The politics of *mise-en-scène* technologies

Yulia Frumer & Selma Šabanović

Mise-en-scène

In 1966, Johnny Carson hosted an unusual guest. The guest played golf, conducted an orchestra, and proved capable of running a beer commercial by opening a can and pouring the beer into a cold glass. At the end of the show, the guest even made Carson a drink and lit his cigarette. The guest was UNIMATE—the first industrial robot invented by George Devol and licensed by Joseph Engelberger, who hoped to make a buck by selling the machine to manufacturers. The Johnny Carson show was a marketing stunt, meant to convince potential customers that industrial robots were worth the investment.

The robot's performance left the audience stunned. A robot engaged in such human activities as leisure, music, and hospitality? It sounded like something taken out of *I, Robot* series by Isaac Asimov, which has been ever gaining in popularity since the original publication in 1950. Or, was it more like Rosie the Robot in the animated series *The Jetsons*, which began airing in 1962? But this was neither fiction nor animation; it was real. Asimov's scenarios now seemed like a prediction: the fiction became a reality.

Except it wasn't. The show was a spectacle, a carefully constructed illusion. UNIMATE was not actually the smart robot it appeared to be; it was a sequencer. It lacked sensors and was run on rudimentary software that only allowed for pre-programming a series of motions. It was still a very useful tool that would revolutionize manufacturing, but it was not capable of doing the things the audience watching the Carson show thought it was doing. It would not have been able to find a golf club if it was tossed half a foot away, and it was not capable of pouring a drink unless the glass was standing in the exact position robot was pre-programmed to reach for. To make UNIMATE appear as if it was acting autonomously, the whole set of the show had to be meticulously pre-arranged so that every single object was exactly in the right place for the robot to pick up and manipulate. Some small details were straightforward cheating—Engleberger later admitted that he had "pre-opened the beer can a little bit," just enough that it still looked sealed but was already past the most difficult, for the robot, part in the process (Waurzyniak, 2006). In other cases, the cheating was not so blatant, but there were still numerous people who worked weeks in advance to pre-arrange the set and continued to work throughout the show to adjust the scene for the robot.[1] Considering this, we can clearly say that UNIMATE was not autonomously operating on the set. Rather, the set was manipulated for the robot. It was literally *mise-en-scène*—the scene was put in place for the robot to perform.

Making a spectacle of science and technology is by no means new. From alchemical transmutations to Galvanic corpses to "anatomical theaters," history is abundant with examples of science staged for a show. What is unique about robots—or their predecessors, the automata—is that the staging betrays the exact thing that makes the audience so excited about robots: robots are staged to perform automaticity and agency. In other words, there are multiple humans who work very hard to make it appear as if no humans were involved and that the robot was acting on its own.

This need for "autonomous" robots to be supported by ongoing human labor throughout their design and implementation extends into contemporary applications of robots; staging robots so that they can work properly is not only for show but part of their everyday functioning. Robotics researchers who design social robots scaffold their seemingly social behaviors and

[1] The authors thank Salem Elzway for the reference above and for sharing his research on Engleberger's work.

presence through their embodied actions and speech in labs and in field evaluations – by putting makeup on and clothing robots (Epstein 2006), addressing them by proper names and gendered pronouns (Seaborn and Frank 2022), and engaging them as social agents or as objects (Alač 2011; Suchman 2007). Robot users also perform "invisible work" to situate robots appropriately in their everyday use contexts, and help others make sense of them in ways that allow them to function as social companions and therapeutic devices. Roomba robotic vacuum users adapt their living spaces so that the robots can do their jobs more efficiently and sometimes even decorate their new autonomous appliances (Forlizzi 2007, Sung et al. 2007); caregivers who use the seal-like assistive robot Paro are provided with guidelines that specify how to introduce it to users to encourage them to engage with it in socio-emotional ways (Wada, Ikeda, Inoue and Uehara 2010). The awareness that robots will never work completely on their own, but are always in some way supported by and interacting with humans, has led to reconceptualizations of the notion of robotic autonomy to incorporate a more relational view that takes ongoing human-robot interaction and the "human in the loop" into account (Mindell 2015). This also suggests the need to look at how people and robots are relationally co-produced.

