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Disentangling Two Fundamental Paradigms in Human-Machine Communication Research: Media Equation and Media Evocation

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Abstract

In this theoretical paper, we delineate two fundamental paradigms in how scholars conceptualize the nature of *machines* in human-machine communication (HMC). In addition to the well-known Media Equation paradigm, we distinguish the Media Evocation paradigm. The Media Equation paradigm entails that people respond to machines *as if* they are humans, whereas the Media Evocation paradigm conceptualizes machines as objects that can evoke reflections about ontological categories. For each paradigm, we present the main propositions, research methodologies, and current challenges. We conclude with theoretical implications on how to integrate the two paradigms, and with a call for mixed-method research that includes innovative data analyses and that takes ontological classifications into account when explaining social responses to machines.

Keywords: CASA, computers are social actors, computers as social actors, human-machine communication, media equation, media evocation, mixed-method research

Introduction

In this theoretical paper, we delineate two fundamental paradigms in how scholars conceptualize the nature of *machines* in human-machine communication (HMC). In addition to the well-known Media Equation paradigm (e.g., Reeves & Nass, 1996), we distinguish the

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Media Evocation paradigm (following the concept of *evocative objects* in Turkle's influential work of 1984 and 2007). We argue that these two paradigms fundamentally differ in their explanations for why humans respond socially to machines, in their research questions, and in their research methodologies. The key notion in the Media Equation paradigm is that people respond mindlessly to machines *as if* they are humans. In contrast, the Media Evocation paradigm conceptualizes machines as objects that are *betwixt and between* former diametrical opposites—such as person versus thing— evoking reflection and negotiation processes about the nature of the object but also about ourselves and human identity. Here, social responses are potentially due to the fact that machines *are* a kind of social actors—albeit different ones than human social actors.

For this succinct summary of the two paradigms we were inspired by the observation that articles referring to the CASA framework—which is the most often employed framework to guide HMC research (e.g., Fortunati & Edwards, 2021; Gambino et al., 2020; Spence, 2019)—use the acronym both for "computers *as* social actors" as well as for "computers *are* social actors," usually without addressing this difference.[1] In our interpretation, the main notions of the Media Equation paradigm imply that humans respond to computers or machines *as* social actors, whereas in the Media Evocation paradigm machines *are* (some type of) social actors. The interchangeable use of "as" and "are" in the CASA acronym could be interpreted as an indicator of the fact that thus far HMC research lacked an explicit differentiation between the Media Equation and Media Evocation paradigms.

The current paper aims to present these two paradigms by showcasing their main propositions, associated research methodologies, and current challenges. Herein, we rely on classical works (particularly Nass et al., 1994; Nass et al., 1993; Reeves & Nass, 1996; Turkle, 2005, orig. 1984), as well as recent theoretical and empirical publications within the HMC field. We argue that these classical works have been visionary in drawing our attention to the huge importance of computers in our lives and to the intriguing observation that humans respond socially to these even though they know that they are not communicating with a human. At the same time, HMC researchers have pointed out that the technical developments that now enable us to interact with AI-enabled communicators such as social robots, chatbots, voice assistants that can talk with us, know our name, distinguish our voice, and learn our preferences make it pressing for the HMC research community to revisit our theorizing and decide how to move forward (e.g., Fortunati & Edwards, 2020, 2021; Fox & Gambino, 2021; Gambino et al., 2020; Guzman, 2018; Guzman & Lewis, 2020; Lombard & Xu, 2021; Spence, 2019).

In our conclusions, we note that particularly the Media Equation paradigm gained much momentum in the HMC field, focusing on the notion that people mindlessly respond socially toward machines and typically involving quantitative, experimental research methods. However, current interactions with AI-enabled communicators make it pivotal for HMC scholars to also focus on the Media Evocation paradigm, which emphasizes reflections and negotiations regarding the ontological boundaries concerning (among others) humans and machines. In our conclusions, we also make a plea for more qualitative research, and mixed-method research that includes innovative data analyses and that takes ontological

1. A Google Scholar search listed about 2,170 articles mentioning "Computers *are* Social Actors," whereas about 1,350 articles mentioned "Computers *as* Social Actors" (date of search: February 14, 2022).

