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Why Human-Machine Communication Matters for the Study of Journalism and Artificial Intelligence

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Introduction

Artificial intelligence (AI), the application of computing to take on tasks normally associated with human intelligence, has become a growing feature—or at least a prominent point of experimentation—in many fields and industries. Journalism, as we argue in this chapter, offers a useful context for examining how opportunities for AI applications are envisaged and enacted amid the growing adoption and influence of algorithms and automation across media and information domains. In the production of news, automated news writing has become an established method for translating highly structured data sources, such as sports results and financial earnings reports, into narrative news texts (Diakopoulos, 2019; Lewis et al., 2019). Beyond that, however, journalists at well-resourced news organizations are turning to a growing array of "smart" tools to track sentiment on social media, transcribe audio, or suggest edits to video footage (see examples in Beckett, 2019 and Marconi, 2020). Even more visibly and significantly thus far, AI-driven tools have become central features in how journalism is distributed, from how news content is personalized for audiences across platforms to how people discover news via social and search algorithms (Beckett, 2019). In all of this incorporation of AI in journalism, there are, as in other fields, inflated expectations for breakthrough innovations in efficiency and productivity, on the one hand, as well as pessimism about dire outcomes for human labor and expertise, on the other. While those perils and possibilities are more fully outlined and debated elsewhere (e.g., Broussard, 2018, Diakopoulos, 2019), what remains less apparent in the literature thus far is how particular conceptual perspectives may help scholars make sense of the AI phenomenon in a larger sense—not merely in terms of how it shifts journalistic practice, important though that is, but more broadly in how it forces us to confront questions about roles and relationships of humans and machines (Lewis et al., 2019). In effect, what does it mean for journalism if AI developments begin to shift how we think about the very essence of what it means to communicate in the first place?

In that spirit, this chapter takes up the case of AI and journalism as an opportunity to explore an emergent conceptual framework and body of research. In connection with this SAGE

Handbook as a whole, we examine Human-Machine Communication (HMC), considering how it might be incorporated by scholars to evaluate the material, social, and ontological implications of "communicative AI," or AI that is designed to function *as a communicator* rather than merely as a mediator (Guzman, 2018; Guzman & Lewis, 2020).

Thus, this chapter investigates the generative potential and applicability of HMC in the context of AI and journalism. Specifically, amid debates about the failures of AI to fulfill its lofty potential as a transformative technological force in journalism and media work, this chapter asks: How might HMC as a lens—as a way of understanding the formation and maintenance of relationships between humans and machines—offer a way of interpreting anew the paths taken so far in the media industry and in scholarly research? And, in turn, how might such an appraisal enable us to more fully scrutinize HMC as a theoretical intervention—to consider where and how HMC fits into journalism studies broadly and into the study of news and technology particularly?

With these questions in mind, we proceed by first clarifying our terms to avoid misunderstandings. The next section briefly defines AI and differentiates it from other terms such as "automation" and "machine learning," which are often used in the same breath. We build upon this context to clarify the nature of "communicative AI" and its connection with HMC, a term that simultaneously serves as a descriptor, a paradigmatic concept, and an emergent field of study. Thereafter, we turn to a key contribution of this chapter: connecting the HMC perspective to the study of AI and journalism to evaluate relative strengths and weaknesses and opportunities for future study.

Artificial Intelligence

AI is a word and concept fraught with uncertainty. As a polysemous term used across different fields, it is imbued with multiple—sometimes conflicting—meanings. Therefore, a generally accepted answer and definition of what "AI" is, does not exist. Common explanations define AI as "a machine or system perform[ing] tasks that would ordinarily require human (or other biological) brainpower to accomplish, such as making sense of spoken language, learning behaviours or solving problems" (*AI – Alan Turing Institute*, 2020 para. 1), as making "efforts to understand human intelligence by recreating a mind within a machine and to develop technologies that perform tasks associated with some level of human intelligence" (Boden, 2018), or "the activity of simulating uniquely human activities and skills" (Wilks, 2020). This, in turn, sets AI apart from mere automation, usually defined as "a device or system that accomplishes (partially or fully) a function that was previously, or conceivably could be, carried out (partially or fully) by a human operator" (Diakopoulos, 2019, p. 16). In other words: a dishwasher is an example of automation, but not of AI. While artificial intelligence applications are forms of automation, the opposite is not always true.

