



Communicative Artificial Intelligence as a New Domain of Research in Media and Communication: Epistemological and Theoretical Reading

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Received: 15/02/2024

Accepted: 29/06/2024

Published: 30/09/2024

DOI: 10.53284/2120-011-003-014

Abstract:

This study examines the epistemological and theoretical dimensions of "Communicative Artificial Intelligence," an emerging area of inquiry in contemporary Western academia. The aim is to elucidate the intersections and interactions between this domain and media and communication studies. The investigation assesses how researchers might employ a communicative framework to analyze the relationship between artificial intelligence and journalism. Additionally, it discusses the necessity for scholars to seek novel theoretical frameworks and methodological approaches in response to the expanding role of intelligent technology. The findings underscore the need to reconsider the conventional understanding of "communication" in light of advancements in artificial intelligence and its applications in media. It advocates for a paradigm shift, acknowledging both human and machine entities as participants in the communicative process. This acknowledgment reflects the evolution of intelligent technology from a mere communication tool to an active communication collaborator.

Keywords: Communicative Artificial Intelligence, Human-Machine Communication, Communication Automation, Communication Theory, Journalism.

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1. INTRODUCTION

The intersection of science and human cognition underscores a dynamic evolution, particularly within nascent scientific disciplines (Piaget, 2004). Science, shaped by both subjective and objective dimensions (Bachelard, 1999), undergoes continuous transformation, highlighting the non-static nature of scientific thought. This notion of perpetual reconstruction is evident in the progressive domain of media and communication sciences.

Media and communication sciences have continuously evolved, establishing themselves as significant fields of study that draw from various disciplines. Their development into a "convergent science" highlights their transdisciplinary, multidisciplinary, and interdisciplinary characteristics, a concept highlighted by early scholars in the field (Alain Laramée, 1991).

The evolution of communication science has been marked by various phases, with its research agenda expanding over time. Initially, phenomena observed within this field quickly became subjects of academic inquiry (Saad, 2017). Despite its progress, the field faces challenges, including internal divisions that hinder its development relative to the humanities. These challenges stem from specialization diversity, cognitive and theoretical origins, and a lack of a unified intellectual framework (Saghir, 2020). Furthermore, the field's research is often dispersed, straddling intra- and interdisciplinary lines, a situation exacerbated by the interdisciplinary nature of communication research (Guzman A. L., 2018). This fragmentation is also reflected in the independent operations of academic institutions, individuals, and groups within the field (Rabeh, 2019).

The advent of artificial intelligence (AI) has introduced complex dynamics to media and communication sciences. AI technologies have automated journalistic tasks, previously the domain of humans, indicating a significant shift in the media landscape.

Given these developments, there's a call among scholars from diverse fields—computer science, engineering, information science, communication—to foster dialogue and establish participatory institutional spaces. This underscores the necessity to revisit and update the methodological and theoretical frameworks within communication studies to address the challenges and phenomena introduced by AI technology.

In this context, the following question arises: How should artificial intelligence technology be conceptualized within communication and media studies?

This question opens up several lines of inquiry:

- What role does "human-machine communication" play within communication studies?
- How can cybernetics contribute to our understanding of artificial intelligence within this field?
- In what ways can traditional communication theories be adapted to account for interactions with smart devices?



2. Human Machin Communication: The Groundwork for Intellectual Genesis

2.1 Communication

The prevailing understanding of communication is traditionally encapsulated in the notion that it constitutes an interaction exclusively between humans. Initial conceptualizations during the 1940s, at the nascent stage of communication studies, defined it as a bounded human interaction. This delineation was reinforced in foundational literature, positioning communication within a strictly human context. Subsequently, all derived models, theories, and frameworks adhered to this human-centric paradigm, emphasizing interpersonal exchanges. Contemporary research trends have increasingly embraced the interactive model of communication, reflecting a nuanced understanding of communicative processes.

The post-World War II era marked a significant evolution in communication and media studies, introducing the concept of mass communication. This paradigm shift challenged the earlier interpersonal focus, proposing a model characterized by unidirectional information flows from media institutions to a dispersed, anonymous audience. In this context, technology is conceptualized not merely as a facilitator but as an integral channel in the transmission of information, underscoring its role in shaping the dynamics of communication.