classifications into account when explaining social responses to machines. As such, our recommendations echo previous calls for more research looking into how machines blur the ontological boundaries surrounding what constitutes human, machine, and communication (e.g., Edwards & Edwards, 2022; Fortunati & Edwards, 2020, 2021; Guzman & Lewis, 2020) and for more inductive and mixed-method projects (e.g., Gambino et al., 2020; Richards et al., 2022). Our intention is that our comparison of the two paradigms will inspire HMC research to recognize, delineate, and integrate both of these two mindsets that are so fundamental in this field. In doing so, we can increase our understanding of how and in which situations Media Equation and Media Evocation processes are at play, thus gaining a more holistic understanding of our social responses to machines.

Media Equation

Foundational Work

Theoretical Notions

The first paradigm originates in the book *The media equation: How people treat computers, television, and new media like real people and places*, in which Reeves and Nass (1996) reported that they found that individuals' interactions with computers and new media are fundamentally social and natural. They concluded that "media equal real life" and posed that this applies to everyone, applies often, and is highly consequential (p. 5). They emphasized that people have these social responses even though people believe these are not reasonable, and even though they do not think these responses characterize themselves (p. 7). Nass et al. (1993, p. 111) wrote that "[u]sers can be induced to behave *as if* computers were human, even though users know that the machines do not actually possess 'selves' or human motivations," and Kim and Sundar (2012, p. 241) posited that "[e]verybody knows that a personal computer is not human. [. . .] Yet, we respond to it socially." Thus, computers are conceptualized from the perspective of what they are *not,* that is, they are *not* human. Therefore, in the CASA acronym, the adverb "as" (i.e., computers *as* social actors) seems most appropriate for the Media Equation paradigm.

Within this perspective, the paradoxical situation that users constantly exhibit social responses toward computers, while consciously being aware that this behavior may be inappropriate when exhibited toward nonhuman entities, naturally led to a focus on mindless attribution processes (Fortunati & Edwards, 2021, p. 13). People treat computers in some of the ways they treat humans by *mindlessly* applying to them the same social scripts they use in human-human interactions (Nass & Moon, 2000). Reeves and Nass (1996, p. 252) wrote that these automatic responses can be initiated with "minimal cues" (p. 253). Machines with limited cues—for instance words as output—induce individuals to employ human-oriented decision rules that they believe are inappropriate for assessing machine behavior (Nass et al., 1993, p. 111).

Reeves and Nass's (1996) explanation for this phenomenon that people are not evolved to 20th-century technology, and that modern media engage old brains (p. 12). That is, people respond to simulations of social actors and natural objects as if they were in fact social and natural: "absent a significant warning that we've been fooled, our old brains hold sway and we accept media as real people and places" (p. 12). The notion of "ethopoeia" (a direct

response to an entity as a human *while knowing* that the entity does not warrant human treatment or attribution, Nass & Moon, 2000, p. 94) was inspired by Langer's (1989/2014, 1992) work on mindfulness and mindlessness. Although the authors of the seminal Media Equation publications acknowledged that "people can be trained to be more mindful of context cues" (Nass & Moon, 2000, p. 98), and that they might be able to think their way out of primitive, automatic responses, they concluded that this strategy makes the process harder and is not typical or usual (Reeves & Nass, 1996, p. 13). They did not see this as a deficiency or dysfunction, but rather as useful and reasonable: people automatically assume reality because throughout evolution there was no reason to do otherwise (Reeves & Nass, 1996, pp. 252–253). In sum, the focus in this paradigm was on the identification of social attitudes, behaviors, and rules that are mindlessly triggered when humans interact with machines (e.g., Nass & Moon, 2000, p. 99).

