Guzman, A., 2022. "Moving Human-Machine Communication Forward Through the Study of Non-Use and Failure."
communication +1, vol 9, iss 1,
DOI: 10.7275/1crf-aj68

Moving Human-Machine Communication Forward Through the Study of Non-Use and Failure

Andrea L Guzman, Northern Illinois University, alguzman@niu.edu

One of the fundamental shifts within the study of communication since the launch of *communication +1* has been the swift growth of Human-Machine Communication (HMC). In 2016, the journal highlighted the changing nature of interactions among people and technology with its volume focused on "Machine Communication." In their introduction to that issue, McDowell and Gunkel[1] stressed that the robot invasion of science fiction was a reality, not in terms of the imagined takeover by sentient tech but in the burgeoning significance of the exchange of increasingly human-like messages between people and technology. Equally important, McDowell and Gunkel continued, were (and still are) the massive flows of data among machines mediating and directing more and more of the human experience. At the time the volume was published, the HMC movement was taking shape within communication studies. Its goal was to more fully carve out a specific area of research that would situate the machine as communicator and interrogate the exchange of messages among people and technology from varying philosophical, theoretical, and methodological perspectives.[2]

The pursuit of recreating life and understanding the ontological spectrum from object to human to the divine is an ancient endeavor spanning the world.[3] Within the twentieth century, pursuit of these technological, social, and philosophical questions intensified with the advent of computers; however, artificial intelligence and robots were viewed as outside the domain of much of the study of communication and its cognates, such as media studies.[4] What caught the interest of increasing numbers of communication scholars during the start of the new millennium was the introduction of technology that could vocally speak in ways that more closely emulated human behavior. Such behavior by machines upset the theoretical

---

[1] Zachary J. McDowell and David J. Gunkel, "Introduction to 'Machine Communication,'" *communication +1* 5, no. 1 (2016): 1–5, http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1056&context=cpo.

[2] see Andrea L. Guzman, "What Is Human-Machine Communication, Anyway?," in *Human-Machine Communication: Rethinking Communication, Technology, and Ourselves*, ed. Andrea L. Guzman, Digital Formations (New York: Peter Lang, 2018), 1–28; Patric R. Spence, "Searching for Questions, Original Thoughts, or Advancing Theory: Human-Machine Communication," *Computers in Human Behavior* 90 (2019): 285–87, https://doi.org/10.1016/j.chb.2018.09.014; Leopoldina Fortunati and Autumn Edwards, "Opening Space for Theoretical, Methodological, and Empirical Issues in Human-Machine Communication," *Human-Machine Communication* 1 (2020): 7–18, https://doi.org/10.30658/hmc.1.1.

[3] Adrienne Mayor, *Gods and Robots: Myths, Machines, and Ancient Dreams* (Princeton: Princeton University Press, 2018); Jessica Riskin, ed., *Genesis Redux: Essays in the History and Philosophy of Artificial Life* (Chicago: University of Chicago Press, 2007).

[4] see Guzman, "What Is Human-Machine Communication, Anyway?"; and the Histories and Trajectories section of Andrea L. Guzman, Rhonda McEwen, and Steve Jones, eds., *The SAGE Handbook of Human-Machine Communication* (London: SAGE Publications, forthcoming).

assumption of technology as mediator, which underlies Computer-Mediated Communication (CMC) as well as much of twentieth-century media and communication theory.[5] Furthermore, scholars were finding that while theory at the intersection of Human-Computer Interaction (HCI) and communication formed around earlier technology provided integral starting points for research,[6] the increasingly intelligent design of newer applications, the growing availability of such technologies to the public, and the nature of people's interactions warranted a more robust effort to adapt existing communication theory, seek out theoretical intersections in related disciplines, and work toward developing new theory.[7] "Communicative AI"[8] were growing in number and type. Within the span of a few short years, Apple introduced Siri, Amazon established Alexa, and Google developed its own smart assistant. A great deal of media buzz accompanied advances in machine learning, artificial intelligence, and humanoid and social robots. News-writing technologies and advanced data processing programs also began raising questions as to the future of work and human workers across media and communication industries.[9] Anticipation for the next generation of devices and applications was high.

As I write this in 2022, HMC now is a recognized area of study with a journal, a forthcoming handbook, and a growing contingent of international scholars examining questions regarding a variety of communicative technologies (e.g., virtual

---

[5] Shanyang Zhao, "Humanoid Social Robots as a Medium of Communication," *New Media & Society* 8, no. 3 (2006): 401–19, https://doi.org/10.1177/1461444806061951; David J. Gunkel, "Communication and Artificial Intelligence: Opportunities and Challenges for the 21st Century," *communication +1* 1, no. 1 (2012): 1, https://doi.org/10.7275/R5QJ7F7R.

[6] e.g., Lucy A. Suchman, *Human-Machine Reconfigurations: Plans and Situated Actions*, 2nd ed. (New York: Cambridge University Press, 2009); Byron Reeves and Clifford Ivar Nass, *The Media Equation* (Stanford, CA : CSLI Publications, 1998).