2.2 The Influence of Communication on Technology Development

In initial research phases, the ontological distinctions between humans (sentient entities) and computers (programmed objects) were identified as a significant barrier to effective communication, with computational usage issues largely stemming from the challenges in facilitating human-machine interaction. This realization led engineers to integrate communication theories within their practice, positioning communication as a foundational model in technology design and engineering, including for artificial intelligence systems and computing devices. The field of "human-technology interaction" emerged as a pivotal area of study, driving forward this line of inquiry. Thus, it is evident that contemporary technology's development has been influenced, at least in part, by the principles of communication. (Guzman A. L., 2018)

2.3 Artificial Intelligence and Communication

As advancements in technologies such as communicative robots and chatbots have evolved, academic focus has shifted towards examining the communicative dimensions of artificial intelligence (AI). Scholars in this field underscore the imperative to reevaluate AI's development and impact, positioning communication as its pivotal theme. This approach acknowledges AI as a technology that not only introduces novel challenges to the concept of communication but also prompts a reexamination of traditional communication theories, which have primarily focused on human interactions.

The introduction of innovative phenomena in this academic arena, such as the widespread adoption of intelligent technologies like Apple's Siri and Amazon's Alexa, the deployment of robots on social media platforms for political purposes, and the incorporation of technological solutions in



media organizations to automate journalistic activities, has attracted substantial scholarly interest. This surge in attention derives from the ethical considerations that modern AI technology raises, representing a significant area of contemporary intellectual discourse.

Despite the relatively scant research dedicated to exploring AI's relationship with communication within the context of media and communication studies' historical evolution, certain researchers regard the communicative aspect as integral to AI's advancement. The historical connection between communication and AI is well-established in the literature; communication has been a companion to AI from its beginnings. Paolo Bory (2021) highlights this relationship (Paolo Bory, 2021), further supported by Martens (2022), who asserts, "Communication is essential for the definition and exploration of artificial intelligence." (Martens, 2022)

2.4 Artificial Intelligence and Communication Theories

For more than seven decades, artificial intelligence (AI) and communication studies have developed along distinct paths. AI research has predominantly aimed at emulating human intelligence features, such as communicative capabilities within machines. In contrast, communication has traditionally been conceptualized as a human-centric process, facilitated by technology, with an overarching focus on the dynamics of message exchange and its consequences among individuals.

The rapid advancements in AI technologies, especially those designed for communicative functions, have significantly narrowed the historical divide between AI and communication disciplines. This convergence is attributed to AI's role in embedding intelligent technologies into everyday life, making it a pervasive presence across various domains—from residential and automotive to healthcare and digital spaces (Andrea L Guzman, 2020). According Margaret Boden (2018), AI has become integral, underpinning the functionality of contemporary ecosystems with its diverse information processing capabilities and facilitating routine interactions, such as conversations with chatbots (Boden, 2018). Furthermore, the emergence of the Internet of Things is poised to amplify the integration of smart devices, while in journalism, the adoption of AI-powered tools for news production and dissemination reflects this trend (Andrea L Guzman, 2020).

This technological evolution challenges the adequacy of classical communication theories and models, which were conceived in different eras and contexts. These traditional frameworks, designed around human-human interactions, fall short of encompassing the complexities introduced by human-machine communications. This critical gap prompts communication scholars to reexamine how people engage with modern devices and to reconsider the definition of communication itself in light of these technological shifts.

Researchers advocate for leveraging insights from outside the communication field to bridge theoretical gaps, suggesting that a comprehensive understanding of communication in the age of AI requires adapting to the nuances of human-machine relations. This approach necessitates drawing upon the interdisciplinary field of human-technology interaction (HTI), underscoring the need for communication studies to evolve in response to the intricacies of contemporary digital interactions.



(Guzman A. L., 2018)

2.5 Human-Machine Communication (HMC)

Technological advancements in the late twentieth century shifted the research focus from media content to the technologies facilitating communication. This shift underscored the pivotal role of communication in technological evolution across various disciplines, raising questions about the need for a dedicated field examining human-machine communications.