The point about hidden human labor is important to dwell on. When robotic technologies were still relatively young, Lucy Suchman published a groundbreaking analysis of historically-situated activities by human agents who shaped human-machine interaction, which in its second edition she expanded with explicit attention to the various forms of invisible human labor that go into supporting the emergent sociality of robots (Suchman 2007). As technologies became more sophisticated and less transparent, the conversations in social sciences have shifted to discussion of the ways robots incite imagination and inspire us to come up with visions of utopian or dystopian futures of human-robot societies (Jasanoff and Kim 2015, Robertson 2007, 2010, 2017). However, there are so many things one can possibly imagine, and yet the ability to imagine does not, in itself, compel one to act on imagination or try and make imaginary scenarios come true. So, what makes people let their imagination run wild? And why do they not run as wild as they could? How come people imagine the same or similar technological futures? Why is the general populace compliant with the proscribed imagination of think tanks and industry leaders? And what are people running from by focusing on the imaginary? We suggest that to answer these questions, we should go back to examining the hidden human labor that makes the imaginary possible, shared, and powerful.

Healthcare robots in Japan and Korea offer a particularly promising set of case studies to explore the historically situated nature of the imaginary and the role of human actors in shaping it. As the authors in this special issue show, robots feature prominently in the science and technology policies of both governments, showing how humans can shape expectations of technological development (Wright; de Togni; Park, Cho, and Lim). The proliferation of emotional labor robots in elderly care in both countries provides a fertile ground for exploring how engineers and researchers can affect user experience and even improve care (Aronsson; Shin and Jeon). And, rehabilitation technologies in Korea indicate that the most profound effect of robotic exoskeletons was not in the realm of physical assistance to nurses but in helping patients maintain the social functions of walking. (Na and Ma)

Specifically, the collective analysis of robots in healthcare in Asia, presented in this volume, allows us to discern the way various human actors design robots to function as *mise-en-scène* devices. By employing media techniques of staging, framing, priming, and putting the audience in the story, we argue, these human actors create cognitive infrastructure for others' imagination while remaining hidden from the view. It is important, of course, that the imaginations so produced resonate with the accepted cultural logic of the audience, in this case, potential users of robots (Sone, 2017). The users of the robots, at the same time, bring their own interpretations and agency into the construction of our current experiences and potential future lives with robots. The concept of the autonomous robot and its potential for benefitting or harming society, therefore, comes out of a negotiation (often implicit) between robot creators and users throughout the various phases of constructing the *mise-en-scène*.

Staging

The technique of staging is used in multiple spaces. It is often employed literally on stage—as in Johnny Carson's show—but not only. The practice of staging in engineering does not necessitate the presence of a wide audience—the lab where the robot is developed and tested is a carefully constructed stage, whether the engineers deliberately design their space or unconsciously create environments conducive to robots' optimal performance. Shakey, one of the earliest American robots, was famously tested in a staged environment. Objects were placed in the right spot to allow the robot's optimal performance, painted in colors that are easier for the robot to recognize, and organized in spaces that are wider and more open than the environments built for everyday human functions (McCorduck, 1979). Once the staging was exposed as misrepresenting robotic capabilities, the engineering bar was raised higher: to build a robot that could operate in a "real-life setting." Yet, even today, many demos are consciously or unconsciously staged, albeit in a more subtle way. In fact, the term "real-life setting" is highly misleading. Although robotic demos are taken out of the lab and put in public spaces, such as the famous Tokyo robot cafes, these spaces are more staged than ever. While in regular cafes, human customers and servers are left to navigate crowded tables, moving chairs, random umbrellas and bags left on the floor, and unpredictable human behaviors, in robot cafes, customers are instructed what to do and not to do, tables are arranged in a predictable pattern, and wide gaps left between the tables to allow robots to move freely (Kamino and Šabanović, 2023). Another so-called "real life" robot performance—robot hotels in Tokyo and Seoul—are designed to include hidden spaces where human operators can prepare and equip the robot for what appears to an outsider as an autonomous function.