[7] Fortunati and Edwards, "Opening Space for Theoretical, Methodological, and Empirical Issues in Human-Machine Communication"; Leopoldina Fortunati and Autumn Edwards, "Moving Ahead with Human-Machine Communication," *Human-Machine Communication* 2 (2021): 7–28, https://doi.org/10.30658/hmc.2.1.

[8] Andrea L. Guzman and Seth C. Lewis, "Artificial Intelligence and Communication: A Human–Machine Communication Research Agenda," *New Media & Society* 22, no. 1 (2020): 70–86, https://doi.org/10.1177/1461444819858691.

[9] Matt Carlson, "The Robotic Reporter: Automated Journalism and the Redefinition of Labor, Compositional Forms, and Journalistic Authority," *Digital Journalism* 3, no. 3 (2015): 416–31, https://doi.org/10.1080/21670811.2014.976412; Andreas Graefe, "Guide to Automated Journalism" (New York: Tow Center for Digital Journalism, 2016), http://towcenter.org/research/guide-to-automated-journalism/; Francesco Marconi, Alex Siegman, and Machine Journalist, "The Future of Augmented Journalism: A Guide for Newsrooms in the Age of Smart Machines" (New York: Associated Press, 2017), https://insights.ap.org/uploads/images/the-future-of-augmented-journalism_ap-report.pdf.

assistants, robots, chatbots, algorithms) and their integration into the home, workplace, and society writ large.[10] Early assessments of HMC's research and publication trends show a quickly growing interdisciplinary and transdisciplinary area of research with continued potential for expansion.[11] Today, the hype surrounding AI, ML, and robots has not subsided, and HMC research is helping to progress knowledge regarding people's interactions with these technologies and the challenges and opportunities of their adoption for individuals, organizations, and society.

Yet, as with any significant technological turn, the reality of the now differs in important ways from what was anticipated only a few short years ago.[12] Here I am thinking about the highly-touted devices that finally were developed and deployed only to struggle or fail, technologically and/or commercially, for a variety of reasons. After a long wait, the social robot Jibo arrived in people's homes and university labs, but it quickly showed limitations, and the company went under. Jibo sat in my office, quietly rotating parts of its body in a programmed show of physical presence, but even I—a scholar of human-machine communication—wasn't sure what sort of communication to have with it. Within the past few years, it has become clear that demand for some types of humanoid robots, such as Pepper, may not be as strong as once assumed (or portrayed by aggressive sales and marketing campaigns).[13] Although novel and seeming full of potential, social robots can have problems functioning consistently and require ongoing maintenance and support. While watching *Finch,* a fictional movie about an engineer who builds a lovable, humanoid robot, I found

---

[10] "Human-Machine Communication Interest Group," International Communication Association, accessed October 4, 2022, https://www.icahdq.org/group/hmc; "Human-Machine Communication," Journal, accessed October 4, 2022, https://stars.library.ucf.edu/hmc/; Guzman, McEwen, and Jones, *The SAGE Handbook of Human-Machine Communication*.

[11] Paula Gardner and Jessica Sage Rauchberg, "Feminist, Postcolonial, and Crip Approaches to Human-Machine Communication Methodology," in *The SAGE Handbook of Human-Machine Communication*, ed. Andrea L. Guzman, Rhonda McEwen, and Steve Jones (London: SAGE Publications, forthcoming); Heidi Makady and Fanjue Liu, "The Status of Human-Machine Communication Research: A Decade of Publication Trends Across Top-Ranking Journals," in *Human-Computer Interaction. Theoretical Approaches and Design Methods*, ed. Masaaki Kurosu, vol. 13302, Lecture Notes in Computer Science (Cham: Springer International Publishing, 2022), 83–103, https://doi.org/10.1007/978-3-031-05311-5_6; Riley J. Richards, Patric R. Spence, and Chad Edwards, "Human-Machine Communication Scholarship Trends: An Examination of Research From 2011 to 2021 in Communication Journals," *Human-Machine Communication* 4 (2022): 45–65, https://doi.org/10.30658/hmc.4.3.

[12] Nathan Rosenberg, "Why Technology Forecasts Often Fail," *The Futurist*, August 1995.

[13] Sam Nussey, "EXCLUSIVE SoftBank Shrinks Robotics Business, Stops Pepper Production-Sources," *Reuters*, June 29, 2021, sec. Technology, https://www.reuters.com/technology/exclusive-softbank-shrinks-robotics-business-stops-pepper-production-sources-2021-06-28/.

myself in disbelief—not at the idea of an advanced sentient robot that could love—but at the idea of a robot with a battery that lasted more than 20 minutes and could carry on a conversation without misunderstanding, saying something completely non-sequitur, or just staring off into space.

Across the world, AI voice assistants and conversational agents have been integrated into the home, office, and spaces between, such as the car. Owning such technologies, however, does not necessarily translate into using them consistently or for a wide variety of tasks.[14] Recently, my Alexa began trying to nudge me into chatting with *her* more, explaining functions *she* can perform other than keeping my grocery list and telling me the weather. I politely declined the additional conversation.