This question prompted researchers to evaluate several aspects, including the dynamic nature of technology and the limitations of traditional communication theories in interpreting these advancements. Despite the divisions in theory and methodology within the communication discipline, along with its diverse intellectual roots and the ambiguity of its research origins, a confluence of technological, theoretical, and institutional factors has led to the establishment of Human-Machine Communication (HMC) as a new research domain. (Guzman A. L., 2018)

Proponents of this field, such as Andrea Guzman, emphasize its significance. Guzman describes HMC as a nascent yet vital area of communication research that delves into "the meanings that emerge from human-machine communication," with a specific focus on technologies designed for communication (Andrea L Guzman, 2020). She advocates for HMC as a critical foundation for scholars in media and communication, suggesting that a reexamination of artificial intelligence's history not only augments our comprehension of AI's development but also encourages a reconsideration of the theoretical frameworks guiding communication and media studies.

Guzman acknowledges the challenge of defining "Human-Machine Communication" (HMC) consistently, due to the variety of technologies studied and the diverse perspectives within the field. This area is characterized by its effort to amalgamate various viewpoints, serving as a bridge across different disciplinary boundaries. A further challenge stems from the philosophical dimensions of research, which impact the study's subject matter and methodological approaches, arising from the multitude of communication definitions within this field.

Nonetheless, parallels between "communication" and "Human-Machine Communication" (HMC) can be identified by focusing on the role and impact of technology (**Table.1**).



Table 1. Similarities between human communication and human-machine communication

Research Field	Central Participant in the Communication Process	Similarities
Human Communication	Human	<ul style="list-style-type: none"> - (HMC) mirrors interpersonal communication where an individual requests something from a robot, which then responds. - HMC can also be asynchronous and follow a mass communication model, similar to how news-writing software transforms user data into news stories. In this context, the device acts both as a speaker and a receiver.
Human-Machine Communication	Machine	

Source: The author, relying on (Guzman A. L., 2018)

In the mathematical model proposed by Shannon and Weaver, roles attributed to individuals are inherently defined by their human characteristics, deemed to be absolute. This delineation prompts a critical reassessment of the technological role in Human-Machine Communication (HMC), suggesting a progression from a mere intermediary or channel to that of a speaker or agent. This advancement leverages technological capabilities to enhance human interaction, whether through direct or indirect engagement. (Guzman A. L., 2016)

A thorough understanding of Human-Machine Communication (HMC) necessitates revisiting the foundational theories of communication, notably Shannon's mathematical model. Originally crafted to decode social interaction meanings, this model strictly categorized individuals as senders or receivers, thus marginalizing machines from assuming communicative roles. This orientation led scholars to prioritize the quest for meaning over the mechanical transmission and reception of signals.

Consequently, the conceptual framework of "communication" should maintain consistency across social and human-machine communication, provided they fall under the same scholarly discipline. If the quintessence of communication lies in meaning creation, then social communication is the generation of meaning amongst humans. Therefore, Human-Machine Communication can be articulated as the process of engendering meaning between humans and machines (Guzman A. L., 2016). However, acknowledging this shared definitional foundation does not preclude recognizing the distinct differences in interaction modalities between human-to-human and human-to-machine communication, particularly in the nuances of social engagement (Guzman A. L., 2018).



3. The Communicative Aspect of Machinery in Cybernetic Perspective

The recognition that engineered technologies function as communicative entities, predicated on the conceptualization of communication as a process facilitating humans and machines to perform identical roles—communicators, engaging in the transmission and reception of messages—underscores the partnership between humans and machines in the domain of communication. Both entities are endowed with "agency," the capacity for independent action and decision-making, albeit with varying degrees of agency. This acknowledgment prompts an inquiry into the mechanisms through which machines gain agency and the manner in which both humans and machines contribute to the communicative process, directing us towards an examination of cybernetics' historical evolution.

3.1. Cybernetics, Communication, and Artificial Intelligence

Cybernetics has been instrumental in shaping the trajectory of communication studies, establishing a theoretical foundation that probes the intricate relationship between humans and machines. Norbert Wiener, an American mathematician, is renowned for coining the term "cybernetics" in his groundbreaking 1948 publication. This discipline emerged during World War II, initially aimed at advancing weaponry and computing systems, but soon evolved to scrutinize communication processes within both organic and artificial systems. Wiener defined cybernetics as a field equally invested in the study of control and communication in machines and living beings. (Wiener, 1950) The advent of cybernetics significantly broadened the scope of communication, extending its reach beyond mere human interaction and cementing its relevance in communication studies.