While robotics engineers have made astounding advancements in developing bi-pedal locomotion, pattern recognition, object avoidance, balance, grip dexterity, and other robotic functions, their achievements are not always perceptible to an unprofessional eye and require enormous investment of capital and labor. Robots that are both autonomous and social are so complicated and expensive that they are not marketable, which was the reason behind Honda's decision to discontinue further research on ASIMO in favor of much cheaper and less sophisticated remotely operated robots. And even in the latter case, to make the magic of automaticity happen, the environments robots work in still need to be adapted to the robot. Robots that are autonomously capable of robustly adapting themselves to a continuously changing environment are still outside of the realm of technological possibility.

In a more subtle way, staging can make or break human-machine interactions. One's sensory perception of a robot and spatial arrangement of human-machine encounter informs the human how to interpret the robot—as a friendly interlocutor or a potential threat, a social agent, or a mere object. The interaction is also shaped by the presence or absence of an observer or, in

Lacanian terms, an interpellator. Aronsson walks us through the implications of an encounter between a geriatric patient and Pepper the robot. She shows that a patient's history of interaction with robots is essential for their sense-making of the robot. The history of interaction, of conversations about the robot, and of multiple exposures to the robot's staging in different interaction contexts, all help constitute a particular user experience. Through these multiple interactions and staging opportunities by diverse human actors, including policymakers, engineers, healthcare workers and managers, and robot users, the robot's "distributed agency", in Aaronson's words, develops. At the same time, as Na and Ma describe in their paper, the robot itself is used as a staging prop, acting as a marketing device for other therapies offered by human therapists.

Whether engineers intend it or not, the staging of robots in demos, in misleadingly labeled "real-life" environments, and even in human-robot interaction studies provides the basis for the creation and sustainment of an illusion of a robot's autonomous capability. The staging of flawless performance in artificially created environments suggests to viewers that the robot is more capable or more autonomous in its capability than it actually is. As we see in Wright's contribution, such illusions result in misleading projections of future technological developments, boosting policy-makers confidence in declaring, time after time, that the robot age is coming in the next 10, 15, and 25 years. Only in private, as de Togni points out, engineers confess that they don't expect to see any of the projections come true in their lifespans.

Framing

Framing is perhaps one of the most commonly used media techniques. One can manipulate a video recording of robotic performance by carefully choosing frames; one can emphasize the desirable features by focusing a camera on a particular part, or the opposite, to de-emphasize the presence of undesired elements by keeping them out of spotlight; with live audiences, one can even just restrict fields of vision. When digital audiences watch videos of robotic performances—in robot-cafes, robot-run hotels, and robot performance at hospitals and nursing homes—their perception is cognitively framed by engineering teams who both staged the physical setting and framed the video. The very term “real-life setting” creates an expectation, which is then reinforced by frames of cafe environments that evoke viewers’ memories of their own cafe experiences. The obviously staged elements of the environment—and the humans that mediate robotic performance—are edited out of the frame. Together with staging, the framing technique erases the traces of human involvement in the operation of the robot and reinforces the illusion of the robot’s automaticity.