Industries, such as journalism, have experienced increased interest and use of ML, AI, and automated technologies, but adoption is not uniform, including across news providers.[15] Large news organizations are taking advantage of a wide-range of automated applications, but local newsrooms do not need the same types of AI or have the funding to invest in emerging technology.[16] There also are pronounced differences in the needs for and the ability to adopt AI in newsrooms across cultures and geographic spaces, notably between the Global North and South.[17]

However, the failure of some technologies and the lack of use surrounding certain others do not render research into communicative AI unnecessary. Indeed, while some devices and applications have not reached their full potential, others still are in routine use. Scholarly investigation also is needed as advanced social technologies and innovative uses continue to emerge, particularly connected to the Internet of Things and to the social and technological shifts that have accompanied the global pandemic. What failure and non-use offer, instead, is a research opportunity for HMC scholars into what so often is overlooked in aspects of

---

[14] Benjamin R. Cowan et al., "'What Can i Help You with?': Infrequent Users' Experiences of Intelligent Personal Assistants," in *Proceedings of the 19th International Conference on Human-Computer Interaction with Mobile Devices and Services* (MobileHCI '17: 19th International Conference on Human-Computer Interaction with Mobile Devices and Services, Vienna, Austria: ACM, 2017), 1–12, https://doi.org/10.1145/3098279.3098539.

[15] Charlie Beckett, "New Powers, New Responsibilities: A Global Survey of Journalism and Artificial Intelligence" (London, UK: London School of Economics, 2019), https://blogs.lse.ac.uk/polis/2019/11/18/new-powers-new-responsibilities/.

[16] Aimee Rinehart and Ernest Kung, "Artificial Intelligence in Local News: A Survey of U.S. Newsrooms' Readiness" (Associated Press, 2022).

[17] Sadia Jamil, "Artificial Intelligence and Journalistic Practice: The Crossroads of Obstacles and Opportunities for the Pakistani Journalists," *Journalism Practice* 15, no. 1 (2020): 1–23. https://doi.org/10.1080/17512786.2020.1788412.

technology research.[18] Within fields that inform and are informed by HMC, specifically HCI and HRI, much of the scholarship has focused on the user, as opposed to the non-user.[19] With that said, scholars increasingly are acknowledging the importance of and advocating for the study of the non-user and consideration for the non-user and user in relation to one another,[20] and the growing work in this area can provide a generative starting point for moving HMC research further forward.

Scholars have developed varying conceptualizations of and approaches to the study of failure[21] and non-use,[22] and although the two are certainly related, failure and non-use are not one and the same. Failure can be theorized along a variety of dimensions, such as cause (technical breakdown to user-error), scope (partial to complete), duration (long-term to temporary), and type (social, psychological, or technological) depending on the technology involved and whose perspective of the failure is adopted (user or designer).[23] In research within the auspices of HMC, short-

---

[18] Susanna Paasonen, "As Networks Fail: Affect, Technology, and the Notion of the User," *Television & New Media* 16, no. 8 (2015): 701–16, https://doi.org/10.1177/1527476414552906; Neil Selwyn, "Apart from Technology: Understanding People's Non-Use of Information and Communication Technologies in Everyday Life," *Technology in Society* 25, no. 1 (2003): 99–116, https://doi.org/10.1016/S0160-791X(02)00062-3.

[19] Christine Satchell and Paul Dourish, "Beyond the User: Use and Non-Use in HCI," in *Proceedings of the 21st Annual Conference of the Australian Computer-Human Interaction Special Interest Group on Design: Open 24/7 - OZCHI '09* (the 21st Annual Conference of the Australian Computer-Human Interaction Special Interest Group, Melbourne, Australia: ACM Press, 2009), 9, https://doi.org/10.1145/1738826.1738829; Maartje de Graaf, Somaya Ben Allouch, and Jan van Dijk, "Why Do They Refuse to Use My Robot?: Reasons for Non-Use Derived from a Long-Term Home Study," in *Proceedings of the 2017 ACM/IEEE International Conference on Human-Robot Interaction* (HRI '17: ACM/IEEE International Conference on Human-Robot Interaction, Vienna, Austria: ACM, 2017), 224–33, https://doi.org/10.1145/2909824.3020236.

[20] regarding HCI, see Eric P. S. Baumer et al., "On the Importance and Implications of Studying Technology Non-Use," *Interactions* 22, no. 2 (February 2015): 52–56, https://doi.org/10.1145/2723667; regarding HRI, Maartje M. A. de Graaf, Somaya Ben Allouch, and Jan A. G. M. van Dijk, "Long-Term Evaluation of a Social Robot in Real Homes," *Interaction Studies. Social Behaviour and Communication in Biological and Artificial Systems* 17, no. 3 (2016): 461–90, https://doi.org/10.1075/is.17.3.08deg; Dimosthenis Kontogiorgos et al., "A Systematic Cross-Corpus Analysis of Human Reactions to Robot Conversational Failures," in *Proceedings of the 2021 International Conference on Multimodal Interaction* (ICMI '21: International Conference on Multimodal Interaction, Montréal, Canada: ACM, 2021), 112–20, https://doi.org/10.1145/3462244.3479887.

