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12 "WHO'S JOHNNY?" ANTHROPOMORPHIC FRAMING IN HUMAN–ROBOT INTERACTION, INTEGRATION, AND POLICY

Kate Darling

In 2015, the robotics company Boston Dynamics released a video clip introducing "Spot," a distinctly doglike robot. In the clip, Spot is kicked twice by humans and scrambles hard to stay on all four legs. The purpose of kicking Spot was to demonstrate the robot's stability, but many commenters took to the internet to express discomfort and even dismay over Spot's treatment. The slew of negative reactions even compelled the animal rights organization PETA to acknowledge the incident (Parke 2015). We know that robots like Spot experience no pain whatsoever, so isn't it absurd for people to make such a fuss?

Perhaps not. Research shows that humans tend to anthropomorphize robotic technology, treating it as though it were alive, even if we know better. As we increasingly create spaces where robotic technology is purposed to interact with people, should we encourage this inclination or discourage it? And how do we change human perceptions of robotic objects when even the simplest of robots engenders anthropomorphism (Sung et al. 2007)?

One of the tools we can use to influence anthropomorphism is framing. An experiment on human–robot interaction conducted together with Palash Nandy and Cynthia Breazeal at MIT indicates that personifying a robot with a name or character description, or giving it a backstory, affects people's responses to robots (Darling, Nandy, and Breazeal 2015).

Turkle (2006, 2012), Scheutz (2012), and others have criticized the anthropomorphization of robotic technology, concerned that the emotional relationships people develop with anthropomorphized robots will replace human relationships, lead to undesirable behaviors, or make people vulnerable to emotional manipulation. Some have also argued that robots should be framed in non-anthropomorphic terms,

i.e., strictly as tools, lest the legal system adopt inappropriate analogies for the use and regulation of robotic technology (Richards and Smart 2016).

As this chapter shows, I agree that framing has a broader effect on the way we view robotic technology and the analogies that drive both use and regulation. However, I argue that anthropomorphic framing is desirable where it enhances the function of the technology. The chapter examines some concerns about human relationships and behaviors, including issues of privacy, emotional manipulation, violence, sexual behavior, and the entrenchment of gender and racial stereotypes that comes with framing robots in human terms. I conclude that we need to address these concerns, but that we should address them within the recognition that there are benefits to anthropomorphic technology.

12.1 Integration of Robots

We know that people treat artificial entities as if they were alive, even when they're aware of the entities' inanimacy (Duffy and Zawieska 2012). Research has shown that most of us perceive computers (Reeves and Nass 1996; Nass et al. 1997) and virtual characters (McDonnell et al. 2008; Holtgraves et al. 2007; Scholl and Tremoulet 2000; Rosenthal von der Pütten et al. 2010) as social actors. Robots tend to amplify this social actor projection because of their embodiment (Kidd and Breazeal 2005; Groom 2008) and physical movement (Scheutz 2012; Duffy 2003, 486). Social robots are specifically designed to be anthropomorphized (Breazeal 2003; Duffy 2003; Yan et al. 2004), but people also anthropomorphize robots with non-anthropomorphic design (Carpenter 2013; Knight 2014; Paepcke and Takayama 2010).

Robots are gradually entering new areas and assuming new roles, some of which rely specifically on our tendency to anthropomorphize robots. There are also contexts where a robot functions as a tool, but is less threatening and more readily accepted by humans if anthropomorphized. In other contexts, anthropomorphism is undesirable, particularly when it can hinder a robot's ability to fulfill its function.

12.1.1 Integration of Robots as Tools

Robots are increasingly interacting with humans in manufacturing, transportation systems, the military, hospitals, and many other workplaces, soon to be followed by personal households. Whether these robots should be framed anthropomorphically depends on their function.

In 2007, *Washington Post* reporter Joel Garreau interviewed members of the U.S. military about their relationships with robots, uncovering accounts of Purple Hearts for robots, emotional distress over destroyed robots, and hero's

welcomes for homecoming robots. One robot was built to walk on and detonate land mines. The colonel overseeing the testing exercise for the machine ended up stopping it because the sight of the robot dragging itself along the minefield was too "inhumane" to bear.

Military robots have been given funerals with gun salutes (Garber 2013). Julie Carpenter (2013) conducted an in-depth study on explosive ordinance disposal robots in the military, finding that the operators sometimes interacted with the robots in much the same way they would interact with a human or a pet, and demonstrating a need for the issue to be addressed in the future deployment of military technology. There are even stories of soldiers risking their lives to save the robots they work with (Singer 2009), illustrating that it can be anything from inefficient to dangerous for robots to be anthropomorphized when they are meant to be non-social tools.

