Artificial Intelligence and Journalism

As a descriptor, artificial intelligence (AI) is polysemous and problematic. Like the muddled "big data" before it, this term *du jour* tends to be invoked broadly and haphazardly, by boosters as well as critics in some cases, making it difficult to discern exactly what AI is supposed to represent in the world, let alone how it is intended to work as a means of performing human tasks—from recognizing images, blocking spam email, and serving up algorithmic newsfeed recommendations to the more complicated challenges of autonomously flying drones and driving cars. Because science fiction and Hollywood so often depict AI in the form of sentient machines, many people associate AI with "thinking" robots or computers that can mimic human reasoning and behavior with uncanny accuracy—though, as Meredith Broussard points out in this special forum and in her book *Artificial Intelligence: How Computers Misunderstand the World* (Broussard, 2018), nothing could be further from the truth.

Rather, AI more narrowly refers to a branch of computer science focused on simulating human intelligence, one that recently has been especially engaged in the subfield of machine learning: the training of a machine to learn from data, recognize patterns, and make subsequent judgments, with little to no human intervention. More narrowly still, and turning to the particular relevance for this journal, "communicative AI" may refer to AI technologies—such as conversational agents, social robots, and automated-writing software—that are designed to function *as* communicators, rather than merely mediators of human communication, often in ways that confound traditional conceptions of communication theory and practice (Guzman & Lewis, 2019). Amid this confusion surrounding the definition of AI and its emergent role in everyday life, this special forum attempts to carve out an elaboration on AI in the context of journalism—a key domain through which to illustrate many of the opportunities and challenges that AI presents for the broader realm of communication, media, and society.

The implications of AI for journalism must be foregrounded in the larger context of the digitization of media and public life—a transition to apps, algorithms, social media, and the like in ways that have transformed journalism as institution: undercutting business models, upending work routines, and unleashing a flood of information alternatives to news, among other things. In that sense, AI technologies, regardless of how transformative they yet prove to be in the short, medium, or long term, may be understood as part of a broader story of journalism's reconfiguration in relation to computation.

The contributors to this forum are a diverse set of experts on journalism, computer science, and human–computer interaction (HCI), as well as on emergent notions of human–machine communication and important considerations about algorithms and marginalized communities.

In a wake-up call to open this forum, Broussard pierces the overinflated hype surrounding AI, arguing that journalists and researchers alike need to re-evaluate their tendency to fancifully imagine (and ultimately misread) the actual impact of successive waves of technology. Broussard writes:

> When you find yourself making a prediction that a new technological tool will usher in a new era, ask yourself: *will it, really?* Hyperbole about technical tools is one aspect of a bias that I call *technochauvinism*, or the assumption that technical solutions are always superior to other solutions.

Journalists can begin to do this by learning what AI actually is (and is not), and, thus, more effectively explain such technologies to the public. Moreover, she argues, scholars and practitioners need to develop a human-centric perspective on AI for journalism; in both journalism and research about journalism, "the point is to report on and find insights into humanity," a process that "will never be sleek and mathematically precise."

Nicholas Diakopoulos further develops this case for a "human-centered future" of AI and journalism. Building on his new book *Automating the News: How Algorithms are Rewriting the Media* (Diakopoulos, 2019), he argues that AI is "a new medium through which journalists can express and exercise their ethical and normative values through the code they implement." And, because journalism is a deeply human endeavor, with many tasks that can be *augmented* by machines but few that can be entirely *replaced* by them, Diakopoulos argues that "the future of AI in journalism has a lot of people around." That is, "[f]ar from destroying jobs in journalism, AI appears to be creating them"—and, thus, we need to develop a research agenda for studying the hybridization of humans and AI in journalistic workflows. Such an agenda, he suggests, has much to learn from decades of discovery from the field of HCI.

Elaborating further on the role of scholarly research, Andrea L. Guzman argues that AI poses particular challenges for media and communication scholars, requiring them to cross disciplinary, technological, and theoretical boundaries that have defined the field for decades. This includes, for example, building intellectual connections with technology-focused fields, recognizing the historical lessons from industrial automation and other technologies not typically associated with communication, and finding ways to theorize not only human–human communication but also human–machine communication—a task that she and others undertake in the recently published edited volume *Human-Machine Communication: Rethinking Communication, Technology, and Ourselves* (Guzman, 2018).