[21] e.g., Kontogiorgos et al., "A Systematic Cross-Corpus Analysis of Human Reactions to Robot Conversational Failures."

[22] Satchell and Dourish, "Beyond the User."

[23] e.g., Paasonen, "As Networks Fail"; Leimin Tian et al., "Redesigning Human-Robot Interaction in Response to Robot Failures: A Participatory Design Methodology," in *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems* (CHI '21: CHI Conference on Human Factors

term failure has been examined regarding people's conversations with technology, including how people and machines misunderstand one another, the factors that lead to a conversational breakdown, and the degree to which the technology can recover from the failure in the mind of the human communicator.[24] Regarding non-use, while people do purposely refuse to use a technology, even devices as ubiquitous as mobile phones,[25] non-use also can result when people try a technology and decide not to adopt it or abandon a technology after a period of use.[26] As Trajkova and Martin-Hammond explain,[27] operationalizations of non-use can vary and be thought of as a continuum, including never using a technology, quitting a technology, and choosing not to use certain features of a technology. Researchers have defined non-use based on the reasoning and factors leading to the decision,[28] ranging from quitting a technology in protest,[29] to not being able to use a technology because of geographic, economic, or

in Computing Systems, Yokohama, Japan: ACM, 2021), 1–8, https://doi.org/10.1145/3411763.3443440; Kontogiorgos et al., "A Systematic Cross-Corpus Analysis of Human Reactions to Robot Conversational Failures."

[24] Sungwoo Choi, Anna S. Mattila, and Lisa E. Bolton, "To Err Is Human(-oid): How Do Consumers React to Robot Service Failure and Recovery?," *Journal of Service Research* 24, no. 3 (2021): 354–71, https://doi.org/10.1177/1094670520978798; Kontogiorgos et al., "A Systematic Cross-Corpus Analysis of Human Reactions to Robot Conversational Failures"; Tian et al., "Redesigning Human-Robot Interaction in Response to Robot Failures."

[25] Hananel Rosenberg and Kalia Vogelman-Natan, "The (Other) Two Percent Also Matter: The Construction of Mobile Phone Refusers," *Mobile Media & Communication* 10, no. 2 (2022): 216–34, https://doi.org/10.1177/20501579211033885.

[26] de Graaf, Ben Allouch, and van Dijk, "Why Do They Refuse to Use My Robot?"; Alexandra Voit et al., "'It's Not a Romantic Relationship': Stories of Adoption and Abandonment of Smart Speakers at Home," in *19th International Conference on Mobile and Ubiquitous Multimedia* (MUM 2020: 19th International Conference on Mobile and Ubiquitous Multimedia, Essen, Germany: ACM, 2020), 71–82, https://doi.org/10.1145/3428361.3428469; Milka Trajkova and Aqueasha Martin-Hammond, "'Alexa Is a Toy': Exploring Older Adults' Reasons for Using, Limiting, and Abandoning Echo," in *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (CHI '20: CHI Conference on Human Factors in Computing Systems, Honolulu, USA: ACM, 2020), 1–13, https://doi.org/10.1145/3313831.3376760.

[27] Trajkova and Martin-Hammond, "Alexa Is a Toy."

[28] Satchell and Dourish, "Beyond the User."

[29] e.g., Hanlin Li et al., "How Do People Change Their Technology Use in Protest?: Understanding Protest Users," *Proceedings of the ACM on Human-Computer Interaction* 3, no. CSCW (2019): 1–22, https://doi.org/10.1145/3359189.

social circumstance,[30] to making alternative choices regarding if, how, and when devices or applications and their features are used.[31]

The multiple paths of scholarly inquiry regarding failure and non-use and the myriad perspectives from which to approach them offer HMC scholars numerous research opportunities. However, the impetus for engaging in HMC research regarding failure and non-use goes well beyond mere opportunity and limited scholarly investigation to date. Some of the technologies HMC scholars study may not be universally adopted or available, particularly given infrastructure constraints. Yet, people can have a sense of technology or application even before they experience it, built up through media portrayals of the specific or similar product or interaction with other users.[32] As I found in my own research regarding voice-based assistants, the study of both users and non-users provides a sense of public discourse and sentiment surrounding a particular application (i.e., specific assistant) or its larger technological class (i.e., assistants more generally), including insight into what may induce people to become users or what is holding them back.[33] The study of failure or non-use also provides a view into people's perceived shortcomings of a technology, so that the technology can be improved.[34] In the case of HMC specifically, breakdowns in the communicative ability of a technology affect more than the flow of interaction between application and user; people's perceptions of the traits of the technology, such as its trustworthiness and level of anthropomorphism, also are informed by failure in interactions.[35] Thus, as scholars advocating for the study of failure and non-

---

[30] e.g, Selwyn, "Apart from Technology"; Susan Wyche and Eric P. S. Baumer, "Imagined Facebook: An Exploratory Study of Non-Users' Perceptions of Social Media in Rural Zambia," *New Media & Society* 19, no. 7 (2017): 1092–1108, https://doi.org/10.1177/1461444815625948.