Cybernetics also prompted a reevaluation of the previously rigid distinctions between humans, machines, and animals, proposing a unified perspective on interaction. Wiener's visionary assertion underscored the critical role of communication across human, machine, and interspecies domains, anticipating its profound impact on future developments. (Wiener, 1950) The debt that communication research owes to cybernetics cannot be overstated. While the foundations of media and communication studies precede those of cybernetics, the latter era underscored the pivotal role of communication, grounding its core theories—feedback, noise, entropy, and signal—in cybernetic principles. (Claude Shannon, 1949)

Artificial Intelligence (AI) epitomizes the principle of "control through feedback," highlighting machines' capacity for autonomous decision-making based on output analysis. This concept, though longstanding, gained formal recognition and became a focal point of scientific inquiry through cybernetics. The application of cybernetic principles to human behavior by early pioneers such as Herbert Simon, George Miller, and others paved the way for more efficient, effective, and safe industrial technology designs and automation (Kline, 2017). Cybernetics' influence on automation, described as a pivotal factor in modern technological development and a



cornerstone of the second industrial revolution, emphasizes its role in enhancing communication flows within and between systems. This led to the creation of sophisticated smart machines utilizing feedback mechanisms, with notable contributions from figures like Ross W. Ashby and Norbert Wiener. (Dechert, 1966) These innovations laid the groundwork for AI and fostered the development of advanced intelligent machines.

Cyberneticians were among the first to recognize the parallels between the human brain and machines, laying the groundwork for the central tenets of AI. This approach challenged traditional Cartesian distinctions, proposing that machines could possess goals and intelligence. In 1943, foundational cybernetic works posited that embedding purpose in machines through feedback could redefine their capabilities. The brain's neural activities served as an initial blueprint for constructing intelligent machines, a parallel that continues to influence various AI domains, including brain-computer interfaces, which aim to integrate human cognition with machine intelligence. (Paolo Bory, 2021)

3.2 Machine Agency VS Human Agency

A pivotal document, "Human Factors in Automated Systems," featured in the book "Robotics Industries," underscores the dynamic interplay between humans and robots. It notes, "Humans can interact with robots in diverse roles, such as colleagues, configurators, and maintainers." (Salvendy, 1985) This insight affirms the critical roles both humans and machines fulfill in pursuing collective goals.

Beckerling introduces the notion of "temporality" to describe the fluctuating agency between humans and machines within specific contexts. This concept suggests that authority shifts between humans and material elements at different moments within a practice. For instance, human authority is evident when programming and tasking an artificial intelligence system, while the system asserts its autonomy as it processes data and independently makes decisions. (Guzman A. L., 2016)

Suchman conceptualizes the "meaning-making" interaction between humans and technology as "human-machine communication." This exchange occurs at the interface where humans can transmit messages or data to technological devices through various actions, including pressing a button, vocal commands, or voice instructions. Machines reciprocate by sending messages to humans, facilitating a two-way communication process. (Suchman, 2007) While these messages may seem simplistic, they are instrumental in conveying control information, embodying the cybernetic interpretation of communication.

From a cybernetic perspective, examining machine systems reveals an intricate network of human-machine communication. Consequently, machines transcend their traditional view as mere production systems, positioning themselves as integral components of communication networks. Cybernetics, therefore, prioritizes the communication process over the mediums or channels employed, emphasizing the systemic nature of these interactions.



3.3 A Critique of the Cybernetic Approach

Despite acknowledging the communicative potential of industrial machines and their significance within the field of communication research, the cybernetic definition of communication is criticized for its theoretical inadequacies. The primary critique centers on its functionalist definition, which narrowly confines communication to the mere transmission and reception of information. This perspective overlooks the crucial aspects of communicative context and the dynamics of interpersonal relationships. Andrea Guzman addresses this shortfall by focusing on the overlooked dimension of communication: the emergent meaning from human-machine interactions (Guzman A. L., 2016)

4. Communicative Artificial Intelligence

4.1 Elevating Communication Theories within Communicative AI

The evolution of communicative artificial intelligence (AI) demands a reevaluation of traditional communication models, historically perceived as exclusive human endeavors, to acknowledge the integral role of technology. Guzman posits that Human-Machine Communication (HMC) is adept at addressing these paradigm shifts by emphasizing the significance of meaning in interactions where machine acts as at least one participant in the communication process, either as the sender or the receiver.