Research Methodology

In the original CASA experiments (e.g., Nass et al., 1994, 1993; Reeves & Nass, 1996), manifest manipulations were related to behavioral responses, thus inferring mindless processes without asking for self-reports. The research design included the following steps: pick a social science finding about how people respond to each other or to the natural environment (e.g., about politeness); change "human" to "computer" in the theoretical statement; replace one or more humans with computers in the experiment; provide the computer with characteristics associated with humans (e.g., language output, responses based on multiple prior inputs, displaying roles traditionally filled by humans, human-sounding voices), and determine whether the social rule still applies (Nass et al., 1994, p. 72; Reeves & Nass, 1996, pp. 14–15). Thirty-five of such studies led Reeves and Nass (1996, p. 6) to formulate the Media Equation paradigm: media take the place of real people and places. They were very straightforward about not being interested in users' reflections. About their experimental research, they wrote that "these methods do not rely on people's ability to be introspective, and they provide objective data. If we had asked people to comment on whether they were polite to computers [. . .], we would have had nothing to report" (p. 255).

Recent HMC Research

HMC Theorizing

Taking these Media Equation notions as a starting point, recent theoretical contributions focused on how to conceptualize and study humans' interactions with AI-enabled communication technologies such as social robots, chatbots, and virtual agents. Updating the foundational theoretical notions that were introduced in the early 1990s is deemed necessary because people have changed (i.e., they have gained experience with artificial agents), technologies have changed (i.e., recent technologies are much more sophisticated in terms of interactions and anthropomorphic features), and affordances have changed (i.e., what users can do with technologies has developed significantly) (e.g., Fortunati & Edwards, 2021; Fox & Gambino, 2021; Gambino et al., 2020; Lombard & Xu, 2021; Sundar, 2020).

In these theoretical contributions, three main points stand out in particular. First, whereas Reeves and Nass (1996) suggested that automatic responses can be initiated with "minimal cues," authors now propose to further differentiate how single social cues and

combinations of these evoke social responses (Gambino et al., 2020; Lombard & Xu, 2021; Sundar, 2020). Social cues have been defined as physical and behavioral features displayed by a social actor, of which a social actor's voice, humanlike appearance, and eye gaze are examples (Lombard & Xu, 2021, pp. 31–32). Importantly, in their Media Are Social Actors (MASA) paradigm, Lombard and Xu (2021) formulated testable propositions on how variations in the quality and quantity of such cues may lead to medium-as-social-actor presence and social responses.

Second, in response to the focus on mindlessness (e.g., Nass & Moon, 2000), Lombard and Xu (2021) proposed mindless and mindful anthropomorphism as two major complementary mechanisms that help to understand people's social responses to technology. Depending on the social cues, individual factors (such as personality and experience with technologies), and contextual factors, mindless or mindful anthropomorphism may be activated. Relatedly, in their work on robots and the Media Equation effect, Złotowski et al. (2018) put forth that anthropomorphism may be the result of a dual process: first, a fast and intuitive (Type 1) process that quickly classifies an object as human-like and results in implicit anthropomorphism, and second, a reflective (Type 2) process that is based on conscious effort and results in explicit anthropomorphism. This ties in with the metatheory of dual processing which increasingly receives attention in HMC research (Koban & Banks, 2023). In addition, Lombard and Xu (2021) suggested that there may be other possible explanations for social responses—that have received less attention in the HMC literature—such as for instance the source orientation explanation, the cognitive load explanation, and folk explanations of social behavior (p. 40).

Third, Gambino et al. (2020) argued that—in addition to the mindless application of human-human social scripts—the mindless application of human-media social scripts may also be at play. This is related to Sundar's (2020) notion of the machine heuristic, which is a mental shortcut whereby people attribute machine characteristics when they make judgments about an interaction (p. 7). Usually positive stereotypes of machines (i.e., they are rule-governed, precise, accurate, objective, neutral, and they do not gossip) as well as usually negative ones (i.e., they are mechanistic, unemotional, cold, and prone to being hacked) form the basis for these heuristics.

HMC Research Methodology

HMC research within the Media Equation paradigm mainly relies on experimental designs. Although these studies typically did not exactly follow the steps that were characteristic for the foundational experiments and are thus not replications of the classical work (with exceptions such as Leichtmann & Nitsch, 2021), some of these did test whether aspects of human-human communication (e.g., correspondence bias and the social desirability effect) also occur in human-robot interactions (e.g., Edwards & Edwards, 2022; Leichtmann & Nitsch, 2021). This type of work has led some authors to conclude that empirical results do not consistently support CASA's predictions (e.g., Fox & Gambino, 2021; Leichtmann & Nitsch, 2021) and that there are differences between how participants judge humans and machines such as robots (e.g., Edwards & Edwards, 2022).