[31] e.g, Radhika Garg, "Understanding Families' Non-/Use Practices and Choices: The Case of Smart Speakers and Smart Interactive Toys," *Proceedings of the ACM on Human-Computer Interaction* 5, no. CSCW2 (October 13, 2021): 1–26, https://doi.org/10.1145/3476036.

[32] S. Shyam Sundar, T. Franklin Waddell, and Eun Hwa Jung, "The Hollywood Robot Syndrome Media Effects on Older Adults' Attitudes toward Robots and Adoption Intentions," in *2016 11th ACM/IEEE International Conference on Human-Robot Interaction (HRI)* (2016 11th ACM/IEEE International Conference on Human-Robot Interaction (HRI), Christchurch, New Zealand: IEEE, 2016), 343–50, https://doi.org/10.1109/HRI.2016.7451771; Wyche and Baumer, "Imagined Facebook."

[33] Andrea L. Guzman, "Imagining the Voice in the Machine: The Ontology of Digital Social Agents" (Chicago, IL, University of Illinois at Chicago, 2015).

[34] de Graaf, Ben Allouch, and van Dijk, "Long-Term Evaluation of a Social Robot in Real Homes"; Kontogiorgos et al., "A Systematic Cross-Corpus Analysis of Human Reactions to Robot Conversational Failures"; Selwyn, "Apart from Technology"; Tian et al., "Redesigning Human-Robot Interaction in Response to Robot Failures."

[35] Filipa Correia et al., "Exploring the Impact of Fault Justification in Human-Robot Trust," in *Proceedings of the 17th International Conference on Autonomous Agents and Multiagent Systems* (Stockholm, Sweden, 2018), 7; Eileen Roesler, Linda Onnasch, and Julia I. Majer, "The Effect of

use have repeatedly emphasized, use and non-use and success and failure should be considered two sides of the same coin, so to speak. To understand use and the user—the primary focus of fields such as HCI and, now, arguably HMC—requires knowledge of non-use and the non-user in their various forms.[36] Without such knowledge, designers, scholars, and policy makers are left with only assumptions guiding their conceptualization of the non-user, which are oversimplified at best, and "flat" representations of the user.[37] Such assumptions can be particularly fraught in the case of historically minoritized or understudied groups.[38]

Furthermore, the implications of technology also cannot be fully grasped by focusing on one group (user or non-user) over the other or the successes and failings of technology and in using technology alone.[39] In their study of people who refuse to use mobile phones, Rosenberg and Vogelman-Natan trace what it is to navigate daily life without constant connectivity, a finding that not only provides a view into the world of the non-user but also illuminates what they call the "price of connectivity" for users.[40] In seeing what non-users potentially gain in not being reachable anywhere at any time, the researchers were provided with a new lens to understand what may be missing in the experience of users. Similarly, technological failure can provide insight into how people come to view themselves in relation to devices or applications.[41] The need to grasp the full range of how technology succeeds and fails, is used and not used, extends well beyond its effects at the individual level. What takes place along the continuum of use and non-use and success and failure ultimately comes to form the cultural view of technology and determine its far-reaching

---

Anthropomorphism and Failure Comprehensibility on Human-Robot Trust," *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* 64, no. 1 (December 2020): 107–11, https://doi.org/10.1177/1071181320641028.

[36] Nelly Oudshoorn and Trevor Pinch, eds., *How Users Matter: The Co-Construction of Users and Technology* (Cambridge, MA: MIT Press, 2005), https://mitpress.mit.edu/9780262651097/how-users-matter/; Satchell and Dourish, "Beyond the User."

[37] Verena Fuchsberger, Martin Murer, and Manfred Tscheligi, "Human-Computer Non-Interaction: The Activity of Non-Use," in *Proceedings of the 2014 Companion Publication on Designing Interactive Systems - DIS Companion '14* (the 2014 companion publication, Vancouver, BC, Canada: ACM Press, 2014), 57–60, https://doi.org/10.1145/2598784.2602781; Selwyn, "Apart from Technology."

[38] Garg, "Understanding Families' Non-/Use Practices and Choices"; Selwyn, "Apart from Technology"; Jenny Waycott et al., "Not For Me: Older Adults Choosing Not to Participate in a Social Isolation Intervention," in *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (CHI '16: CHI Conference on Human Factors in Computing Systems, San Jose, CA, USA: ACM, 2016), 745–57, https://doi.org/10.1145/2858036.2858458.

[39] Oudshoorn and Pinch, *How Users Matter: The Co-Construction of Users and Technology*.

[40] "The (Other) Two Percent Also Matter," 217.