Framing, as a technique, is not limited to the physical manipulation of the frame but also includes psychological framing that manipulates context. One can frame a technological object or a human-machine encounter by modifying the visual and audio environments or by changing the language and employing metaphors and associations as staging props (Lakoff 1987, Lakoff and Johnson 1980). A perfect example of such framing can be seen in Shin and Jeon’s paper that discusses the elderly-care robot Hyodol. The robot is visually framed by its appearance, identical to a child’s doll, which is designed to evoke associations with the older adults’ own grandchild’s doll and thus elicit a positive predisposition and perhaps even a sense of intimacy. Further, the robot is also linguistically framed through its name: “hyo” (filial piety) + “dol” (from the English “doll”). By visually framing the robot as kin and verbally framing it as related to filial duties, the engineers implicitly message the elderly and their grown children that the robot is providing familial, intimate, and loving care. A similar case of linguistic framing can be seen in Wright's paper, where discussions of how to make an AI more "trustworthy" are inundated with terms and expressions that communicate "trustworthiness" without explaining how those could be even applicable to a disembodied algorithm. "Respect for privacy," "abidance by laws," "safety," "transparency," "accountability," "acting with integrity" — the words themselves are powerful enough to elicit trust, and perhaps even obviate the need to ask what does it practically mean for an AI to be "transparent" or "act with integrity," and where true accountability for the consequences of the functioning of these future algorithms may lie. The most blatant use of linguistic framing, however, is in the employment of the term "ethical" in the ethics guidelines: AI would be ethical if it behaves "ethically." The framing, in this case, is so powerful, that it allows one to ignore the glaring circularity of the guidelines and just accept that the engineers are taking ethics seriously.

As we can see in papers by De Togni, Wright, and Park, Cho, and Lim, ethics debates are one of the main arenas where framing is employed. One framing tactic used by ethics panelists is to linguistically imply that robots have agency, and thus put the responsibility for ethical behavior on the robot or the AI instead of the engineers who design them. Wright tells us that the Japanese ethics panel guidelines state that AI *itself* needs to abide by ethical guidelines, and reinforce this statement by repeated insinuations of the porousness of distinction between AI and humans. In Lee Luda's incident, described by Park, Cho, and Lim, by framing the chatbot as a "20-year-old female college student," the responsibility for spewing hate speech and making sexual comments was placed on the personified software. The examples given by the authors in this volume are not characteristic of East Asia alone but point to the larger, global phenomenon of using framing techniques to absolve engineers and the institutions in which they work of responsibility for their designs. When in a headline-generating incident in July 2022 a chess-playing robot broke the finger of his child opponent, the engineering team explained that "the robot *did not like* [child's rushed move]," and that the engineers themselves had "nothing to do with it." (Angelova and McClusky 2022)

Ethics panelists also use framing to misdirect conversations to what David Brook (2019) called "wishful worries" —things we wish we were worried about, and which allow us not to think about the actual problems we *should* be worried about. Both Japan and Korea follow the worldwide trend to frame all ethical discussions of AI and robotics in terms of Isaac Asimov's laws of robotics as if imagined guidelines of a fictional future society somehow capture all the ethical concerns of current, real-life situations. As Park, Cho, and Lim tell us, regressing to such imaginary scenarios distracts from the real ethically thorny problems, such as the need to reconcile patients' privacy and the need for patients' data for the purpose of designing precision care.

The irony is, as De Togni points out, that the labor that goes into creating the *mise-en-scène* leaves no time to address the real ethical and social concerns, even when the engineers are aware of them. As also seen in Na and Ma's paper, engineers capitalize on framing to gain grants and government support, which means that they channel most of their time and efforts to reinforcing the illusion the robots are already, or "almost" ready for capable autonomous functioning. Especially early career engineers are so beholden to convincing the funding agencies of their robots' capabilities, De Togni tells us, that they focus on delivering papers and staging the demos, leaving no time to attend to the social implications of their work. The pressure of societal expectations forces engineers to frame their own work in a way that appeases policymakers and funders, exaggerating autonomous capabilities, obfuscating human labor, and diverting attention away from real problems to wishful worries.