So far, the notions of mindless and mindful processing and dual processing (Koban & Banks, 2023; Lombard & Xu, 2021) have found their way into HMC research in experimental studies in which both mindless and mindful anthropomorphism were included as

mediators. A first publication in this line of research was Kim and Sundar's (2012) article in which they challenged Nass and Moon's (2000) notion that anthropomorphism involves the thoughtful, sincere belief that the object has human characteristics and thus cannot explain social responses (p. 93). Kim and Sundar wrote that anthropomorphism could also be automatic and mindless (p. 242), and they thus set out to examine whether the tendency to treat human-like agents as human beings is conscious (mindful) or nonconscious (mindless). Mindless anthropomorphism was measured by asking participants how well the adjectives likeable, sociable, friendly, and personal described the website (with/without a human-like agent), whereas mindful anthropomorphism was assessed by asking participants directly whether they perceived the website as humanlike/machinelike, natural/unnatural, or lifelike/artificial (Powers & Kiesler, 2006). Following this example, recent experiments that investigated the effects of (social cues in) chatbots have also included these two measures as mediators (e.g., Araujo, 2018; Ischen et al., 2020; Zarouali et al., 2021, see also van der Goot, 2022). This is a deviation from the classical Media Equation work, in which self-reports and thus such mediators were deemed unnecessary.

These types of studies are needed to further test Lombard and Xu's (2021) propositions, disentangling the effects of varying social cues on mindless and mindful processing. However, for differentiating these types of processing, the current explicit measures of mindless and mindful anthropomorphism are not uncontested, and researchers aim to move forward by using a combination of methods and measures including behavioral measures, interviews, and open-ended questions; explicit and implicit measures; and psychophysical measures such as fMRI and EEG (e.g., Lombard & Xu, 2021; van der Goot, 2022). More specifically, two-response procedures or conflict-detection procedures in combination with eye-tracking may help to make a clear distinction between Type 1 and Type 2 processes (Koban & Banks, 2023).

Media Evocation

Foundational Work

Theoretical Notions

We called the second paradigm Media Evocation (referring to Turkle's concept *the evocative object)*, which she proposed in her influential book *The second self: Computers and the human spirit* (2005, orig. 1984) and later elaborated on in her book *Evocative objects* (2007). Herein, the computer is conceptualized in terms of its "second nature" as an evocative object: an object that provokes self-reflection (Turkle, 2005, p. 2), fascinates, disturbs equanimity and precipitates thought (p. 19), and a problematic object that defies easy categorization and troubles the mind (p. 4). The computer stands "betwixt and between," in some ways on the edge of mind, thus raising questions about mind itself (p. 29). Thus, in contrast to the absence of a conceptualization of computers in the Media Equation paradigm, computers are conceptualized from the perspective of what they *are.* In this paradigm, users respond socially to machines—and even develop relationships with them—because the machine's evocative and "betwixt and between" nature changes how we think about what a social actor is—and that it does not necessarily have to be a human. Therefore, in the CASA acronym,

the adverb "are" (i.e., Computers *are* Social Actors) seems most appropriate for the Media Evocation paradigm.

In contradiction to the propositions in the Media Equation paradigm, it is not the user's behavior, but instead, the machine's state that is paradoxical. Turkle (2005, p. 326) draws on Turner's (1969) work on liminal objects and Douglas's (1966) observations about marginality, referring to ambiguous states, or disorientation of individuals or groups (e.g., adolescents): a threshold state in which they find themselves after disengaging from the prevailing social order or pattern. Similar to those individuals or groups, machines possess neither properties of their previous state (e.g., "thing") nor those of the future one (e.g., "hybrid" or "subject"), inducing reflections and negotiations about these categories and the object itself. Thus, social behavior toward machines is part of a mindful process of reflection, which involves negotiations concerning the nature of the machine, the user, and their relationship. Instead of being fooled by their old brains, users are being inspired by the paradox of the machine to re-think their schemes and paradigms. Hence, computers bring philosophy down to earth, by raising questions about the machine's "life" and "mind," and then by extension, making us wonder what is special about our own (Turkle, 2005, p. 2). Computational objects, poised between the world of the animate and inanimate, being at the same time a thing and a subject, alive and not alive, a physical object and an abstract idea, are experienced as both part of the self and of the external world, evoking questions about life, mind, and human identity.