HMC stands out as a pivotal framework for examining communicative AI, as it fundamentally challenges the traditional view of communication as a purely human activity and refutes the notion of technology merely as a passive conduit. Instead, the field recognizes the role of technology based on its capabilities and functions within communication, fostering the development of a novel theoretical outlook that positions technology as an active participant in dialogue with humans. (Andrea L Guzman, 2020) Importantly, this perspective highlights technology's multifaceted role in this research domain, providing a fresh theoretical and methodological path for communication scholars to explore AI as a burgeoning topic within media studies.

4.2 The Human Role of Machines in Media

The transformation of machines from mere communication channels to active communicative agents marks a significant shift in their role. Traditionally, machines served as conduits for information transfer between individuals. With the advent of artificial intelligence (AI), however, machines have gained the capability to autonomously generate and disseminate information, moving beyond their conventional channel role. This evolution is particularly evident in generative AI and algorithmic systems, which are capable of performing a wide array of tasks, extending from reproducing text, images, and sounds to artificially creating symbols. (Lévy, 2023) Furthermore, chatbots such as ChatGPT and Google Bard exemplify machines that autonomously create and share content across social media platforms using computational algorithms.

This swift societal pivot towards algorithmic services and intelligent robotics has reshaped the



landscape of media organizations, altering their workflows and expanding the range of informational options available. Media entities globally are exploring innovative ways to engage their audiences and ensure their viability, increasingly adopting new operational models in response to the AI surge.

Today's media industry is fundamentally technological, with technology's role in content production fostering a symbiotic relationship that leads to the emergence of novel journalistic practices at the intersection of coding and journalism. This trend towards automation in the media sector is driven by news organizations' growing interest in reducing manpower, cutting costs, and enhancing operational efficiency.

Digital journalism studies have been characterized as an academic field that investigates the convergence of technology, digitalization, and journalism, focusing on the sustainability of these integrations. It emphasizes the proliferation of automated practices, the transformation of journalistic routines, and the exploration of contemporary AI-related issues.

In this context, Guzman and Lewis introduce the concept of "communicative AI" to denote specific applications, such as automated writing software or social robots, designed to perform tasks traditionally executed by humans. Communicative AI liberates machines from their erstwhile intermediary function, emphasizing the significance of digital technology and innovation within newsrooms for media organizations striving to comprehend and leverage these developments to secure their long-term prosperity. (Agnes Stenbom, 2021)

5. CONCLUSION

The pursuit of communicative artificial intelligence (AI) aims to dismantle entrenched views of communication by encouraging researchers to extend their understanding beyond the traditional conflation of communication with human interactions. Specifically, within the context of automated journalism and the broader field of journalism, this research area strives to cultivate a dialogue that integrates individual interactions with communicative technologies. Sociologists advocate for a reevaluation of the communication concept by shifting our view of the communicative process to embrace the "machine" aspect and move away from an exclusively "human" focus. The argument is for considering intelligent technologies through the lens of communicative AI rather than solely an AI perspective. (Esposito, 2022)

Accordingly, communication and media studies are called to engage with the wider scientific landscape, which encompasses the foundational sciences that supported the genesis and subsequent development of these fields, both internally and externally. This engagement allows researchers to grasp the foundational pillars of this domain, opening avenues for scholarly contributions. Engaging researchers within the communicative ecosystem is crucial for reestablishing a connection with reality. Sadik Rabah views contemporary media and communication studies as a collaborative endeavor among all stakeholders with relevant expertise, discouraging isolation from the scientific community and the solitary construction of each entity's interpretation of the "discipline." (Rabeh,



2019) Researchers posit that at its core, the discipline of media and communication inherently embodies an interdisciplinary field. From this perspective, there emerges a recognition of the limited integration with adjacent knowledge areas to communication science, which is intrinsically interdisciplinary in its methodological and theoretical synthesis. It is epistemologically linked to fields such as software engineering and computer science (Andreas Hepp, 2022), presenting researchers with opportunities to further enrich communication studies.

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