Generally, it is crucial to differentiate between *real* and *imaginary* AI (Broussard, 2018). To the latter category belongs what is commonly known as "artificial general intelligence" (AGI), often defined as the "overarching, and as yet unachieved, goal of a system that displays intelligence across multiple domains, with the ability to learn new skills, and which mimic or even surpass human intelligence" (Article 19, 2018, p. 6), whereas real or narrow AI is what can be observed in practice. It usually refers to a diverse range of applications and techniques at different levels of complexity, autonomy and abstraction (Broussard, 2018; Mitchell, 2019); such technologies chip away at fairly narrowly defined tasks and problems but are unable to operate beyond the "frontier of [their] own design" (Diakopoulos, 2019, p. 243).

Machine learning, deep learning, predictive analytics, and neutral networks are some examples for such narrow AI that are currently in existence and applied in various contexts (Boden, 2018; Broussard, 2018, p. 33; Russell & Norvig, 2009). Of these, machine learning (ML), in particular, is widely in use today and often meant when people talk about AI. As a branch of artificial intelligence, ML allows computer systems to learn directly from examples, data, and experience. Machine learning relies on algorithms[1] trained on large amounts of data to improve a system's performance on a narrowly defined task over time.

Finally, despite the recent hype surrounding AI (Brennen et al., 2019; Mitchell, 2019; Wilks, 2020), it is not a new concept. While English mathematician and writer Lady Ada Lovelace is generally credited as the first to recognise the potential of computers to go beyond pure calculation (Boden, 2018, p. 6; Fuegi & Francis, 2003), most modern approaches in AI have their origins the mid-1950s, coming into existence as a result of research along four interrelated but separate goals: creating systems that "think like humans" (see also Picard, 2000), systems that "act like humans", systems that "think rationally", and systems that "act rationally" (Russell & Norvig, 2009). After an "AI winter" between the 1970s and 1990s where interest in AI languished, mostly because many of the early promises did not materialise, AI-related work and research has seen a strong resurgence since the late 2000s, mainly due to four self-reinforcing trends: "ever more sophisticated statistical and probabilistic methods; the availability of increasingly large amounts of data; the accessibility of cheap, enormous computational power"; and the increasing digitalization of many aspects of our lives, with "steady progress and cross pollination in these areas [reinvigorating] the feasibility, importance, and scalability of AI" (Cath et al., 2018). A fifth factor currently propelling artificial intelligence forward is the strong media interest in this topic, which follows earlier hype cycles around AI (Mitchell, 2019; Wilks, 2020) and which has likely helped to push this topic into the wider public realm and into the minds of investors, researchers, and other elites (see discussion in Brennen et al., 2020).

Communicative AI and Human-Machine Communication (HMC)

After having somewhat boxed in AI, we will narrow down the focus even further and concentrate on what Guzman and Lewis (2020) have called "communicative AI." This refers to AI technologies—such as conversational agents, social robots, and automated-writing software in the vein of GTP-3—that are designed to function as *communicators*, rather than as merely *mediators* of human-to-human communication in the classic sense of computer-mediated communication, leading to arrangements that confound traditional conceptions of communication theory and practice (Guzman & Lewis, 2020; see also Guzman, 2018). Communicative AI may come in the form of AI applications or systems that are interpreted by human users as stand-alone communicators, as in the case of chatbots that are virtually indistinguishable from human communicators, or they may be designed to stand in the place of a human communicator within a particular process, as in the case of automated journalism software that produces news stories *as if they were written by a human* (Lewis et al., 2019). Put another way, specific applications of AI can be seen as "communicative" even if not all AI are designed to function in that way.