In these cases, projecting lifelike qualities onto robots is undesirable, because the resulting emotional attachment can impede the intended use of the technology. But there are also robotic technologies whose use is facilitated by anthropomorphism.

For example, a CEO and employees of a company that develops medicine delivery robots observed hospital staffers being friendlier to robots that had been given human names. Even tolerance for malfunction was higher with anthropomorphic framing ("Oh, Betsy made a mistake!" vs. "This stupid machine doesn't work!"). So the company has started shipping its boxy, non-anthropomorphically designed hospital delivery robots with individual names attached to them on a plaque (Anonymous 2014).

Jibo is a table-lamp-shaped household robot that schedules appointments, reads email, takes photos, and functions as a family's personal assistant. But it is mainly thanks to its anthropomorphic framing that Jibo has received a slew of positive attention and millions of dollars in investments (Tilley 2015). As *Mashable* describes: "Jibo isn't an appliance, it's a companion, one that can interact and react with its human owners in ways that delight" (Ulanoff 2014).

These examples illustrate that people may be more willing to accept new technology and integrate it into their lives, whether at work or at home, if it is introduced with anthropomorphic framing, like a personified name or a description as a "companion." So long as the intended function of the robot is not implicated, we may want to encourage this effect to help with technology adoption and literacy.

12.1.2 Integration of Robots as Companions

Social robots provide benefits that are most effectively realized through a relationship between the human and the robot. Today's social robots can simulate

sound, movement, and social cues that people automatically and subconsciously associate with states of mind (Scheutz 2012; Koerth-Baker 2013; Turkle 2012). With these projections come possibilities. State-of-the-art technology is already creating compelling use-cases in health and education, possible only as a result of engaging people through anthropomorphism.

The NAO Next Generation robot is a little humanoid that has found applications working with children with autism spectrum disorders (Shamsuddina 2012). One of the advantages of using the NAO is that it can be effective in creating eye contact or interaction, helping bridge communication gaps between a teacher or parent and the child. Another example is a robot teddy bear called Huggable, which cheers up children in hospitals and similarly facilitates communication between kids and their doctors or parents in what can be a scary and difficult situation (*Wired* 2015). Other social robots like MIT's DragonBot and Tega engage children in learning, often with better results than books or computers (Ackerman 2015).

The benefits of assistive robots are not limited to children. Social robots can help adults through interaction, motivation, monitoring, and coaching in health and education (Feil-Seifer and Matarić 2005; Tapus, Matarić, and Scassellatti 2007). Research shows that people trying to lose or maintain weight will track their data for nearly twice as long when they use a social robot compared with a computer or paper log method (Kidd 2008). Robots can motivate people to exercise through praise and companionship (Fasola and Matarić 2012), help them take medicine (Broadbent et al. 2014), and serve as a nonjudgmental partner in sensitive tasks.

Paro is a robot baby seal that has been used therapeutically in nursing homes since 2004. Its compelling design gives most people who interact with it a sense of nurturing. Paro has been used to calm distressed people, from earthquake victims in Japan to dementia patients across the world, even serving as an effective alternative to medication (Chang and Sung 2013). Similar to the therapeutic use of live animals, which is often too unhygienic or unsafe to implement in these health contexts, Paro gives people who are being cared for a sense of empowerment (Griffiths 2014). Paro has also encouraged more interaction among people in nursing homes (Kidd, Taggart, and Turkle 2006).

Because social robots can provide therapy or motivation that works most effectively when they are perceived as social agents rather than tools (Kidd 2008; Seifer and Matarić 2005), it makes sense to frame them accordingly. That said, we need to discuss concerns about some uses of anthropomorphic robots.

12.1.2.1 Effects on Human Relationships

Some have criticized anthropomorphism in the context of social robots. Sherry Turkle laments a loss of "authenticity" (2010, 9), a term she uses to describe the difference between a biological and a robotic turtle (Turkle 2007), and worries that seductive robot relationships (assuming these are less difficult than relationships with humans) will lead people to avoid interacting with their friends and family (Turkle 2010, 7).