Rounding out the forum, the final two contributions call us to reconsider our assumptions in a new light. Rediet Abebe argues that the human-centered AI described by Broussard and Diakopoulos has been rightly lauded for "shifting the focus away

from what AI *can* do to what AI *should* do." But, she adds, "another question remains: *which humans*?" She goes on to reveal an essential dimension of AI and society: the pattern of such technologies in overlooking or harming historically marginalized communities. At the same time, she emphasizes that journalism, in particular, may be well suited to illustrate how AI can be used for social good—a fact that gets lost in dystopian accounts of AI's impact. Taking this re-evaluation further, Michel Dupagne and Ching-Hua Chuan, in the forum's concluding remarks, suggest that too much pessimism about AI can be distracting and even detrimental. "Although we are not naive technological determinists," they write, "we argue that the journalism profession would be best served by being proactive toward AI development, which requires a better understanding of what AI can do or is likely to achieve in the years to come." Being proactive, they contend, could include developing curricula that connect AI and journalism/media at a conceptual level—that is, not with a crash course in computer coding, but rather with a higher level evaluation of strengths, weaknesses, ethical questions, and applications of AI for our field.

In all, these contributions offer an important set of directions, questions, and provocations—ones that carry a certain degree of urgency amid the onrush of AI technologies in journalism, communication, and public life at large.

Seth C. Lewis
Invited Forum Editor
University of Oregon

Rethinking Artificial Intelligence in Journalism

What does artificial intelligence (AI) mean for journalism? The conventional answer is something along the lines of, "AI is reshaping the journalism landscape as we know it." If I were writing the conventional answer, I might start by citing the excellent work that has been done in the past few years by scholars looking at the field of data journalism and how AI is being adopted inside it (Diakopoulos, 2013, 2014; Fink & Anderson, 2014; Hamilton & Turner, 2009; Howard, 2014; Lewis & Westlund, 2015; Parasie, 2015; Royal, 2010). I would talk about data journalism as the latest evolution of what we used to call computer-assisted reporting (Houston, 2015), which itself evolved from precision reporting (Meyer, 2002), in which social science methods were applied to journalism. I would talk about the distinction between data and computational journalism (Coddington, 2015; Flew, Spurgeon, Daniel, & Swift, 2012; Heravi, 2017), and I would point out that using AI is the province of highly paid, specialized practitioners who generally create AI as a collaborative endeavor, using both academic and industry resources. I might talk about my own work building AI systems for investigative journalism (Broussard, 2014), and call out the academic and investigative work done by Mark Hansen, Nick Diakopoulos, Julia Angwin, Reg Chua, Sarah Cohen, James T. Hamilton, Fred Turner, Seth Lewis, Bahareh Heravi, Nikki Usher, Cathy O'Neil,

Safiya Noble, Rediet Abebe, Timnit Gebru, Joy Buolamwini, Virginia Eubanks, Philip Howard, Gina Neff, Solon Barocas, Kate Crawford, Meredith Whittaker, danah boyd, Charles Seife, Hilke Schellmann, Cheryl Phillips, Scott Klein, and more.

I am not going to do that.

As I write in my book *Artificial Unintelligence: How Computers Misunderstand the World* (Broussard, 2018), I have been hearing the same promises about the bright technological future for at least three decades now. We can do better. The way people talk about the revolutionary future of AI in journalism is structurally identical to the way people talked about the revolutionary future of microcomputers in journalism, or desktop publishing (DTP) in journalism, or databases in journalism, or mobile devices in journalism, or social media in journalism, or automation in journalism, or video in journalism, or virtual reality in journalism, and so on.

It is time to disrupt that narrative.

Communicate Differently About AI

As newsrooms and researchers embrace the age of AI, I encourage us to rethink the conventions we have adopted when talking about tech.

The first step is recognizing the conventions. In a 1988 article called "RX for Journalism Departments and Their Budgets—DTP," C. B. Watterson (1988) wrote the following rhapsody about DTP:

> The microcomputer has replaced the pencil as an essential tool for scholastic journalists. With it, they are able to personally change the content, direction, shape, and appearance of their publications. Without it, they must be content to take a back seat to their peers across the country who have mastered the most powerful writing tool at their command— the microcomputer. (p. 37)

This has the same chipper tone as the 2016 memo from Bloomberg Editor-in-Chief John Micklethwait, who wrote to his staff:

> Done properly, automated journalism has the potential to make all our jobs more interesting . . . The time spent laboriously trying to chase down facts can be spent trying to explain them. We can impose order, transparency and rigor in a field which is something of a wild west at the moment. (Mulin, 2016, n.p.)

It also sounds like the research question from a *Technology in Society* article that asks whether the recent introduction of automatically produced content is "merely another evolutionary stage in the field of sport journalism, or whether it has triggered an insurrection, that will dissolve human journalists from the profession" (Galily, 2018, p. 47).