Research Methodology

Turkle based her notions on her ethnographic work in the 1980s in which she studied computer cultures such as home computer owners, hackers, and artificial intelligence experts, as well as children, by living with them, participating in their lives and rituals, and interviewing them to understand things from the inside (2005, p. 25). For instance, she gave children, in groups and individually, toys—some traditional and some electronic—and observed their spontaneous reactions. She also asked questions in Piaget's style and gave them small tasks to, for example, sort pictures into piles according to whether the objects pictured were "alive" or "not alive" or asked them to draw something alive and not alive (p. 45). This starkly contrasts with the Media Equation paradigm, in which Reeves and Nass (1996) expressed no interest in users' reflection and introspection. Turkle's (2005) description of several groups of people enabled her to show the computer's second nature as a reflective medium and a philosophical provocateur (p. 279). She concluded that we need a new object relations theory. That is, a theory about our connection with objects or things, to help us understand feelings such as attachments to machines and to navigate them responsibly (p. 297).

Recent HMC Research

HMC Theorizing

When Guzman (2018) laid out the foundation for HMC as a research area within communication science, she defined HMC as the creation of meaning among humans and machines (p. 1). She noted that—following earlier work by Blumer (1969), Mead (1967), and Carey

(1989)—communication is also a means through which people learn about their world, form an understanding of Self and Other, and contribute to the shape of society. Thus, questions arise like: "What sorts of relationships emerge when technologies become communicators? How do people understand themselves as the results of their interactions with, for instance, a virtual agent? And what society is being constructed through people's communication with humans as well as machines?" (pp. 3–4). Similarly, just like Turkle (2005) conceptualized computers as philosophical provocateurs, Fortunati and Edwards (2021, p. 15) noted that the blurred boundaries between humans and current-day AI-enabled communicators raise questions such as: "What is a human being? What are our capabilities regarding thinking and doing things? How are these capabilities different from those of communicators such as robots?" And although both humans and machines may be social actors, they are not necessarily seen as the same type of social actor (Edwards & Edwards, 2022, p. 8).

Several scholars worked on conceptualizing the "betwixt and between" nature of these modern communicators. For instance, Etzrodt and Engesser (2021) conceptualized voice-based agents as "personified things," referring to Piaget's fundamental ontological object-subject classification, which they identified as a modification of the "thing" scheme, tending toward "person." Similarly, Guzman (2015, p. 252) referred to such agents as "social things" to emphasize their enhanced social nature, which at the same time is different from social beings. Gunkel (2020, p. 55) referred to Ihde's (1990) "quasi-otherness" to emphasize that some machines like Jibo inhabit a place in between the two ontological classifications "who" or "what," which he substantiated as being between "thing" and "person" in recent publications (Gunkel, 2022). Drawing on Harraway's (e.g., 1991, 2008) ideas of boundary projects and moving ontologies when humans meet other species, Suchman (2011) created the term "subject objects" for humanoid robots, to indicate the simultaneity of both categories during negotiation. In a similar vein, Krummheuer (2015, p. 185) transferred the negotiating act to embodied conversational agents by referring to Braun-Thürmann's (2002) "threshold object" ("Schwellen-Objekt" in German) to indicate that these agents are neither a human nor an artifact, emphasizing the triangulation of the agents' design, the users' interpretation, and the situation itself (p. 183).

HMC Research Methodology

The empirical studies that investigated ontological boundaries and the ontological classification of machines included qualitative interview studies (e.g., Guzman, 2019, 2020; van der Goot, 2022), surveys with open-ended questions (e.g., Edwards, 2018), content analyses of user reviews (e.g., Purington et al., 2017), and surveys that aimed to develop measures that capture the hybrid nature of machines (e.g., Etzrodt, 2022; Etzrodt & Engesser, 2021; Weidmüller, 2022).