Oddly, we don't see the same amount of concern for people who spend time with their pets. Even if we frame robots as social companions, it is not immediately clear that people would substitute robots for their human relationships. Nor is there any evidence that authenticity will cease to be valued as she predicts. (In fact, markets for authentic artwork and jewels and the persistence of sexual relationships in countries with legalized prostitution suggest otherwise.) Instead of substituting for existing relationships, we may find a new kind of relationship in robots. The key is how technology is used.

Cynthia Breazeal has drawn attention to the issues around supplementing versus replacing, emphasizing that social robots are meant to partner with humans and should be designed to "support human empowerment" (Bracy 2015). When used correctly, social robots can even be catalysts for human–human interaction, as seen in some of the cases described earlier.

For example, Kidd, Taggart, and Turkle herself (2006) show that the Paro baby seal robot inspires conversation among nursing home residents when placed in a common area. Good assistive robots can facilitate communication between children and their teachers, doctors, and parents, presenting a valuable supplement to human interaction.

Turkle's concerns are slightly misplaced in that they seem to dismiss the technology altogether rather than recognize the potential for valuable supplementary relationships. But awareness of supplementing versus replacing is important in helping drive the design and use of these technologies in a socially desirable direction.

12.1.2.2 Personal Data Collection and Other Emotional Manipulations

A simple example of an engaging technology is the Fitbit step tracker. The Fitbit One has a flower on it that grows larger with increasing activity, targeting a natural human instinct to nurture something and be rewarded for it (Wortham 2009). While the Fitbit likely affects people's lives in a positive way by improving their exercise habits, the worrisome aspect of this engagement is that it stems from a mechanism that manipulates people's behavior on a subconscious level.

It may be great that we can emotionally motivate people to walk more by giving them the sense of nurturing a digital flower. What else can we get people to do? Can we get them to vote? Buy products? Serve someone else's interests? And as our technology gets better, robots have the potential to be Fitbits on steroids. Perhaps we should let people choose to be manipulated, so long as the outcome

is positive (Koerth-Baker 2013). But it is not clear what constitutes a positive outcome.

One of the largest concerns with regard to manipulating user behavior through technology is the protection of private information. Fitbit has come under criticism for data collection and storage, raising privacy concerns (Ryan 2014). Yet wearable fitness trackers are still on the rise (Stein 2015), as people continue to trade their data for the motivations they value. To what extent is this an appropriate trade-off and to what extent could it be deceptive, relying on poorly informed consumers or distracting people with something shiny?

The privacy issues of data collection are not unique to robotics. Robots will, however, present new opportunities for data collection as they enter into previously untapped areas in personal households (Fogg 2003, 10) and take on social functions (Calo 2012). Social media platforms have demonstrated that people are willing to publicly share photos, locations, and other personal details in return for the "likes" and general social engagement this creates on the respective platforms. Stricter privacy settings are often directly at odds with the benefits the service provides to its users (Grimmelmann 2009). Similarly, the emotional engagement inherent in the use of social robot technology may incentivize people to trade personal information for functional rewards. It could also persuade people to reveal more about themselves than they would willingly and knowingly enter into a database (Kerr 2004; Fogg 2003; Calo 2009; Thomasen 2016).

Furthermore, revealing personal information is not the only type of manipulation that warrants concern. Platforms like Facebook harness social relationships to great effect, wielding the power to potentially swing political elections (Zittrain 2014). Research on human–computer interaction indicates that we are prone to being manipulated by social AI (Fogg and Nass 1997). Joseph Weizenbaum (1976), after witnessing people interact with his 1960s psychotherapist bot, ELIZA, warned against being influenced by machines and taking on computers' (and their programmers') worldview. Ian Kerr predicts that AI will engage in all manner of persuasion, from contracting to advertising (2004).

According to Woodrow Hartzog (2015), there may even be cause to discuss regulation. The interests of corporations do not necessarily align with those of consumers, and market imperfections can prevent free market solutions (Mankiw and Taylor 2011, 147–55). If a company charges an exorbitant amount for a mandatory upgrade to a robot that someone's child or grandfather has become emotionally attached to, is that a permissible exploitation of consumers' willingness to pay (Hartzog 2015)? Is it OK for a child's language-teaching robot to have a vocabulary that is skewed toward specific products or for sex robots to have in-app purchases? We may find ourselves asking these questions in the near future.

It is concerning that neither market forces nor consumer protection laws have been able to adequately resolve current incentive structures to reveal personal

data online. On the other hand, our continuing engagement with these issues in the context of the internet means that we are aware that there is a consumer protection problem and are continuously working to find solutions. As these issues extend to robotic technology, we can draw on existing discussions and studies of social media, advertising, gamification, addiction, and other areas to understand related user behaviors and get a sense of appropriate boundaries and trade-offs. Furthermore, promoting a broad public awareness of privacy and other manipulation concerns can pave the way for solutions through law, markets, norms, technology, and framing.