When you find yourself making a prediction that a new technological tool will usher in a new era, ask yourself: *will it, really?* Hyperbole about technical tools is one aspect of a bias that I call *technochauvinism*, or the assumption that technical solutions

are always superior to other solutions. Technology adoption is not the same as intellectual and social progress in a field. AI is not a magic bullet for journalism; it is merely a shiny new tool. Let us not perpetuate the assumption that because a particular new technology exists, it is the right tool for every task.

Explain What AI Is and Is Not

The term *artificial intelligence* is poorly chosen. To most people, the phrase suggests that there is a synthetic brain inside the computer. This could not be further from the truth. Taking Abbott's (2001) fractal-based approach to disciplines, we can regard AI as a subfield of the academic discipline of computer science—just as algebra is a subfield of mathematics. Inside AI, there are other subfields: machine learning, expert systems, and natural language processing, to name a few. However, machine learning is the field that is most popular at this cultural moment. When people say "AI" in a business context, generally they are referring to machine learning. Again, machine learning is a subfield of AI, and, like its parent, its name misleadingly suggests that sentience exists inside the computer. Computers that engage in machine learning are not sentient; machine learning at its heart is computational statistics, albeit on steroids. Neural nets and deep learning, two algorithmic practices associated with machine learning, are named in homage to neurobiological processes. The similarity is more metaphorical than actual. The AI we have today is merely complex and beautiful mathematics.

Journalists and editors need to take the time to explain AI and be precise about terms. This comes up a lot in automated text generation. Automation is not the same as AI, but a lot of students come into my classroom assuming the two are the same. We also need to allocate more space to explanations. Editors face pressure to keep stories as short as possible to maximize traffic. This does not help when a writer is explaining a complicated topic regarding AI (Bertamini & Munafo, 2012). Subtleties of predictive modeling and bias cannot be explained to a mainstream audience in the space of a tweet.

Consider the Economics in Research and in the Newsroom

AI is expensive. It may be cheap to run cloud services like the ones in Amazon Web Services (AWS) AI suite, but it is expensive to hire and retain a workforce that knows how to use sophisticated computing. In *Democracy's Detectives*, James T. Hamilton (2016) lays out how much it costs to do high-impact computational journalism. It costs far more than most people imagine; a major investigation can take months and can cost more than $1 million in labor alone. It may be fast to use AI to detect anomalies in investigative reporting, but it is extremely time-consuming to create AI systems, and the specialized labor of AI experts is far outside the freelance budget of most media organizations.

The newsroom brain drain problem works against the technochauvinist imperative to adopt new technologies. It is common for workers to learn tech skills in the newsroom and then leave for higher paid tech industry jobs. Simon Rogers, the former *Guardian* data journalist now of Google News Lab, is one high-profile example. The number of available tech jobs has increased while newsroom jobs have declined; the American Society of News Editors (ASNE) estimates that U.S. newsrooms lost 40% of full-time editorial professionals from 2006 to 2014 (Edmonds, 2015). One of the reasons we have so much hype about AI is that when you are a freelance journalist getting paid $0.05 a word for an 800-word story, it is cost-effective to simply parrot press releases. Freelance rates were $1 to $3 per word before the Internet era.

Furthermore, not every newsroom needs to use AI. Most major metropolitan dailies do not have the same needs or audiences or tech capacity as the *New York Times*. That is OK; people need jobs, and not every organization needs to be a cutting-edge technological marvel. The shift to digital is over, and this is what it looks like: Digital resources—and power—in media are just as unevenly distributed as resources anywhere else.

Center Humans, Not Machines, in AI for Journalism

Journalism is a deeply human endeavor. Whether we are researching how humans use machines in journalism, or we are using machines to research or produce a story, the point is to report on and find insights into humanity. This will never be sleek and mathematically precise; it is messy, just like life. It is clear from decades of research in communication, sociology, and science and technology studies that technological systems do not erase social problems but merely shift and obscure them. Every technological system reflects the conscious and unconscious bias of its makers; AI is no different (Angwin & Larson, 2016; Angwin, Larson, Mattu, & Kirchner, 2016; Barocas & Selbst, 2016; Crawford, 2016, 2017; S. U. Noble, 2018; Zook et al., 2017). We can benefit from using technological tools to commit acts of journalism, but at its heart, journalism is about telling stories about the human condition. How can we, as scholars and practitioners, do better at centering humans in our sociotechnical discourse about AI?