These empirical studies showed how users negotiate the nature of machines, and the struggles this implies. For instance, users struggled with how to refer to artificial agents when constantly shifting between the pronouns "she" and "it" (Guzman, 2015; Purington et al., 2017), and the majority of participants in Etzrodt and Engesser's (2021) study classified these agents in the realm of "personified things" but they were highly uncertain about this classification. In addition, Guzman's (2020) analysis of her interviews showed that people differentiate between humans and computers based on origin of being, degree of autonomy, status as tool or tool-user, level of intelligence, emotional capabilities, and inherent

flaws, but that the ontological boundaries are getting more and more blurred due to the fact that technologies increasingly emulate human-like qualities such as emotion. Relatedly—when asked to group humans, chimpanzees, and robots—thoughts about naturalness/artificiality, (non-)aliveness, (non-)resemblance to humans' embodiment, intellect, and behavior, or interactivity, and—true only for some—the difference from and the inferiority to human beings were evoked (Edwards, 2018).

Also, analyses in terms of source orientation (who or what they think they communicate with, Guzman, 2019, p. 344) revealed that users diverged in their perceptions. For voice assistants, they related to voices of the machine (i.e., the mobile device) versus voices in the machine (i.e., an agent separate from the device) (Guzman, 2019), whereas for text-based chatbots they thought they had communicated with a human being, a conversational agent (e.g., virtual assistant, robot), something software-related (e.g., algorithms) or something hardware-related (e.g., computer, machine or server) (van der Goot, 2022). Importantly, the question is raised how these conceptualizations inform humans' interactions with these artificial communicators (e.g., Edwards, 2018; Guzman, 2020).

In contrast to the Media Equation paradigm, the Media Evocation paradigm focuses on mindfulness. That is, conscious negotiation processes, whereby the findings seem to rely on the user's ability to express an in-between status, graduality, or hybridity. However, this may be limited not only by the participant's (in)ability to verbalize this (Turkle, 2005) but also by our language that does not yet provide words for machines' hybrid statuses, forcing people into the two poles person ("she/he") or thing ("it"), respectively "who" and "what." Thus, it is vital that HMC researchers keep reflecting on and conceptualizing machines' "betwixt and between" status, keep conducting observational and interview studies to gain insights in the interactions in naturalistic settings and from the users' perspectives, and aim to develop measures that provide insights in machines' hybrid nature without forcing participants to have to invent words or use words that are unnatural to them. Moreover, Etzrodt (2022) highlights the difficulties in analyzing quantitative measures that consider the ontological hybrid nature of machines, by demonstrating that the often reasonably skewed data call for the need for more innovative and robust analyses beyond simply examining central tendencies.

Conclusion and Future Directions

In this paper, we presented a distinction between two paradigms that are driving current HMC research. First, the Media Equation paradigm, which—in its seminal works—conceptualized machines as nonhuman beings that "fool" humans into mindless social responses, and that now focuses on how a variety of social cues leads to social responses through both mindless and mindful processes. The empirical studies within this paradigm mostly rely on experimental designs to test these effects. Second, the Media Evocation paradigm, which conceptualizes machines as objects that can evoke reflection or negotiation processes about, e.g., the ontological categories "who" and "what," since they are "betwixt and between" these categories, and, depending on the situation, culture, or individual inclination are sometimes more one or more the other—resulting in more or less mindful social responses. Within this paradigm—to be able to understand users' reflections and negotiations—qualitative analyses are more common.

Theoretical Implications

We envision that making this differentiation more explicit in HMC research deepens our understanding of *why* humans react socially toward machines and the consequences this has. Obviously, it is important to continue studying the impact of social cues on social responses, whereas at the same time it is vital to investigate machines in their roles as "philosophical provocateurs" and describe how users negotiate and reflect on their own identities and those of the machines they are interacting with. It is called for to study how the hybrid "betwixt and between" nature of machines makes the boundaries between humans and machines less clear.