[41] Paasonen, "As Networks Fail."

impacts.[42] As Dourish and Satchell explain, "Eager adopters and active resisters are both responding to and shaping cultural interpretations of technology, even though they do so in different ways; their perspectives each play a role in the cultural appropriation of technologies."[43]

From this perspective, non-use and failure are more than interesting variables in the study of technology, including Human-Machine Communication; they are critical perspectives that when overlooked create a deficit in understanding of a device or application, of communication with it, of the people interacting with it and the effects for them, and of larger cultural conceptualizations and far-reaching implications. There is an additional pressing factor within HMC that creates an even greater imperative for extending research beyond use and success. Many of the technologies scholars of HMC study—in particular, artificial intelligence—are amorphous and steeped in ambiguity. The ongoing debates surrounding even the definition of AI coupled with its rapid technological acceleration and societal diffusion demand that scholars, politicians, and civic leaders grapple with a great deal of uncertainty while trying to guide design, develop ethics, and craft policy.[44] Thus, HMC scholars need to work toward developing as full an understanding as possible of communicative AI and related technologies in an attempt to reduce this uncertainty and make better decisions and predictions. To do so, we must consider not only what is immediately there in front of us but that which is less easily observed or seemingly a failure.

---

[42] Oudshoorn and Pinch, *How Users Matter: The Co-Construction of Users and Technology*; Satchell and Dourish, "Beyond the User."

[43] "Beyond the User," 11.

[44] Maria Nordström, "AI under Great Uncertainty: Implications and Decision Strategies for Public Policy," *AI & SOCIETY*, 2021, https://doi.org/10.1007/s00146-021-01263-4.

Bibliography

Baumer, Eric P. S., Jenna Burrell, Morgan G. Ames, Jed R. Brubaker, and Paul Dourish. "On the Importance and Implications of Studying Technology Non-Use." *Interactions* 22, no. 2 (February 2015): 52–56. https://doi.org/10.1145/2723667.

Beckett, Charlie. "New Powers, New Responsibilities: A Global Survey of Journalism and Artificial Intelligence." London: London School of Economics, 2019. https://blogs.lse.ac.uk/polis/2019/11/18/new-powers-new-responsibilities/.

Carlson, Matt. "The Robotic Reporter: Automated Journalism and the Redefinition of Labor, Compositional Forms, and Journalistic Authority." *Digital Journalism* 3, no. 3 (2015): 416–31. https://doi.org/10.1080/21670811.2014.976412.

Choi, Sungwoo, Anna S. Mattila, and Lisa E. Bolton. "To Err Is Human(-Oid): How Do Consumers React to Robot Service Failure and Recovery?" *Journal of Service Research* 24, no. 3 (2021): 354–71. https://doi.org/10.1177/1094670520978798.

Correia, Filipa, Carla Guerra, Samuel Mascarenhas, Francisco S Melo, and Ana Paiva. "Exploring the Impact of Fault Justification in Human-Robot Trust." In *Proceedings of the 17th International Conference on Autonomous Agents and Multiagent Systems*, 7. Stockholm, Sweden, 2018.

Cowan, Benjamin R., Nadia Pantidi, David Coyle, Kellie Morrissey, Peter Clarke, Sara Al-Shehri, David Earley, and Natasha Bandeira. "'What Can i Help You with?': Infrequent Users' Experiences of Intelligent Personal Assistants." In *Proceedings of the 19th International Conference on Human-Computer Interaction with Mobile Devices and Services*, 1–12. Vienna, Austria: ACM, 2017. https://doi.org/10.1145/3098279.3098539.

Fortunati, Leopoldina, and Autumn Edwards. "Moving Ahead with Human-Machine Communication." *Human-Machine Communication* 2 (2021): 7–28. https://doi.org/10.30658/hmc.2.1.

———. "Opening Space for Theoretical, Methodological, and Empirical Issues in Human-Machine Communication." *Human-Machine Communication* 1 (2020): 7–18. https://doi.org/10.30658/hmc.1.1.

Fuchsberger, Verena, Martin Murer, and Manfred Tscheligi. "Human-Computer Non-Interaction: The Activity of Non-Use." In *Proceedings of the 2014 Companion Publication on Designing Interactive Systems - DIS Companion '14*, 57–60. Vancouver, BC, Canada: ACM Press, 2014. https://doi.org/10.1145/2598784.2602781.

Gardner, Paula, and Jessica Sage Rauchberg. "Feminist, Postcolonial, and Crip Approaches to Human-Machine Communication Methodology." In *The SAGE Handbook of Human-Machine Communication*, edited by Andrea L. Guzman, Rhonda

McEwen, and Steve Jones. London: SAGE Publications, forthcoming.

Garg, Radhika. "Understanding Families' Non-/Use Practices and Choices: The Case of Smart Speakers and Smart Interactive Toys." *Proceedings of the ACM on Human-Computer Interaction* 5, no. CSCW2 (October 13, 2021): 1–26. https://doi.org/10.1145/3476036.