At first glance, it may appear that computer-mediated communication (CMC) and related streams of research have already addressed the communicative potential of AI. It is true that

[1] An algorithm can be described as a finite sequence of well-defined, computer-implementable instructions, typically to solve a class of problems or to perform a computation.

human-like "talking technologies" have long existed (e.g., in the form of car navigational systems), and that, in the realm of research, human-computer interaction (HCI) and related fields have long had ways of capturing dynamics between humans and machines (Turkle, 1984), including the social cues and perceptions that develop as people come to see machines as "social actors" (Nass et al., 1994). However, because CMC research, as it developed alongside the introduction of "new media" and the internet in the late twentieth century, has remained grounded in an anthropocentric paradigm—assigning human to the role of communicator, computer to the role of mediator (Gunkel, 2012)—it is inadequate on its own to deal with the particular puzzles posed by artificial intelligence and communication. Re-imagining the machine as communicator, not merely as channel, may sound like little more than a reorganization of the communication flowchart. But, as a growing number of scholars suggest, the ontological mismatch this poses for how we think about the roles and relationships of humans and machines requires a more fundamental reappraisal. As Guzman and Lewis (2020, p. 73) sum up, "AI devices designed as communicators—machine subjects *with* which people make meaning instead of *through* which people make meaning—do not fit into theories based on previous technologies designed as channels of human interaction."

It is in this spirit that Human-Machine Communication (HMC) offers a theoretical intervention. As a concept as well as an emergent field of research, HMC focuses on capturing the substance and significance of meanings created through interactions between humans and technology, including the corresponding implications that such encounters have for individuals and society at large (Guzman, 2018; for additional overviews, see Fortunati & Edwards, 2020; Spence, 2019). HMC, however, does not suggest that human-machine communication is the *same* as human-human communication, nor does it imply that machines are even *mostly* now situated in the role of communicators relative to their typical role as mediators of human-to-human exchange—for they clearly are not. Rather, HMC is about dedicating space for theorizing and empirically exploring "a new form of communication with digital interlocutors that has recently developed and has imposed the urgency to be analyzed and understood" (Fortunati & Edwards, 2020, p. 7), particularly in the era of artificial intelligence. In this way, HMC draws in a variety of epistemological, philosophical, and methodological traditions to more holistically acknowledge and more assertively study the "meaning-making that occurs within a communication context in which at least one of the interaction partners is a machine" (Guzman & Lewis, 2020, p. 74)—ranging from evaluating how voice-based agents become personified (Etzrodt & Engesser, 2021), to the construction of gender as people engage with robot "brides" (Liu, 2021), to the negotiation of agency, control, and structuration between humans and machine agents (Gibbs et al., 2021).

Overall, and in ways that are more fully in literature reviews elsewhere (e.g., Guzman, 2018), HMC provides a fresh conceptual path for attempting to make sense of a future in which machines increasingly communicate, not merely mediate. This presents an opportunity for evaluating what HMC may have to offer for the study of AI and journalism.

Evaluating AI and Journalism on Four Key Dimensions

One way to think through AI in journalism in the context of HMC is to adopt the framework outlined by Guzman and Lewis (2020) for evaluating AI and communication. They developed HMC as a concept and set forth a research agenda organized around three key elements of communicative AI technologies: (1) the *functional* dimensions, which capture both

how these technologies work as well as how people make sense of these applications as communicators; (2) the *relational* or *social* dynamics, which point to how people associate with the technologies and, in turn, relate to themselves and others; and (3) the *metaphysical* or *ontological* dimensions, or questions around what constitutes human, machine, and communication amid blurring boundaries. Applying these to journalism, for example, allows us to more readily assess what it means functionally for how journalism "works" that AI technologies are situated in the role of communicators; what it means relationally for newsworkers to develop a sense of identity and orientation in correspondence with tech-as-communicators being deployed in newsrooms—that is, how newsworkers come to see themselves vis-à-vis machines and others; and what it means ontologically for communicative AI to potentially complicate notions of how distinctly "human" (or not) journalism is intended to be. And, to these three, we suggest adding a fourth category, namely the *normative* dimensions of news-making—in other words, how does AI in journalism sit in relation to what constitutes good work and/or news? Using this approach, we can look at some concrete and still hypothetical (but conceivable) examples of AI in journalism for each of these categories before concluding with an overview of what HMC might portend for future research in this area.