So far, the Media Equation paradigm and its emphasis on mindless processes (e.g., Nass & Moon, 2000; Reeves & Nass, 1996) gained a lot of momentum in the HMC field. These works enabled HMC researchers to consider machines as serious social actors, although the machines were only conceptualized as *as-if* actors (i.e., they are not human). Importantly, also in the influential Media Equation publications, authors indicated that the "equation" does not apply to all social interactions with machines. Whereas these authors focused on "social attitudes and behaviors that are controlled by more primitive or automatic processes" and "[r]ules that are used frequently" (Nass & Moon, 2000, p. 99), they did acknowledge the existence of conscious, reflective processes (e.g., Nass & Moon, 2000, p. 99; Reeves & Nass, 1996, p. 9). However, since the Media Equation paradigm does not offer a theoretical framework for exploring these conscious reflections, HMC researchers can in addition turn to the work of Turkle (2005, 2007) and Langer (1992)—authors who were also mentioned by Reeves and Nass, and Nass and Moon.

Langer's (1992) views on mindlessness and mindfulness can provide a bridge to exploring the causes of social responses more holistically. She wrote that "[r]ather than relegating all social interaction to mindless behavioral scripts, I began exploring contextual factors that might shift conscious awareness from minimal structural cues to a more complete awareness of available information" (p. 290). She also emphasized situational factors alongside individual ones. Whereas mindless responses seem invariant, she pointed out that being aware of our behavior, and the factors causing it, makes us more flexible and better able to adapt to new situations (pp. 300–301)—which is very pertinent for our current-day interactions with artificial communicators. Recent work on dual processing will also help HMC researchers to study the interplay between such mindless and mindful processes (e.g., Koban & Banks, 2023; Złotowski et al., 2018).

In addition, the inclusion of the Media Evocation paradigm (using Turkle's 2005, 2007 work) will help to come to a more in-depth understanding of how machines *are* social actors, by exploring the "betwixt and between" nature of machines, thus moving on from the limited dichotomy of either "thing" or "person" (e.g., Etzrodt & Engesser, 2021; Gunkel, 2022). Recognizing and paying sufficient attention to both of the paradigms will deepen our understanding of how and in which situations Media Equation and Media Evocation processes are at play, thus gaining a more holistic understanding of our social responses to machines.

Methodological Implications

As said, the Media Equation paradigm gained a lot of momentum, and this paradigm relied almost exclusively on experimental study designs (Gambino et al., 2020). Indeed, a recent

analysis of 132 HMC publications in 28 communication journals over the past decade found that quantitative studies accounted for almost half of all studies (48.5%), and that the most used type of data collection was an experiment (40.2%). Qualitative studies (12.1%) and especially mixed-method studies (only 3.8%) accounted for the smallest number of studies (Richards et al., 2022, pp. 52–53).

Following previous calls (e.g., Gambino et al., 2020; Richards et al., 2022; van der Goot, 2022), we emphasize that more qualitative and inductive studies are needed. This will contribute to our understanding of not only the human-human or human-media scripts people are using in their interactions (Gambino et al., 2020, p. 79), but also our understanding of how users negotiate the blurring boundaries between humans and machines. Importantly, it will enhance our understanding of how ontological classifications relate to humans' social responses to machines (e.g., Edwards & Edwards, 2022). For quantitative data, the hybrid nature of human-machine communication implies that more innovative, robust strategies of data analysis are required (e.g., Etzrodt et al., 2022). And finally, we would like to make an especially strong plea for more mixed-method studies. Fortunati and Edwards (2021, p. 23) concluded that the research methodologies in the HMC field increasingly integrate qualitative and mixed methods, and we underline that to enhance our understanding of both Media Equation and Media Evocation we cannot do without more mixed-method research. Specifically, the combination of experiments (in which entity perceptions are included as mediators) with observations and interviews that use think-aloud methods and open-ended questions is needed to gain in-depth insights in both the effects and the negotiations in response to machines such as voice-based agents, robots, and chatbots.

Author Biographies

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Katrin Etzrodt (PhD, TU Dresden, Germany) is a research associate at the Institute of Media and Communication at the TU Dresden. Her work particularly focuses on users' definitions of the situation when communicating with voice-based assistants and other artificial agents, and on the negotiation process when objects cannot be categorized precisely.

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