flanagin J (2010) Technical code and the social construction of the internet. *New Media & Society* 12(2): 179–196.
Fletcher R and Nielsen RK (2017) Are news audiences increasingly fragmented? A cross-national comparative analysis of cross-platform news audience fragmentation and duplication. *Journal of Communication* 67(4): 476–498.
Flichy P (2008) *The Internet Imaginaire*. Cambridge, MA: MIT Press.
Ford SM (2011) Reconceptualizing the public/private distinction in the age of information technology. *Information, Communication & Society* 14(4): 550–567.
Fulk J (1993) Social construction of communication technology. *Academy of Management Journal* 36(5): 921–950.
Fulop L, Linstead S and Clarke RJ (1999) Decision making in organizations. In: Fulop L and Linstead S (eds) *Management: A Critical Text*. London: Macmillan Education, pp. 295–334.
Garretson JJ (2015) Does change in minority and women's representation on television matter?: A 30-year study of television portrayals and social tolerance. *Politics, Groups, and Identities* 3(4): 615–632.
Gilovich T, Griffin DW and Kahneman D (eds) (2002) *Heuristics and Biases: The Psychology of Intuitive Judgment*. Cambridge: Cambridge University Press.
Goffman E (1974) *Frame Analysis: An Essay on the Organization of Experience*. Cambridge, MA: Harvard University Press.
Gvora J (2023) Google glass: what happened to the futuristic smart glasses? *Screen Rant*, 30 April. Available at: https://screenrant.com/google-glass-smart-glasses-what-happened-explained/
Habermas J (1989) *The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society*. Cambridge, MA: MIT Press.
Hambrick DC and Snow CC (1977) A contextual model of strategic decision making in organizations. *Academy of Management Proceedings* 1977(1): 109–112.
Hartmann M (ed.) (2023) *The Routledge Handbook of Media and Technology Domestication*. London: Routledge.
Hedström P and Bearman P (2011) What is analytical sociology all about? An introductory essay. In: Hedström P and Bearman P (eds) *The Oxford Handbook of Analytical Sociology*. Oxford: Oxford University Press, pp. 3–24.
Jones MR and Karsten H (2008) Giddens's structuration theory and information systems research. *MIS Quarterly* 32(1): 127–157.
Jungherr A and Rauchfleisch A (2024) Negative downstream effects of alarmist disinformation discourse: evidence from the United States. *Political Behavior* 46: 2123–2143.
Jungherr A and Schroeder R (2023) Artificial intelligence and the public arena. *Communication Theory* 33(2–3): 164–173.
Jürgens P and Stark B (2022) Mapping exposure diversity: the divergent effects of algorithmic curation on news consumption. *Journal of Communication* 72(3): 322–344.
Keren G and Wu G (eds) (2015) *The Wiley Blackwell Handbook of Judgment and Decision Making*. Hoboken, NJ: Wiley-Blackwell.
Klein PG, Mahoney JT, McGahan AM, et al. (2019) Organizational governance adaptation: who is in, who is out, and who gets what. *Academy of Management Review* 44(1): 6–27.
Kreiss D and McGregor SC (2018) Technology firms shape political communication: the work of Microsoft, Facebook, Twitter, and Google with campaigns during the 2016 US Presidential cycle. *Political Communication* 35(2): 155–177.
Kristensen NN and Mortensen M (2017) Self-referential practices in journalism: metacoverage and metasourcing. In: Franklin B and Eldridge SA III (eds) *The Routledge Companion to Digital Journalism Studies*. London: Routledge, pp. 274–282.

Kruglanski AW, Erb H-P, Spiegel S, et al. (2003) The parametric unimodel of human judgment: a fanfare to the common thinker. In: Aspinwall LG and Staudinger UM (eds) *A Psychology of Human Strengths: Fundamental Questions and Future Directions for a Positive Psychology*. Washington, DC: American Psychological Association (APA), pp. 197–210.

Kruglanski AW, Orehek E, Dechesne M, et al. (2010) Lay epistemic theory: the motivational, cognitive, and social aspects of knowledge formation. *Social and Personality Psychology Compass* 4(10): 939–950.

Kunda Z (1990) The case for motivated reasoning. *Psychological Bulletin* 108(3): 480–498.