Graaf, Maartje de, Somaya Ben Allouch, and Jan van Dijk. "Why Do They Refuse to Use My Robot?: Reasons for Non-Use Derived from a Long-Term Home Study." In *Proceedings of the 2017 ACM/IEEE International Conference on Human-Robot Interaction*, 224–33. Vienna, Austria: ACM, 2017. https://doi.org/10.1145/2909824.3020236.

Graaf, Maartje M. A. de, Somaya Ben Allouch, and Jan A. G. M. van Dijk. "Long-Term Evaluation of a Social Robot in Real Homes." *Interaction Studies. Social Behaviour and Communication in Biological and Artificial Systems* 17, no. 3 (2016): 461–90. https://doi.org/10.1075/is.17.3.08deg.

Graefe, Andreas. "Guide to Automated Journalism." New York: Tow Center for Digital Journalism, 2016. http://towcenter.org/research/guide-to-automated-journalism/.

Gunkel, David J. "Communication and Artificial Intelligence: Opportunities and Challenges for the 21st Century." *communication +1* 1, no. 1 (2012): 1. https://doi.org/10.7275/R5QJ7F7R.

Guzman, Andrea L. "Imagining the Voice in the Machine: The Ontology of Digital Social Agents." University of Illinois at Chicago, 2015.

———. "What Is Human-Machine Communication, Anyway?" In *Human-Machine Communication: Rethinking Communication, Technology, and Ourselves*, edited by Andrea L. Guzman, 1–28. Digital Formations. New York: Peter Lang, 2018.

Guzman, Andrea L., and Seth C. Lewis. "Artificial Intelligence and Communication: A Human–Machine Communication Research Agenda." *New Media & Society* 22, no. 1 (2020): 70–86. https://doi.org/10.1177/1461444819858691.

Guzman, Andrea L., Rhonda McEwen, and Steve Jones, eds. *The SAGE Handbook of Human-Machine Communication*. London: SAGE Publications, forthcoming.

"Human-Machine Communication." Journal. Accessed October 4, 2022. https://stars.library.ucf.edu/hmc/.

International Communication Association. "Human-Machine Communication Interest Group." Accessed October 4, 2022. https://www.icahdq.org/group/hmc.

Jamil, Sadia. "Artificial Intelligence and Journalistic Practice: The Crossroads of

Obstacles and Opportunities for the Pakistani Journalists." *Journalism Practice* 15, no. 1 (2020): 1–23. https://doi.org/10.1080/17512786.2020.1788412.

Kontogiorgos, Dimosthenis, Minh Tran, Joakim Gustafson, and Mohammad Soleymani. "A Systematic Cross-Corpus Analysis of Human Reactions to Robot Conversational Failures." In *Proceedings of the 2021 International Conference on Multimodal Interaction*, 112–20. Montréal, QC, Canada: ACM, 2021. https://doi.org/10.1145/3462244.3479887.

Li, Hanlin, Nicholas Vincent, Janice Tsai, Jofish Kaye, and Brent Hecht. "How Do People Change Their Technology Use in Protest?: Understanding Protest Users." *Proceedings of the ACM on Human-Computer Interaction* 3, no. CSCW (2019): 1–22. https://doi.org/10.1145/3359189.

Makady, Heidi, and Fanjue Liu. "The Status of Human-Machine Communication Research: A Decade of Publication Trends Across Top-Ranking Journals." In *Human-Computer Interaction. Theoretical Approaches and Design Methods*, edited by Masaaki Kurosu, 13302:83–103. Lecture Notes in Computer Science. Cham: Springer International Publishing, 2022. https://doi.org/10.1007/978-3-031-05311-5_6.

Marconi, Francesco, Alex Siegman, and Machine Journalist. "The Future of Augmented Journalism: A Guide for Newsrooms in the Age of Smart Machines." New York: Associated Press, 2017. https://insights.ap.org/uploads/images/the-future-of-augmented-journalism_ap-report.pdf.

Mayor, Adrienne. *Gods and Robots: Myths, Machines, and Ancient Dreams*. Princeton: Princeton University Press, 2018.

McDowell, Zachary J., and David J. Gunkel. "Introduction to 'Machine Communication.'" *communication +1* 5, no. 1 (2016): 1–5. http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1056&context=cpo.

Nordström, Maria. "AI under Great Uncertainty: Implications and Decision Strategies for Public Policy." *AI & SOCIETY*, 2021. https://doi.org/10.1007/s00146-021-01263-4.

Nussey, Sam. "EXCLUSIVE SoftBank Shrinks Robotics Business, Stops Pepper Production- Sources." *Reuters*, June 29, 2021, sec. Technology. https://www.reuters.com/technology/exclusive-softbank-shrinks-robotics-business-stops-pepper-production-sources-2021-06-28/.

Oudshoorn, Nelly, and Trevor Pinch, eds. *How Users Matter: The Co-Construction of Users and Technology*. Cambridge, MA: MIT Press, 2005. https://mitpress.mit.edu/9780262651097/how-users-matter/.