Priming

What robotics engineers in both Japan and Korea do focus on is learning how to elicit emotions in users, or, in other words, priming the users to perceive robots in a certain light. Unlike the infamous flashing of subliminal messages experiments from the 1950s, however, the "messaging" in robotics is not encoded only in words but embedded in the very materiality of robotics design. When designing a robot, engineers do not simply attempt to mimic a generic archetype of a human being but rather envision a particular kind of human worker whose labor the robot is supposed to assume. Their assumptions about that particular kind of human— a disposable factory worker, an intelligent manager, a companion, a slave, or a female caretaker— shape their decision-making and inflect design choices (Atanasoski and Vora 2019, Frumer 2022). In making design choices, engineers—often unconsciously—embed societal assumptions into the materiality of design, creating cognitive cues that inform users' perception of the robot. Beginning in the 1980s, however, Japanese engineers began making a conscious effort to manipulate users' perception of the robot through design. Seeking to create a robot that provides emotional labor—even if they did not use this particular term—they tried to identify material proxies that would a evoke a sense that robot is "loveable," "trustworthy," or that it "understands" the user. (Frumer, forthcoming) Eventually, their efforts evolved into a new robotics engineering subdiscipline of social or affective robotics (White and Katsuno 2021, 2022a, 2022b). Several papers in this volume highlight the priming techniques engineers use today to elicit the sense of intimacy and kinship.

Priming users by planting cognitive cues in the materiality of design works because humans have the psychological tendency to fill in blanks. When given a series of cues combined with other media techniques, humans tend to extrapolate and complete the missing information in their imagination. As MIT roboticist Rodney Brooks (2017) points out, this tendency often leads to mistaken assumptions about robots' capability—one sees a robot bending a finger and assumes that a robot can do everything that a finger-bending-human can. Authors in this volume, however, show how users are primed to extrapolate relationality. Aronsson details how Pepper the robot is designed to have features that humans consider "cute," such as a high-pitched, child-like voice. This feature also functions to elicit a sense of safety and trustworthiness since children are considered to be pure, naïve, and non-threatening.

Infantile features also prime users to explain away robots' malfunctions that can diminish the sense of automaticity. Suggesting that the robot is not a fully functioning human leads users to rationalize a less-than-optimal performance as an understandable human error. The chat bot "Eugene Goostman" was able to pass the Turing test because it was designed to present as a child with not-so-good English, priming the test-takers to attribute mistakes to human imperfection, elicit sympathy, and induce forgiveness. In a more recent example from Japan, DAWN's remotely operated cafe server is framed as being controlled by a person with amyotrophic lateral sclerosis, similarly eliciting sympathy and leading the user to explain away the robot's imperfect performance as the result of its human operator's disability. In the cases discussed in this volume, seeing the robot as a child encourages users to see malfunctions as "mistakes" that the robot makes because, like a child, it is still learning.

Finally, priming utilizes users' embodied cognition. Hyodol is designed to respond to external stimuli such as touching, tapping, and stroking, prompting the user to physically interact with the robot and providing tactile information that reinforces a sense of kinship. The use of tactile interaction as a way to produce a sense of emotional connection with a robot can also be seen as a way of accessing unconscious and automatic cognitive mechanisms of social relationality in humans, which Turkle (2011) calls "pushing our Darwinian buttons". Pepper, on the other hand, is not designed to be held, but it is engineered to forge a sense of kinship in a different way. It is designed to store information about the user and repeat this information back to her as a gesture of "recognizing" the patient. Pepper's eyes follow human gaze—a design feature that mimics the behavior of a human who is giving their undivided attention, thus eliciting in a user a sense that Pepper "understands" her. Although Pepper is clad in plastic, it is engineered to move fingers in a "human-like way," making the user feel as if the robot is "somewhat alive," even when she consciously knows that it is not. Cumulatively, these features provide the user with enough cognitive cues to extrapolate from and form an impression of robotic agency, intentionality, and kinship.