Meredith Broussard
New York University

Paving the Human-Centered Future of Artificial Intelligence + Journalism

I would be hard-pressed to disagree with almost anything that Professor Broussard writes in her essay on what artificial intelligence (AI) means for journalism. Whether it is needing to tone down the rhetoric and hype of the technology in how it is

communicated, explaining it more thoroughly and precisely to lay readers, considering how its costs fit within the precarious economic situation of most modern newsrooms, or putting people at center stage, these are all laudable goals that practitioners should exercise and scholars should incorporate into the ways they ask research questions of the field.

In the spirit of picking up where she left off, I would like to elaborate on how, more precisely, I think journalism might go about recentering humans in the development and use of AI, a topic that is thematically at the core of my new book, *Automating the News: How Algorithms are Rewriting the Media* (Diakopoulos, 2019). In particular, here I want to talk about human values in technology, how humans and algorithms are increasingly hybridized in news production, and how practitioners and scholars of the field will benefit in their study of AI and journalism by adopting methods and approaches from human–computer interaction (HCI).

Journalistic Values

All technologies, including and especially AI technologies, embed and encode human values, reflecting choices like what data were used to train the system, how that data was defined and sampled, how algorithms are parameterized and defaults chosen, what inputs a system pays attention to, and, indeed, even whether to quantify some aspects of the world while leaving other things out. AI systems are tools built by humans to serve human means and ends. They are profoundly political, exuding the values that designers and developers build into them (Shilton, 2018). This suggests an opportunity for journalists and news organizations to become aware of and exercise their ability to embed their own organizational, institutional, and professional values into the technologies that then drive news production. If not journalistic values and ideology (Deuze, 2005), then alternative values from noneditorial stakeholders or nonjournalistic media companies and platforms will fill the void (Ananny & Crawford, 2014).

AI is a new medium through which journalists can express and exercise their ethical and normative values through the code they implement. For example, in 2017, the *Washington Post* launched a system called ModBot, which automatically reads the comments made on its website to determine if they meet quality standards or should be moderated away. Maintaining the quality of the online comments section is a major challenge that many online news sites struggle with (Park, Sachar, Diakopoulos, & Elmqvist, 2016). ModBot can save hours of manual human effort sifting through comments. In making its determination of whether a comment should stay or go, one of the signals that the AI picks up on is the use of abusive language (Jiang & Han, 2019). Interestingly though, the system was explicitly designed to set the abusive language bar higher for public figures, with the recognition that criticism of public figures must be allowed in a forum dedicated to fostering deliberative conversation on issues of societal import. By developing its own system for moderating comments, the *Post* was, therefore, able to better match the operational behavior of its AI with professional ethical and normative expectations.

Hybridizing Humans and AI

Every wave of new technology, whether it be telephony, photography, reproduction, or computerization, has somehow changed the nature of roles, tasks, and workflows in the newsroom (Pavlik, 2000). AI is no different—it, too, is a technology that is and will continue to change newswork, often complementing but rarely wholesale substituting for a trained journalist. Some experts estimate that only about 15% of a reporter's job and about 9% of an editor's job could be automated using current levels of AI technology (Manyika et al., 2017). Humans still have an edge over non-Hollywood AI in two key areas that are essential to journalism: complex communication and expert thinking (Levy & Murnane, 2004). Reporting, listening, responding, and pushing back, negotiating with sources, and then having the creativity to compellingly put it together, or knowing when a new angle of attack is needed—AI can do none of these indispensable journalistic tasks, though it can often *augment* human work to make it more efficient or high quality (Diakopoulos, 2019). More often than not, AI technologies actually *create* new types of work, like the configuration, parameterization, knowledge management, data production, and template-writing tasks involved with setting up and operating automated content production systems (Lindén et al., 2019). Far from destroying jobs in journalism, AI appears to be creating them.

Ultimately, while AI will help to enhance the speed and scale of news in routine situations, complement and augment journalists, and even create new opportunities for optimization and personalization that would not otherwise be possible, it still cannot do most newswork, and, in many cases, creates new tasks and forms of work. In short, the future of AI in journalism has a lot of people around. Scholarship and practice should, therefore, seek to undertake an agenda for studying human-centered AI in journalism (Riedl, 2019)—for instance, by understanding the roles and tasks of journalists in hybrid workflows more thoroughly, studying the ways in which journalists and AI can effectively interact and collaborate, and elaborating the human perspectives and concerns of autonomy, agency, and the ergonomics of labor that these new technologies may upset (Cohen, 2018). Much research remains to be done studying the new and changing newswork that AI creates when blended into journalism practice.