It would be a shame to relinquish the health and education benefits of robotics in order to regulate the potential harm. But to embrace anthropomorphic robots, knowing that they surpass most emotionally persuasive technology we have seen previously, we may need to have safeguards in place for those who would abuse us.

12.1.2.3 Violence and Sexual Behavior

Experimental research suggests that we can measure people's empathy on the basis of how they interact with lifelike robots (Darling, Nandy, and Breazeal 2015). An interesting question is whether we can *change* people's empathy through interactions with robots. We sometimes use therapy animals to encourage empathy in children and youth, but therapy with real animals is problematic and requires extensive supervision. As robots become cheaper, they may be an effective alternative. Robots could also be used in more places than animals can, such as pet-restrictive households or in prison rehabilitation programs.

On the flip side, there is a danger that treating robots violently might have a negative effect on people's empathy development. For example, there are reasons we may want to prevent children from vandalizing robots (Brscić et al. 2015) that go beyond respecting people's property: if the robots behave in a lifelike way, they might begin to influence how children treat living things (Walk 2016). And it's not just children who are of concern here—there is a chance that violence toward lifelike robots could desensitize adults to violence in other contexts (Darling 2016). Similarly, undesirable sexual acts or behaviors may be encouraged by the repeated use of robots as sexual partners (Gutiu 2016).

The question of whether robots can actually change people's long-term behavioral patterns, in either positive or negative ways, is unanswered. While there are parallels to research on violence in video games, the differences in how we perceive what is virtual and what is physical warrant reconsideration of the question (Bainbridge et al. 2008; Kidd and Breazeal 2005). Currently, we do not know if human–robot interaction is more likely to encourage undesirable behavior or serve as a healthy outlet for behavior that would otherwise have negative consequences. But this is an important question to explore, as discussions around

violent behavior toward robots begin to surface (Parke 2015) and sexual robots become a reality (Freeman 2016; Borenstein and Arkin, 2016).

12.1.2.4 Gender and Racial Stereotypes

Robots that are framed in human-like terms can unfortunately reinforce existing cultural biases that are harmful to certain social groups (Tiong Chee Tay et al. 2013; Riek and Howard 2014). Andra Keay surveyed the types of names creators gave their robots in robotics competitions. The names tended to reveal functional gender biases (2012, 1). Keay also found that the male names were far more likely to express mastery (for example, by referencing Greek gods), whereas most of the female names tended to be in the infantilizing or sexualizing style of "Amber" and "Candii" (5). Framing robots in masculine terms could further dampen young women's interest in engaging with the field. Derogatory female framing of robots may not only reflect but also reinforce existing biases.

In the movie *Transformers: Revenge of the Fallen* (2009), there is a robot duo that blunders around and whose main contribution is comic relief. Unlike the other members of their crew, these two robots cannot read. They talk jive and argue with each other in "rap-inspired street slang" ("Let's pop a cap in his ass, throw him in the trunk and then nobody gonna know nothing, know what I mean?"). One of them has a gold tooth. Director Michael Bay brushed off criticism of racial stereotypes, saying that the characters are robots (Cohen 2009). How that absolves him is unclear.

If we are aware of these issues, however, we may even be able to positively influence gender and racial stereotypes through technology. We can *choose* what names and personalities we imbue robots with. Could we encourage people to associate a female name with something intelligent (Swartout et al. 2010)? Aside from companies that intentionally give subservient virtual assistants female names based on "market research," some harmful racial and gender biases may simply be going unnoticed among developers and users of robotic technology. Drawing attention to suppressive stereotypes in the framing of robots would be a first step toward mitigating the problem. The next step could be to use the anthropomorphic framing of robots as a tool to challenge perspectives on race or gender.

In summary, while some concerns about anthropomorphizing robots are valid, there are many cases in which it can be useful for people to bond with robots on a social level. Addressing the concerns calls for targeted solutions rather than broad discouragement of anthropomorphism.

12.2 Framing Experiment

How do we deal with the integration of robots as tools in use-cases where anthropomorphism gets in the way? The lifelike physical movement of robots is assumed

to be a major driver of anthropomorphic projection (Knight 2014; Saerbeck and Bartneck 2010; Scheutz 2012, 205). But robots often need to move around a certain way in order to function optimally, making movement a difficult thing to adjust. So we conducted an experiment to explore framing as an alternative mechanism to influence anthropomorphism (Darling, Nandy, and Breazeal 2015).