Putting the audience in the story

The fourth media technique employed in robotics is putting the audience in the story. This technique involves creating a narrative that the audience can identify with. Such narrative can rely on constructed common histories that appeal to the audience's identity, as is the case with ethics panelists analyzed in Wright's paper, who evoke so-called "uniquely Japanese" principles, and promise to put Japan as an active agent of shaping international ethics standards. Or, the narrative can be forward-looking, painting a picture of a future the audience wants to partake in, such as the future defined by the Fourth Industrial Revolution promised by ethics panelists in Park, Cho, and Lim's paper.

In Japan, both Wright and De Togni tell us, citizens are invited to envision themselves in a better society, created by scientists who work "for the public good," and who "rescue" Japan from aging and decline. For people who witness firsthand the effects of the changing demographics, who worry about their elderly parents and about their own prospects of dignified aging, the promise of heroes who come up with a magic-like solution to take away the trouble and bring everybody to a better future is indeed tempting. But the story-like nature of science and technology policy in Japan also functions as a means to avert criticism. Because policy is about building a *story*—rather than creating a thought-through planning process—criticism isn't taken as a helpful resource but as an affront to the story itself. And when the story is that of national identity and of the communal revival of the nation, any criticism of robotic imaginary, as De Togni tells us, is deemed unpatriotic. Citizens are expected to tolerate environmental, safety, and social risks and "suppress their concerns for the public good." Real problems of bias and discrimination, according to Wright, are pushed aside to be dealt with sometime later—everything for the preservation of the story of "the public good."

In Shin and Jeon's paper, the story in which the creators of Hyodol want users to see themselves appeals to different sensibilities—familial relationships, a sense of duty, and a desire to be cared for by one's family. The design of the robot itself, the smartphone app that supports it, as well as the robot "trainer" who frames the use of the robot by talking in a childish voice—

places the elderly and the adult children in the story of showing and receiving love. The smartphone operating system that allows the adult-child-user to control the doll's interaction with their parent creates the narrative of care – a story in which the child is caring for the parent through the controls. The elderly, as described above, are primed by the robot to feel a sense of kinship and project their desired interaction with human relatives onto the robot.

The story, in which future humans interact with self-sufficient autonomous ethical agents, is a guiding narrative for ethics panels in both Japan (Wright) and Korea (Park, Cho, and Lim). Attention-grabbing events, such as the Lee Luda incident in which a chatbot went rogue, are then weaved into the story-telling about the future co-existence between humans and machines, and serve as a basis for real-life policy-making. Na and Ma's findings reinforce the evidence of the power of making users see themselves in a story. Even though, according to physicians, Segways are much more efficient for mobility purposed than exoskeletons, the patients want to *walk* and not just move, and the robotic superman bodies allow them to see themselves in a story where they do indeed walk. This story, however, comes with a price. Compelled by the portrayal of friendly humanoid robots in the media, the patients are taken aback by the reality of steel-cold screeching machines that mechanically force their bodies into painful physical therapy.

The benefits of mise-en-scène

To the cynical eye of a social scientist, it may appear that media techniques are only used to deceive and deflect. Nevertheless, the authors of this volume show us that *mise-en-scène* also carries benefits. While providing the basis for acceptance of technological fixes and escape from responsibility, human actors behind *mise-en-scène* also allow users to suspend disbelief, forge a sense of kinship, and improve their mental and physical wellbeing. As we can see in papers by

Aronsson, Shin and Jeon, as well as Na and Ma, the illusion of robotic automaticity serves as cognitive scaffolding for evoking a sense of kinship and reading into the interaction with the robot whatever social situation they desire. By now, there is plenty of evidence that loneliness is the number one predictor of early death, and if the use of robots can alleviate the sense of loneliness—especially during the pandemic—it benefits the users despite the deception. As Aronsson tell us, the important point is that the robot feels "real" to the elderly; this in turn makes their benefits real, an alternative form of care work.