Landeweerd M, Spil T and Klein R (2013) The success of Google Search, the failure of Google Health and the future of Google Plus. In: Dwivedi YK, Henriksen HZ, Wastell D, et al. (eds) *Grand Successes and Failures in IT. Public and Private Sectors*. Berlin; Heidelberg: Springer, pp. 221–239.

Larsson AO and Skogerbø E (2018) Out with the old, in with the new? Perceptions of social (and other) media by local and regional Norwegian politicians. *New Media & Society* 20(1): 219–236.

Leary MR (1999) The social and psychological importance of self-esteem. In: Kowalski RM and Leary MR (eds) *The Social Psychology of Emotional and Behavioral Problems: Interfaces of Social and Clinical Psychology*. Washington, DC: American Psychological Association (APA), pp. 197–221.

Lehman-Wilzig S and Cohen-Avigdor N (2004) The natural life cycle of new media evolution: inter-media struggle for survival in the internet age. *New Media & Society* 6(6): 707–730.

Lievrouw LA (2010) New media design and development: diffusion of innovations v social shaping of technology. In: Lievrouw LA and Livingstone S (eds) *Handbook of New Media: Social Shaping and Social Consequences of ICTs*. Thousand Oaks, CA: SAGE, pp. 246–265.

Ludwig K and Müller P (2022) Does social media use promote political mass polarization? A structured literature review. In: Krämer B and Müller P (eds) *Questions of Communicative Change and Continuity. In Memory of Wolfram Peiser* (pp. 118–166). Nomos.

Manson SM, Sun S and Bonsal D (2012) Agent-based modeling and complexity. In: Heppenstall AJ, Crooks AT, See LM, et al. (eds) *Agent-Based Models of Geographical Systems*. Berlin; Heidelberg: Springer, pp. 125–139.

Meynhardt T (2009) Public value inside: what is public value creation? *International Journal of Public Administration* 32(3–4): 192–219.

Mickey TJ (1998) Selling the internet: a cultural studies approach to public relations. *Public Relations Review* 24(3): 335–349.

Miró-Llinares F and Aguerri JC (2021) Misinformation about fake news: a systematic critical review of empirical studies on the phenomenon and its status as a "threat." *European Journal of Criminology* 20: 356–374.

Müller P (2016) *Die Wahrnehmung des Medienwandels. Eine Exploration ihrer Dimensionen, Entstehungsbedingungen und Folgen*. Springer VS.

Müller P, Schmitt JB and Krämer B (2018) Of rules and role models: How perceptions of parents' mediation and modelling contribute to individuals' media innovativeness. *Journal of Broadcasting & Electronic Media* 62(4): 685–703.

Natale S (2016) There are no old media. *Journal of Communication* 66(4): 585–603.

Natale S, Bory P and Balbi G (2019) The rise of corporational determinism: digital media corporations and narratives of media change. *Critical Studies in Media Communication* 36(4): 323–338.

Neuman WR (2010) Theories of media evolution. In: Neuman WR (ed.) *Media, Technology, and Society: Theories of Media Evolution*. Ann Arbor, MI: University of Michigan Press, pp. 1–21.