Designing the Future With HCI

Whether we are talking about values in design or the evolution of hybrid workflows, it is clear that the future of AI and journalism must be human-centered. To study this hybrid future, scholars might draw on the methods and approaches from the almost 40-year-old field of HCI (Shneiderman et al., 2016). For instance, value-sensitive design approaches will enable the deliberate design and operation of AI systems within the values framework of journalism (Friedman, Kahn, Borning, & Huldtgren, 2006), and methods such as task analysis will help decompose high-level tasks into automatable subtasks that can be blended with human effort. As an information-production discipline, journalism will need techniques to grapple with new flows of work created

by automation and AI. How might interfaces be designed to empower editors to "edit at scale" when an AI has just generated thousands of stories? How can human agency be maintained in such systems so that people can direct AI and uphold quality standards? And how will end users interact with algorithmically imbued news media and AI agents? Pursuing all of these types of questions will benefit from further collaboration with scholars and practitioners in the field of HCI (Aitamurto et al., 2019).

Nicholas Diakopoulos
Northwestern University

Human–Machine Communication: Bridging Disciplinary, Technological, and Theoretical Divides

As Professors Meredith Broussard and Nick Diakopoulos have expertly argued, journalism needs to wrestle with what artificial intelligence (AI) is as both technology and cultural product; how AI is employed within a particular social context; and the implications for journalism and society. Here, I expand upon the pragmatic aspects of such research by explaining how the study of AI requires media scholars to cross key disciplinary, technological, and theoretical boundaries that have shaped communication research and how the emerging area of human–machine communication (HMC) can guide scholars in bridging these divides.

Disciplinary Divides

Disciplines within the social sciences have historically had the most influence on communication research, though notable intersections with the hard sciences exist (e.g., Shannon, 1948). The study of AI technologies of communication requires journalism and media scholars to understand the nature of the technology they are studying, the contexts and values in which it was produced, and the core debates surrounding it. Such knowledge, however, cannot be achieved within the confines of journalism, communication, or even the social sciences; rather, scholars must increase their interaction with technology-related fields, chiefly AI, Computer Science, and, as Diakopoulos argues above, human–computer interaction (HCI).

A key issue that exemplifies the need to work across disciplinary boundaries is the contested nature of AI. Much like communication, AI is a concept without concrete definition that has been debated for more than 70 years as the hyperbolic promises of the future of AI (see Ekbia, 2008) have been weighed against existing technological capabilities (see Boden, 2016; Frankish & Ramsey, 2014; Kaplan, 2016). The result is multiple, often competing, conceptualizations of AI among both scholars and the public. Media scholars risk perpetuating misunderstanding about AI or basing elements of

their research on faulty premises without the requisite knowledge of this and related issues (Guzman, 2019)—knowledge that can only be gained by crossing disciplinary divides.

Technological Divides

The study of journalism has evolved with technology (Pavlik, 2000) as has communication research (Rogers, 1986); however, the nature of technology that has been the subject of this scholarship has largely not changed. The radio, television, computer, Internet, mobile phone, and related devices and programs classified as Information and Communication Technologies (ICTs) have been the exclusive focus of journalism and communication scholarship.

This focus on a singular technological class is no longer tenable given the function of AI within the communication process (Guzman, 2016). As integrated into media industries, AI programs are a form of automation—a role for which industrial machines have been designed since the mid-20th century. As Carey (1989) has argued, technology inscribes cultural values and, in use, enacts and reifies them. The industrial machines of automation have embodied such values pertaining to labor and capital, with implications for workers and society (D. F. Noble, 2011). Although they differ significantly, industrial technologies of automation are the cultural predecessors to AI technologies that automate communication (Guzman, 2016; J. Reeves, 2016). Understanding where AI fits into the larger cultural and historical arc of automation, therefore, requires the study of technologies typically outside the purview of communication, including those of industrial automation.

Theoretical Divides

The study of mass communication developed in conjunction with the contemporary media of the early 20th century. It is upon these forms of media, which functioned as channels conveying messages, that the role of technology in communication was theorized (e.g., Lasswell, 1972). The result has been that for more than a century, media scholars have continued to theorize communication as a primarily human-driven activity: The role of sender and receiver, or communicator, has been almost exclusively reserved for people, while the role of medium or channel, has been assigned to technology (cf. Gunkel, 2012).

The AI programs and devices that are the subject of media research, such as automated newswriting programs and chatbots, function as more than a channel; they are designed to fit into the role of communicator, a role that has been predominantly reserved for humans. The theoretical implication of this shift in the role of technology is that, for the most part, early models formed around older forms of media cannot adequately account for the form and function of AI within journalism (Lewis, Guzman, & Schmidt, 2019) or communication more generally. The result is that scholars now must find ways to theorize journalism, media, and communication in both human–human and human–machine contexts (Guzman, 2018).