Functional Dimensions

First, from a *functional* standpoint, it matters to understand how AI-driven technologies may be shifting the way journalism works—how news is produced, distributed, and ultimately received by audiences—through the introduction of a new cast of communicators (machines) that are situated in roles normally associated with humans. This functional view draws our attention to the gatekeeping processes that shape how journalism is organized in carrying out its basic gathering, filtering, and disseminating functions (Tandoc, 2014).

On the side of the production of news, we are mainly talking about applications of AI that lead to greater efficiency in existing processes: for example, the automatic creation of short news items based on highly structured data of the variety found in sports results or company earnings reports (Carlson, 2015; Thurman, 2019), the use of NLP-driven speech-to-text technology to automatically provide voice-over tracks for video content in various languages, or the use of AI to create automatic interview transcripts for journalists (Marconi, 2020, p. 109). On the side of the distribution of news, this includes tools which, among other things, read news articles to readers (e.g. at German weekly *ZEIT*) or allow for a better understanding of audiences with e.g. machine learning applications segmenting users into distinct categories, which form the basis for customised offerings and a better understanding of who the journalists are writing for (as demonstrated by the *South China Morning Post*). Notably, this category of efficiency-oriented tools includes software that communicates *to audiences* as if the material had been written or recorded by journalists themselves (e.g., automated news stories; see Lewis et al., 2019, for discussion) as well as other software that communicates *to/with* journalists as if the technology were in the role of a human assistant (e.g., automated transcription; see Marconi, 2020, for other illustrations).

A second category of functional dimensions is composed of AI applications and approaches that allow newsworkers to do things that were previously impossible to achieve, given their scope and scale. This represents a speed and degree of news output that far surpasseses the likes of "data journalism" or other longstanding techniques in applying computers to news. Examples here include *Reuters'* "NewsTracer," an in-house tool powered by machine learning that sifts through emerging topics on social media to determine if they are

newsworthy and truthful. Other news organisations use similar applications that allow for the large-scale analysis of social media data and news coverage to monitor the public's curiosity around specific topics and deliver that information to journalists (Marconi, 2020, p. 141). Another example is "Perspective," a free Application Programming Interface (API) developed by Jigsaw, a subsidiary of Google's parent company Alphabet, that uses machine learning to identify toxic and hateful comments. Perspective is used to aid and enable content moderation at scale by news outlets including *The Wall Street Journal*, *The New York Times*, *Le Monde*, and *El País*. All these examples describe tasks that could (or have been) carried out by humans, but often with severe limitations (especially in terms of scope and scale). Given the scope of this article we could only provide a brief overview of an increasingly growing list of AI applications that shape the gatekeeping processes in the news in various ways. Just as important as the functional dimensions of AI, however, are the social dimensions: how people associate with the technologies and, in turn, relate to themselves and others.

Relational or Social Dimensions

Second, turning the attention to the *relational* or *social* dimensions, we follow Guzman and Lewis (2020) in acknowledging that it is through communication that people forge relationships with one another and that society as a whole is constituted (Mead, 1967). Indeed, human interactions, at the individual level and aggregated up at the level of society, can be seen as an unfolding set of social encounters through which people develop a sense of self (who am I?) and a sense of others (who are they?).