Notten N and Kraaykamp G (2009) Parents and the media: a study of social differentiation in parental media socialization. *Poetics* 37(3): 185–200.
Pariser E (2011) *The Filter Bubble: What the Internet Is Hiding From You*. London: Penguin.
Pärna K (2010) *Believe in the Net: Implicit Religion and the Internet Hype, 1994-2001*. Universiteit Leiden. Available at: https://hdl.handle.net/1887/14622
Peiser W (1999) The television generation's relation to the mass media in Germany: accounting for the impact of private television. *Journal of Broadcasting & Electronic Media* 43(3): 364–385.
Pettigrew AM (2014) *The Politics of Organizational Decision-Making*. London: Routledge.
Rice RE (1999) Artifacts and paradoxes in new media. *New Media & Society* 1(1): 24–32.
Rice RE, Hagen I and Zamanzadeh N (2018) Media mastery: paradoxes in college students' use of computers and mobile phones. *American Behavioral Scientist* 62(9): 1229–1250.
Rogers EM (1983) *Diffusion of Innovations*. 3rd ed. New York: Free Press.
Samuelson W and Zeckhauser R (1988) Status quo bias in decision-making. *Journal of Risk and Uncertainty* 1(1): 7–59.
Scharkow M, Mangold F, Stier S, et al. (2020) How social network sites and other online intermediaries increase exposure to news. *Proceedings of the National Academy of Sciences of the United States of America* 117(6): 2761–2763.
Scolari CA (2013) Media evolution: emergence, dominance, survival, and extinction in the media ecology. *International Journal of Communication* 7: 1418–1441.
Sewell WH (1992) A theory of structure: duality, agency, and transformation. *American Journal of Sociology* 98(1): 1–29.
Shapira Z (ed.) (2011) *Organizational Decision Making*. Cambridge: Cambridge University Press.
Sherry JL (2015) The complexity paradigm for studying human communication: a summary and integration of two fields. *Review of Communication Research* 3: 22–65.
Silka L (1989) *Intuitive Judgments of Change*. New York: Springer.
Stöber R (2004) What media evolution is: a theoretical approach to the history of new media. *European Journal of Communication* 19(4): 483–505.
Stöber R (2015) Redundant layers of efficient media communication. Why communication seems to be stable and the media is not. *Studies in Communication and Media* 4(4): 300–363.
Strycharz J, Kim E and Segijn CM (2022) Why people would (not) change their media use in response to perceived corporate surveillance. *Telematics and Informatics* 71: 101838.
Sun S, Zhai Y, Shen B, et al. (2020) Newspaper coverage of artificial intelligence: a perspective of emerging technologies. *Telematics and Informatics* 53: 101433.
Thomas WI and Thomas DS (1928) *The Child in America: Behavior Problems and Programs*. Alfred A. Knopf. Available at: http://archive.org/details/in.ernet.dli.2015.155699
Thune J (2021) S. 2024—117th congress (2021-2022): Filter Bubble Transparency Act, 6 October. Available at: https://www.congress.gov/bill/117th-congress/senate-bill/2024/text
Tresselt ME and Mayzner MS (1960) A study of incidental learning. *The Journal of Psychology* 50(2): 339–347.
Tsukayama H (2011) Google Plus could be the fastest-growing site in history. *The Washington Post*, 3 August. Available at: https://www.washingtonpost.com/blogs/faster-forward/post/google-plus-could-be-the-fastest-growing-site-in-history/2011/08/03/gIQA9x2vrI_blog.html
Van Duyn E and Collier J (2019) Priming and fake news: the effects of elite discourse on evaluations of news media. *Mass Communication and Society* 22(1): 29–48.
Van Meyel AM (1979) Approaches to strategic monitoring: a case study approach. *Geoforum* 10(4): 389–405.
Waldherr A (2017) Öffentlichkeit als komplexes System. Theoretischer Entwurf und methodische Konsequenzen. *Medien & Kommunikationswissenschaft* 65(3): 534–549.

Walton DN (1980) Omitting, refraining and letting happen. *American Philosophical Quarterly* 17(4): 319–326.
Wartella E and Reeves B (1985) Historical trends in research on children and the media: 1900–1960. *Journal of Communication* 35(2): 118–133.
Watson G (1971) Resistance to change. *American Behavioral Scientist* 14(5): 745–766.
Webster DM and Kruglanski AW (1997) Cognitive and social consequences of the need for cognitive closure. *European Review of Social Psychology* 8(1): 133–173.
Williams R and Edge D (1996) The social shaping of technology. *Research Policy* 25(6): 865–899.
Winner L (1993) Upon opening the black box and finding it empty: social constructivism and the philosophy of technology. *Science, Technology, & Human Values* 18(3): 362–378.
Wirth W, Von Pape T and Karnowski V (2008) An integrative model of mobile phone appropriation. *Journal of Computer-Mediated Communication* 13(3): 593–617.
Ytre-Arne B (2019) Media use in changing everyday life: how biographical disruption could destabilize media repertoires and public connection. *European Journal of Communication* 34(5): 488–502.
Zerfass A, Verčič D, Nothhaft H, et al. (2018) Strategic communication: defining the field and its contribution to research and practice. *International Journal of Strategic Communication* 12(4): 487–505.

Author biography

Philipp Müller (PhD, LMU Munich, 2015) is Senior Lecturer in the Institute for Media and Communication Studies, University of Mannheim, Germany, as well as Project Director in the Mannheim Centre for European Social Research (MZES). His research focuses on questions of media and communication change and on political communication.