Paasonen, Susanna. “As Networks Fail: Affect, Technology, and the Notion of the User.” *Television & New Media* 16, no. 8 (2015): 701–16. https://doi.org/10.1177/1527476414552906.

Reeves, Byron, and Clifford Ivar Nass. *The Media Equation*. Stanford, CA : CSLI Publications, 1998.

Richards, Riley J., Patric R. Spence, and Chad Edwards. “Human-Machine Communication Scholarship Trends: An Examination of Research From 2011 to 2021 in Communication Journals.” *Human-Machine Communication* 4 (2022): 45–65. https://doi.org/10.30658/hmc.4.3.

Rinehart, Aimee, and Ernest Kung. “Artificial Intelligence in Local News: A Survey of U.S. Newsrooms’ Readiness.” Associated Press, 2022.

Riskin, Jessica, ed. *Genesis Redux: Essays in the History and Philosophy of Artificial Life*. Chicago: University of Chicago Press, 2007.

Roesler, Eileen, Linda Onnasch, and Julia I. Majer. “The Effect of Anthropomorphism and Failure Comprehensibility on Human-Robot Trust.” *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* 64, no. 1 (December 2020): 107–11. https://doi.org/10.1177/1071181320641028.

Rosenberg, Hananel, and Kalia Vogelman-Natan. “The (Other) Two Percent Also Matter: The Construction of Mobile Phone Refusers.” *Mobile Media & Communication* 10, no. 2 (2022): 216–34. https://doi.org/10.1177/20501579211033885.

Rosenberg, Nathan. “Why Technology Forecasts Often Fail.” *The Futurist*, August 1995.

Satchell, Christine, and Paul Dourish. “Beyond the User: Use and Non-Use in HCI.” In *Proceedings of the 21st Annual Conference of the Australian Computer-Human Interaction Special Interest Group on Design: Open 24/7 - OZCHI ’09*, 9. Melbourne, Australia: ACM Press, 2009. https://doi.org/10.1145/1738826.1738829.

Selwyn, Neil. “Apart from Technology: Understanding People’s Non-Use of Information and Communication Technologies in Everyday Life.” *Technology in Society* 25, no. 1 (2003): 99–116. https://doi.org/10.1016/S0160-791X(02)00062-3.

Spence, Patric R. “Searching for Questions, Original Thoughts, or Advancing Theory: Human-Machine Communication.” *Computers in Human Behavior* 90 (2019): 285–87. https://doi.org/10.1016/j.chb.2018.09.014.

Suchman, Lucy A. *Human-Machine Reconfigurations: Plans and Situated Actions*. 2nd ed. New York: Cambridge University Press, 2009.

Sundar, S. Shyam, T. Franklin Waddell, and Eun Hwa Jung. “The Hollywood Robot

Syndrome Media Effects on Older Adults' Attitudes toward Robots and Adoption Intentions." In *2016 11th ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, 343–50. Christchurch, New Zealand: IEEE, 2016. https://doi.org/10.1109/HRI.2016.7451771.

Tian, Leimin, Pamela Carreno-Medrano, Aimee Allen, Shanti Sumartojo, Michael Mintrom, Enrique Coronado Zuniga, Gentiane Venture, Elizabeth Croft, and Dana Kulic. "Redesigning Human-Robot Interaction in Response to Robot Failures: A Participatory Design Methodology." In *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems*, 1–8. Yokohama, Japan: ACM, 2021. https://doi.org/10.1145/3411763.3443440.

Trajkova, Milka, and Aqueasha Martin-Hammond. "'Alexa Is a Toy': Exploring Older Adults' Reasons for Using, Limiting, and Abandoning Echo." In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–13. Honolulu, HI, USA: ACM, 2020. https://doi.org/10.1145/3313831.3376760.

Voit, Alexandra, Jasmin Niess, Caroline Eckerth, Maike Ernst, Henrike Weingärtner, and Paweł W. Woźniak. "'It's Not a Romantic Relationship': Stories of Adoption and Abandonment of Smart Speakers at Home." In *19th International Conference on Mobile and Ubiquitous Multimedia*, 71–82. Essen, Germany: ACM, 2020. https://doi.org/10.1145/3428361.3428469.

Waycott, Jenny, Frank Vetere, Sonja Pedell, Amee Morgans, Elizabeth Ozanne, and Lars Kulik. "Not For Me: Older Adults Choosing Not to Participate in a Social Isolation Intervention." In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*, 745–57. San Jose, CA, USA: ACM, 2016. https://doi.org/10.1145/2858036.2858458.

Wyche, Susan, and Eric P. S. Baumer. "Imagined Facebook: An Exploratory Study of Non-Users' Perceptions of Social Media in Rural Zambia." *New Media & Society* 19, no. 7 (2017): 1092–1108. https://doi.org/10.1177/1461444815625948.

Zhao, Shanyang. "Humanoid Social Robots as a Medium of Communication." *New Media & Society* 8, no. 3 (2006): 401–19. https://doi.org/10.1177/1461444806061951.