But do these same outcomes hold for human-machine communication? First, it is important to recognize that, long before the present interest in AI, technology has from the beginning been modeled on human social roles—e.g., as "assistants" that often follow certain gendered norms and cues to align with stereotypes of human helpers (Suchman, 2009). This anthropomorphization (the attribution of humanlike features, traits and behaviors to non-human agents; see Epley et al. 2007) has been demonstrated for both technologies in general and for AI more specifically (Salles et al., 2020; Watson, 2020). In that sense, perhaps it's not surprising that much of the trade-press discourse (and even some of the academic discussion, too) surrounding the rise of automated journalism has tended to characterize news-writing software in embodied terms, describing these tools as "robot journalists"—complete with images of fedora-wearing androids smoking pipes while pounding away at keyboards (Oremus, 2015)—even though robots are never involved and the template-writing functions performed are limited to but one aspect of a journalist's role (see Carlson, 2015).[2]

The more salient consideration here is how AI-inflected forms of journalism might, to some degree, reset the social expectations on which journalism has been established—from the machine-consumer relationship, on the one hand, to the machine-journalist relationship, on the other (see Lewis et al., 2019). For example, depending on how people come to imagine forms of AI, both in general and specifically as communicators they turn to for information, and depending on how thoroughly they appreciate that such technologies are involved in producing news (in partnership with or in replacement of a human journalist), that may well have

[2] In their critique of the "robot journalism" metaphor, Lindén and Dierickx (2019) also point to the potential harmfulness of the same when it comes to the development of automated approaches in the news as it furthers notions that robots are "coming to take the jobs," thus distracting from a more realistic future of augmented journalism in which software plays a supportive rather than a supplanting role.

consequences for how news consumers perceive the world and their place in it relative to their machine interlocutors.

In a similar vein, what are the implications of communicative AI for the shifting social roles of journalists—for how journalists imagine themselves, their machine counterparts, and the communicative work between them? At the moment, we find ourselves in a situation where news organisations and journalists have certain expectations and fears about what AI is, and what it will do for and to them—expectations that are not necessarily rooted in the actual reality of such technologies. These "imaginaries" or expectations (Beckert, 2016) nevertheless matter insofar as they can shape incentives to adopt or invest in AI applications (Brennen et al., 2020), and to the degree they influence how journalists think about the use of AI in the news more broadly and how it will affect them—both in a positive and a negative sense. By at least one account, some journalists express optimism that emerging tools will augment their journalistic roles rather than disrupt them (Schapals & Porlezza, 2020). But there are other longstanding fears about automation's impact on employment that are shared across industries (see e.g. Shiller, 2019). The fear of being (partially or fully) replaced by technology is not new to the field of journalism, but the threat—however realistic, given that in most cases AI is not fully autonomous and requires human supervision—of a new technology performing a human's tasks with greater efficiency has the potential to lead newsworkers to question their identity, value, and role in modern news organisations (Carlson, 2015; Lewis et al., 2019; Morikawa, 2017).

Ultimately, the social and relational dynamics of AI and journalism gesture to the important role of *perceptions* developed about oneself and others. The ongoing rollout of communicative AI may indeed constitute an ontological shift in journalism, as we discuss in the next section. This, in turn, has implications for how a variety of stakeholders—most prominently but not exclusively journalists—relate to these technologies even before such a shift has fully occurred, regardless of how warranted their hopes, fears, or imaginations may be. As Lewis, Guzman, and Schmidt (2019) have argued, it might not yet be clear "to what extent existing and emerging technologies will displace people from what were thought to be distinctly human roles within journalism," but that it *will* happen to some extent seems to be a given. What remains to be determined is how people respond in kind.

Metaphysical or Ontological Dimensions

Third, as we suggested earlier, AI in journalism and communication should be considered in terms of its potential to reshape or stir up *metaphysical* or *ontological* dimensions and distinctions around how distinctly "human" (or not) journalism is intended or ought to be. On one level, this is a debate about communication theory. "In a domino-like effect," Lewis and colleagues (2019, p. 421) write, "the placement of a communicative technology into a role previously occupied by a human draws into question every other aspect of theory and elements of practice built upon the core assumption of humans as communicators." But on another level, this is not merely an abstract philosophical question; rather, it influences an array of issues surrounding technology design, ethical norms, and social expectations.