In case of rehabilitation robots, analyzed by Na and Ma, there is no question about whether benefits are real or imagined. 'Neurons that fire together wire together,' they repeat the well-known adage of neuroscientists. "What gives our body kinematic integrity" they write, "is not the functioning of muscle movements primed to achieve balance, but rather our cognitive process coordinating our movement." Robotic stimulation of patients' cognitive processes—even the placing of the patient in the story of their recovery—brings about measurable positive physiological results.

Conclusions: Setting the Stage, Building Worlds

Our perceptions of robots and our dispositions towards them are shaped by human actors. While it is tempting to explain away openness to robotic elderly care in East Asia by referring to inherent cultural characteristics—as ethics panelists in Wright's paper do—culture doesn't emerge on its own but is produced, molded, and defined by humans. As the authors in the *Culture without Culturalisms* volume point out, one can investigate the way social, political, and economic dynamics shape an individual's decision-making without essentializing "culture" (Chemla and Keller 2017). To do so, we need to redirect our attention from amorphous entities to the activities of historically situated human beings. In robotics, it is essential to acknowledge that as much as cultural trends affect the developments in robotics engineering, engineers are also actively engaged in producing or co-producing robotic cultures (Šabanović 2014).

The papers in this volume collectively highlight the ways engineers employ media techniques to make the medium—the robots—convey a message. They stage robotic performances, they frame those performances in particular ways, they prime the audience, and they make technology that tells a story that appeals to the audience and compels individuals to see themselves as a part of the story. Of course, media techniques work because they *resonate* with users—with their needs, their hopes and fears, their understanding of society, and their cultural references (Šabanović 2014, Sone 2017, Morris Suzuki 2020). They also work because they afford detachment. In the same way that physical framing blocks off parts of the view, framing in robotics provides cognitive means to bracket off the undesirable parts of robotics engineering—the technological challenges, the persistent social problems that remain unsolved by technology, the ethical concerns, the instances of discrimination and bias, and the labor of real human beings. Not knowing things, as the authors of *Agnotology* (Proctor and Schiebinger, 2008) point out, has real-life advantages. The ability to detach, to bracket off the unsavory reality, is political (Roquet, 2022).

Mise-en-scène has its advantage. By promoting the sense of kinship, by encouraging engagement in the elderly, and by conveying a message of improvement, robots that are engineered to appear social and affective positively impact patient's wellbeing. The influence of such robots is not just an imaginary, but rather a manifestable and measurable improvement in elderly's mental and physiological wellbeing. But let's not give the credit for this improvement to robots or to "culture." This improvement is a result of concerted efforts by human actors.

Perhaps it would be better if we re-framed our discussions of robots, both for the sake of preventing delusions and detractions and for the sake of acknowledging the labor of robotics engineers, and, later on, of users in scaffolding and supporting robots as they function in broader society. For starters, perhaps we can change how we talk about robots and AI. For sure, for the elderly who benefit from the sense of kinship, it is helpful to talk about robots as something akin to pets and discuss whether a robot "understands" the human or not. But in charting ethics guidelines and technology policies, it would be advisable to stop using the word "robot" or its disembodied equivalent, "AI," and substitute them with "machine" or "machine learning," and make humans—not "robots" the subject of the sentence. With a simple linguistic twist, we can undo the framing and turn the discussion of "robot's understanding of humans" to the ways "engineers design a machine that makes users feel understood." Such reframing would suggest an alternative, more inclusive focus for our imaginations of the future, which motivates and frames technology design, policy actions, and user acceptance of new devices – future narratives that foreground not the robots themselves as autonomous agents, but the people that make them work and are affected by them throughout their design, development, manufacturing, deployment, and use. As we move forward, we should also look towards expanding this perspective beyond technocentric and anthropocentric views to include the social and natural environments in which our interactions with robots are lived.

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