HMC

The integration of AI into media production, consumption, and distribution requires scholars to navigate disciplinary, technological, and theoretical divides. But journalism and media researchers are not alone in facing these challenges. As a result of the proliferation of AI-related technologies designed for numerous communicative tasks, such as home assistants and social robots, scholars across communication's subfields are negotiating these and other divides, efforts that are encompassed within the emerging area of communication research known as HMC (Guzman, 2018; Guzman & Lewis, 2019; Spence, 2019).

As explained in *Human-Machine Communication: Rethinking Communication, Technology, and Ourselves* (Guzman, 2018), HMC focuses on the study of technology that functions as communicative subject, and it aims to better understand the process of people's communication with technology and the resulting personal and social implications. HMC provides a unique entry point into the study of automated journalism (Lewis et al., 2019) and other areas of communication (Spence, 2019) by bridging the theoretical divide between people and machines as communicators. HMC scholars also draw upon and generate scholarship that puts communication into dialogue with technology-focused fields, such as research that has shown that people treat computers as social actors (e.g., B. Reeves & Nass, 1998) and distinct sources of news (e.g., Sundar & Nass, 2000). For journalism, media, and communication scholars interested in research questions regarding AI, HMC scholarship can be instructive not only in its findings but also in its approach to navigating across the divides discussed here. In addition, HMC is an active community that offers scholars from throughout communication's subfields the opportunity to network and collaborate toward the shared goal of addressing the challenges of studying communicative technologies, including AI. In doing so, HMC also enables scholars to work across the discipline's own divides.

Andrea L. Guzman
Northern Illinois University

Centered on Whom? The Pitfalls of Human-Centered Artificial Intelligence

Human-centered artificial intelligence (AI) has been celebrated for shifting the focus away from what AI *can* do to what AI *should* do. These discussions often revolve around ensuring that researchers assess the societal impact of AI-driven solutions and frequently include recommendations to use a hybridized approach, in which we treat humans as the experts and use AI to assist and augment—rather than supplant—them. Recentering humans in this manner is a laudable goal. But another question remains: *which humans?*

Many have noted that a failure to center historically marginalized and underserved communities risks defaulting to groups that have already been afforded significant amounts of privilege. All too often, disadvantaged communities are an afterthought, and ensuring that AI-driven solutions account for their needs is treated as an add-on to or extension of the "main" problem. Communities that bear the burden of historical discrimination are, unsurprisingly, also those most acutely harmed by the shortcomings of AI. Without centering such communities, we risk repeating the same mistakes of the past.

Building on previous pieces, I highlight here two ways in which historically marginalized communities are overlooked and harmed by AI, as well as discuss the role that journalism can play in mitigating these consequences.

Limitations of AI

Much has been written about the limitations of AI systems, particularly algorithmic bias, in which machine learning algorithms trained on data that reflect historical discrimination can replicate and even exacerbate it (Barocas & Selbst, 2016; Broussard, 2018; Gebru, 2018; S. U. Noble, 2018; O'Neil, 2017; Sweeney, 2013). High-profile examples of this phenomenon include racial bias of risk assessment tools in criminal justice, gender discrimination in automated hiring, and automated determination of eligibility for social assistance that tends to punish the poor (Angwin et al., 2016; Dastin, 2018; Eubanks, 2018). Journalism, as evidenced by these three pieces, plays a key role in exposing shortcomings and addressing issues that are not captured by the legal system or other forms of scholarship. Eubanks, who previously conducted research on topics including economic justice activism, explains that she was able to tell more accurate stories about poverty in the United States through the medium of investigative journalism (Newton, 2018). Eubanks's work illustrates that journalism can work symbiotically with the growth of AI and that it plays a unique role in recentering human experiences in discussions around technology. Indeed, journalism has prompted AI scholars to confront the evident limitations of their discipline and has encouraged the public to grapple with what role AI should play in systems that we interact with in our day-to-day lives.

These harms caused by automated systems, such as race- and gender-based discrimination, are in large part a result of a lack of attention paid to the way in which AI systems encode human values, which in turn calls for a more human-centered approach. As Nicholas Diakopoulos explains, human-centered AI also presents an opportunity for journalists (or other AI practitioners) to embed their own values. Acknowledging the political nature of seemingly objective choices in building AI systems is an important first step (Green, 2018). On its own, however, it fails to fully address the needs of marginalized communities.