Indeed, we raise the point of ontology because already we can see examples "in the wild" where communicative AI is blurring the boundaries between the two. Consider, for instance, how *The New York Times*, in response to the COVID-19 pandemic, launched in 2020 a Q&A tool that uses natural-language processing to connect readers with answers to their questions about the pandemic. While the system is still in development, the initial audience response indicates that users treat the application (at least to some extent) as if it were human, "not only submitting full

questions, but at times, entire paragraphs," as the developers describe it (Pisapia et al., 2020). An increasing number of news organisations have also started to introduce (partly) AI-written formats, as in the case of *The Washington Post*'s Heliograf tool that is described as the newspaper's "artificial intelligence system" and which is used to produce novel forms of results about sports and politics. In a yet bolder move, the *Guardian* and other news organizations have begun to play with (however fancifully) the possibilities of GPT-3, a language generator developed by the software company OpenAI that uses machine learning to produce text as if out of thin air. GPT-3, responding to short prompts written by humans, draws on thousands of pre-existing articles from Wikipedia and other databases to create forms of prose—including poetry and fiction as well as news-like articles—that seem uncannily "real."

These developments have raised questions not only about notions of authorship but also about journalistic transparency and the role and response of audiences to such news products. This begins with the issue of who (or what) produced the content and how their contribution should be acknowledged in bylines (Montal & Reich, 2017), but it extends also to thornier matters regarding whether and how news consumers should be informed that a piece of news was wholly or partially produced by automation or machine learning. Moreover, what might that awareness (or lack thereof at the moment) mean for the degree to which people trust in news, particularly at a moment of particularly low trust in the press in many parts of the world? While definitive answers have yet to be discovered, some research suggests that, at least under certain circumstances, news consumers cannot properly distinguish between news stories created by humans and those created by software, although this does not necessarily indicate that news created by AI is trusted less (see e.g. Clerwall 2014; Waddell, 2018; Tandoc et al., 2020). Indeed, the "machine heuristic" concept suggests that people may trust algorithms over humans in certain instances—although it remains uncertain how . For the time being, the picture here remains inconclusive—but the normative consequences that flow from these blurring of ontological boundaries remain important.

Normative Dimensions

Fourth, and last, we turn to the normative dimensions of news-making and the question of how AI in journalism sits in relation to what constitutes good journalistic work and/or news—particularly in light of AI that is designed to communicate in humanlike fashion. If we take Nielsen's suggestion as a starting point that the lowest common denominator for what constitutes good journalism or news (in terms of its democratic effect) is to "provide people with relatively accurate, accessible, diverse, relevant, and timely independently produced information about public affairs" (Nielsen, 2017), then we have already seen a number of applications of AI that potentially will allow for just that, if they are used to this end. For example, if AI is applied in such a way that it aids journalists in mundane tasks thus giving them more time to concentrate on activities that cannot simply be taken over by a machine, and/or if AI applications help with quality control in ways that improve, for instance, the accuracy of journalism, it is conceivable that AI can contribute to reaching the ideal Nielsen describes. Likewise, if AI is used to improve the understanding of audiences by communicating their interests *to* journalists as well as by communicating *with* audiences to improve their experience of the news—making news more accessible, diverse, and relevant, following Nielsen's suggestion—this may well be seen as a contribution to a normative ideal of "good" news as well.

Yet, there is a catch. For one, no technology expands its shaping effects in a vacuum. Just as the gatekeeping process in the news is moderated by and operates under several levels or

layers of influence (Shoemaker & Reese, 2013), so will AI be bound by the same forces. We can put this more simply: AI's role in a normative sense is heavily dependent on the context within which it will be put to use.

There is, however, a second aspect that merits attention. As various scholars, especially from the Science and Technology Studies (STS) school of thought, remind us, "the logics, techniques, and uses of [AI, and the] technologies [that inform AI] can never be separated from their specific social perceptions and contexts of development and use" (Bucher, 2018; Elish & boyd, 2018, p. 58). While AI is frequently invoked in the public eye as the solution to "otherwise intractable social, political, and economic problems […]", seemingly promising "efficiency, neutrality, and fairness" (Elish & boyd, 2018, p. 74), these scholars argue that this widespread enthusiasm often obscures AI's limitations, trade-offs, and biases. Not least through their training data, AI systems may mirror, amplify, and obscure issues of bias, inequality, and discrimination, especially in the context of gender and race, as an increasing number of scholars has highlighted (see e.g. Eubanks, 2018; Noble, 2018;).