Privacy-loss, for example, is frequently cited as an undesirable consequence of insufficiently human-centered design. Discussions of this issue often revolve around Western notions of individual privacy, which aim to give each individual real autonomy over whether, how, and with whom their data are shared. This idea of privacy,

however, does not translate to all cultural contexts. Within many nations in Africa or East Asia, for instance, there is a strong culture of collective identity; Western notions of individual identity and privacy do not necessarily map on to this cultural setting (Namara et al., 2018; Yuki, 2003). Therefore, systems that protect some notions of individual privacy may still fail to protect sensitive information about groups, leading to collective privacy-loss. In this way, a human-centered approach that is sensitive only to Western ideas of privacy-loss may yield a false sense of security while failing to address other, culturally specific definitions of privacy-loss.

Journalism is well positioned to uncover the sources and consequences of such failings. It is especially valuable in AI because marginalized communities are severely underrepresented in the discipline and have fewer opportunities to advocate for design that is sensitive to their identities (West, Whittaker, & Crawford, 2019). Journalism scholars' ability to cross boundaries, discussed by Andrea Guzman, allows them to bridge some of these gaps.

Missed Opportunities by AI

Just as one's values may impact the process of building AI systems, they can also impact what problem one tackles in the first place (Abebe, 2018). Even in a world in which AI systems may be free of algorithmic bias and other unintended consequences, communities on the margins of society will continue to be underserved by advances in AI. Without ensuring representation and inclusion of all communities within AI and creating opportunities to look beyond disciplinary boundaries, we will continue to miss opportunities to work toward holistic and innovative solutions that improve the lives of a broad spectrum of our society (Abebe & Goldner, 2018).

As Meredith Broussard states, journalism is uniquely positioned to tell stories about the human condition. Such storytelling can shed light on discrepancies that exist in the attention given to improving the lives of different communities. Take, for instance, the availability of quality health data. Such data are more difficult to come by for women (Buvinic, Furst-Nichols, & Koolwal, 2014); LGBTQ (Lesbian, Gay, Bisexual, Transgender, and Queer) people (James et al., 2016); immigrants (Fountain & Bearman, 2011); individuals living in low- and middle-income nations (Abebe, Hill, Vaughan, Small, & Schwartz, 2018; Baron, 2019); and older age groups (Independent Expert Advisory Group, 2014). This data inequality limits our understanding of the varied and complex health needs of these communities, and algorithmically informed interventions will necessarily fall short of addressing them. What do the experiences of individuals in these communities look like in a health care system that is not set up to adequately and accurately represent them? What opportunities have there been for AI researchers and practitioners to address some of these data inequalities? Journalism can highlight these opportunities to make AI work for the good of all that remain to be undertaken by AI scholars and practitioners.

Journalism can also highlight the exemplary work of individuals and organizations that empower underserved communities. Clear My Record, for example, is a nonprofit organization that uses an AI-assisted system to let eligible families clear their criminal

records. Academic subfields such as Human–Computer Interaction (HCI), Information Communication Technology for Development (ICTD), and Science and Technology Studies (STS), furthermore, have long thought about the social and cultural context of technologies. Journalism can help facilitate discussions so that other fields are able to build on this work rather than reinventing the wheel.

Finally, with all the hype around AI, journalists have a responsibility to carefully and responsibly present work in a way that centers humans. While the occasionally fanatic excitement around AI presents challenges, it is also an opportunity to address societal problems—discrimination, poverty, and oppression—that we have long struggled with through a different lens. By centering marginalized communities, we not only ensure that their needs are met, but also may be able to spur the public to notice them anew.

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Rediet Abebe
Cornell University

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Concluding Comments: A Few More Points About Artificial Intelligence

Whether the development of artificial intelligence (AI) accelerates, slows down, or maintains its current course, this technology is bound to produce disruptive forces and have major repercussions for virtually all aspects of society. In our view, the primary question for journalism and mass communication practitioners and academics is to decide how to react to this looming game-changer. Although we are not naive technological determinists, we argue that the journalism profession would be best served by being proactive toward AI development, which requires a better understanding of what AI can do or is likely to achieve in the years to come. In this essay, we will briefly respond to our colleagues as well as make a few concluding descriptive and normative comments.

Fear of AI Can Be Detrimental

First, notwithstanding the hype, it is worth repeating how the field of AI has changed in recent years for the news business. In one form or another, AI is already present in newsroom operations as automated assistants and smart search engines (e.g., Pallanich, 2019; Peiser, 2019; Stray, 2016), is affecting advertising copywriting through the use of natural language generation algorithms (e.g., Nicolaci da Costa, 2019), is influencing advertising strategies through programmatic sales and new audience metrics (e.g., Lafayette, 2018), and could even help broadcast meteorologists with weather predictions in a not-too-distant future (e.g., Tugend, 2019). In China, the Xinhua News Agency went even further and tested, as a proof of concept, AI-based male and female

news anchors with anthropomorphic characteristics who could read fed text in Chinese and English (Zhang, 2019).

We agree with Broussard's central premise that journalism should remain a quintessential human storytelling practice and experience. We also believe that the evolution of media technology, and how we have studied it over the years, has suffered from a pro-innovation bias (Rogers, 2003) that has probably limited academic interest in the motivating factors for technology resistance, rejection, or discontinuance. But today, the journalism profession is facing a particularly formidable challenge in the form of AI applications that will unavoidably alter the news industry. As Garrison (2001) presciently noted, "It seems inevitable that new technologies will replace computers and networks or, at the least, improve the ways in which they are used" (p. 75). It is reasonable to assume that AI will produce heart-wrenching instances of what Toffler (1970) called "future shocks" (i.e., "the shattering stress and disorientation that we induce in individuals by subjecting them to too much change in too short a time," p. 2), both in the news industry and in many other parts of the societal fabric. But, as pointed out below, it is also up to human journalists to determine how much or how little AI will influence their work routines. Equally important is our belief that we should not forego the potential positive benefits of this technological innovation, often depicted in doomsday terms, out of fear of the unknown. As rational and deliberate human beings, we should be capable of recalibrating the pace of AI change through adequate preparation and smart knowledge management strategies.

Understanding AI Beyond Definitions

It is fascinating to see such a well-established term as artificial intelligence being defined over and over again by researchers in different fields. We understand the need to adapt and translate the specific definition and meaning of AI across different contexts for establishing relevance. However, we also hope that the original conceptual AI definition in the field of computer science can provide a sufficient technical foundation to achieve a more analytical understanding for the growing community of stakeholders in this quickly evolving field.

As defined in computer science textbooks, AI can be viewed from four different perspectives: thinking humanly, thinking rationally, acting humanly, and acting rationally. The prevailing view adopted by the computer science field, which determined the goal of AI, is to create computer agents to *act rationally* (Russell & Norvig, 2010). Although the definition can seem narrow to some people, compared with the other three viewpoints, it provides computer scientists a flexible yet clear guiding principle to model problems objectively. As Broussard explains, the core of AI consists of mathematics and algorithmic procedures. Yet, this view does not mean that any complex mathematics or algorithms can be considered to be AI. For an AI researcher, such mathematics and algorithms must be created based on precise goals and objective performance measures: (a) goals that reflect how rational humans will act in a given circumstance (i.e., doing the right thing) and (b) measures that objectively evaluate the performance to indicate the degree to which the machine is indeed doing the right

thing. For example, a driverless car stops when it sees a red light just as a rational (and lawful) human driver does. However, it becomes complicated when AI is designed for problems that lack common agreement on what the rational action to take or "the right thing" to do is, such as social dilemmas in driverless cars (Bonnefon, Shariff, & Rahwan, 2016). Obviously, the goal of AI can also be set to create damages, such as bots that disseminate misinformation and fake news (e.g., Gallagher, 2019).

While developing complex mathematics and algorithms is the job for computer scientists and engineers, it is everyone's responsibility to define the goal for AI applications. This work flow is exactly how human values can be encoded in AI, as Diakopoulos suggested, and what we need to focus on when discussing what AI should do, as argued by Abebe.

What Is Next? Education

One paramount issue that we have not yet tackled in this forum, perhaps purposefully given its difficulty, is the educational or curricular approach we should follow to covering AI technology and issues. Specifically, how do journalism and mass communication instructors who are not trained as computer scientists, statisticians, or data scientists impart AI knowledge to students who are equally unlikely to have much expertise in computer science, statistics, or data science? In fact, should we even teach this subject in some depth in college-level journalism classes? If we intend to be proactive, we would contend that we should at least consider avenues for making this complex topic palatable and relevant in the classroom. Using a sophisticated Python programming book (e.g., Joshi, 2017) to teach students who are not developers and have not taken advanced statistics courses how to build AI apps is probably not the most useful or suitable way to introduce AI to journalism students.

One option for approaching the topic of AI and journalism/media in the classroom—one that probably requires a substantial learning curve or dedication of resources for specialized faculty hires—might follow a more conceptual path. As the second author does in her "Design with AI" class, journalism departments and schools could offer an AI course that does not mandate actual coding. The purpose of such a course would be to review the strengths, weaknesses, processes, ethical issues, and various applications of AI related to our field. Books, such as those written by Broussard and Diakopoulos, can provide a valuable overview of the AI issues for journalism and mass communication students. Gerrish's (2018) *How Smart Machines Think* relies on case studies that may be directly related to students' queries and interests (e.g., How does Netflix's recommendation system work?). In sum, the course could give our students at least a high-level introduction to important concerns for the future of AI and media.

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