These blind spots matter because of AI's growing incorporation in the "making" of journalism. Despite efforts by scholars, activists, and not least journalists themselves, the news industries in many countries continue to exhibit poor records when it comes to questions of inclusion, nondiscrimination, and equality, both in the composition of news staffs as well as the nature of the content they produce (Carter, Steiner, & Allan, 2019; Lück et al., 2020). As is often the case with new technologies, AI also potentially stands to exacerbate these issues, lest conscious efforts are made to design and apply it in a way to counterbalance these structural issues and flaws. Indeed, to the extent that communicative AI represents a kind of emergent "voice" in what journalists say to and about the world, it matters for media organizations to consider carefully what kind of articulations get expressed accordingly.

Conclusion

Given the rapid pace and development of AI, and particularly communicative AI, in journalism and the dearth of theories that help explain these dynamics and their effects, new models will need to be developed or existing ones will have to be adapted to make sense of the shift that is underway with the rise of AI. Our chapter has opted for the latter approach by explaining what Human-Machine Communication as a perspective and theoretical body might offer for the study of AI and journalism, not merely in terms of how the former potentially shifts journalistic practice—which has been the focus of most discussion so far (e.g., Beckett, 2019; Marconi, 2020)—but more holistically in how it forces us to confront questions about roles and relationships of humans and machines, and the very essence of what it means to communicate.

As an orientating framework, HMC allows researchers to more comprehensively map the dynamics and implications of machines as communicators (rather than merely machines as mediators), particularly at a moment when the meaning-making possibilities of human-machine encounters have become more readily visible through communicative AI. To test the strengths of this approach, we evaluated the application of AI in journalism through functional, relational/social, metaphysical/ontological, and normative dimensions. Each dimension provides a different perspective on the potential outcomes not just of AI's use as a tool, but rather of its growing incorporation *as a communicator*, one that may augment human communication in some instances, replace it in others, and ultimately lend significantly greater "voice" to so-called "mute" technologies (Guzman, 2016). The importance of HMC for interpreting communicative

AI, therefore, is evident in how it brings to the fore questions that may otherwise be overlooked from an anthropocentric paradigm—questions about what it means to be human and what it means to forge meaning, relationships, and sociality through communication. And, to these we would add the importance of evaluating the normative implications that pertain not only to data, code, and algorithms in general, but to communicative AI in particular because of its capacity for increasingly humanlike interactions.

Beyond these strengths, however, certain limitations to the HMC framework also become apparent when applied to the context of AI and journalism. For one, HMC orients attention more so to micro encounters, those occurring between (individual) humans and machines, rather than to the macro influences that, in the case of journalism and the news industry, are likely to be much more consequential. What comes to mind here are an overall media landscape in flux through increasing digitalization (Jungherr et al., 2020, Schroeder, 2018), the continuing decline of traditional business models (Nielsen, 2018), the lasting influence of media systems (Hallin and Mancini, 2004), or the structural control exerted by major technology companies (Bell et al., 2017), to name just a few. While it is worthwhile, as we have argued, to focus on how journalists are rethinking themselves and relationships on account of communicative technologies, or on how audiences may be doing the same, we also have to acknowledge that these trends likely rank below these far larger, more influential structural factors that shape news, journalism, and the media in a more existential sense.

Another question that has yet to be borne out by the evidence will be HMC's value, not just to the community of scholars concerned with the study of journalism and the news, but to the objects of analysis: the news organizations and newsworkers whose work (and relationship to technology) HMC sets out to study. While notions of popular value should not be the sole judgment criteria for any epistemic undertaking such as this, HMC just as any other strand of scholarship has to ask itself who it is for and what it has to offer to those it seeks to understand—and ultimately, if this offering is in line with the needs of these communities.

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