In one part of our experiment, participants were asked to observe a Hexbug Nano, a small robotic toy, and then strike it with a mallet. The participants were significantly more hesitant to strike the robot when it was introduced with anthropomorphic framing like a name and backstory (for example, "This is Frank. He's lived at the Lab for a few months now. His favorite color is red . . ."). In order to help rule out hesitation for other reasons (for example, perceived value of the robot), we measured participants' psychological trait empathy and found a strong relationship between tendency for empathic concern and hesitation to strike robots introduced with anthropomorphic framing. Adding color to our findings, many participants' verbal and physical reactions in the experiment were indicative of empathy (asking, for example, "Will it hurt him?" or muttering under their breath, "It's just a bug, it's just a bug," as they visibly steeled themselves to strike the personified Hexbug).

In summary, our results show that framing can influence people's immediate reactions to robots. Robots are often personified or referred to as experiencing the world in a lifelike way, partly in reference to the many robots in science fiction and pop culture that have names, internal states of mind, and emotions. Awareness of the effects of framing could make people and institutions more sensitive to when this prompt is useful and when it is not.

12.3 Anthropomorphism and the "Android Fallacy": Distinguishing Between Use-Cases

Richards and Smart (2016) argue that the metaphors we use to understand robots are important, because they influence how lawmakers will approach the regulation of robotic technology. They warn against the "Android Fallacy": falling into the trap of anthropomorphizing robots and framing them as social agents rather than as tools.

Their piece illustrates the legal consequences of using certain framings of technology over others, by drawing upon the metaphors used in wiretapping cases in the twentieth century and the debate over whether to give email privacy protection analogous to that of postal mail or postcards (Richards and Smart 2016, 19). Metaphors matter, from the conceptual stage of technology, where they influence design and anticipated issues, to the product stage, where consumers and the legal system will use them to understand the technology (18). The framing of robots as either companions or tools matters at both of these stages as well.

But perhaps in some cases there might be reason to use the very framings and metaphors that Richards and Smart warn against. For example, if research shows that people respond to violent or sexual behavior toward certain robots as if the robots were alive, then one option is to take that framing to its conclusion, instead of discouraging the anthropomorphism. When we frame robots as nonliving tools, we relinquish an opportunity: lifelike robots may be able to help shape behavior positively in some contexts. If we were to embrace, for example, an animal metaphor, then we could regulate the harmful use of pet robots or sex robots with laws analogous to existing animal protection laws by restricting unnecessarily violent or cruel behavior (Darling 2016). Not only would this combat desensitization and negative externalities in people's behavior, it would preserve the therapeutic and educational advantages of using certain robots more as companions than as tools.

It is important to note that framing a social robot anthropomorphically corresponds to the function of the robot and the consistency with which people perceive these robots differently from other devices. We might ultimately do better to accept a social actor analogy for socially designed robots and work from there, saving the tool analogy for cases where anthropomorphism is a hindrance to functional technology or functional law.

12.4 Final Thoughts

As the examples in this chapter illustrate, it makes sense to distinguish between use-cases where we want to encourage anthropomorphism and cases where we do not. When anthropomorphism hinders the main function of a robot, this can cause problems. For robots that are not inherently social in design or functionally enhanced through social interaction, we should consider discouraging anthropomorphism using every tool at our disposal. Rather than continuing to treat science fictional narratives and personification as harmless fun, those building or implementing robotic technology should be more aware of framing effects.

For example, companies like Boston Dynamics are building military robots that mimic animal-like movement and physiology, because animals have evolved structures that happen to be incredibly efficient for mobility (Twenty 2011). But because these robots are so animal-like, soldiers may be quick to anthropomorphize them, undermining their usefulness as tools. Because lifelike movement is so central to the robots' functionality, we might at least try to objectify the robots with language (for example, using the pronoun "it") and encourage names such as "MX model 96283" instead of "Spot." This will not make anthropomorphism disappear by any means, but it may help a little to discourage the automatic treatment of these robots like pets.

Then there is the case where anthropomorphism enhances the acceptance and use of a robot, as well as the case where it directly supports the main function of the robot. These cases should be separated from the above at every level, from design to deployment, and can even be separated at a regulatory and legal level.

The law views things (*res*) as separate entities to be handled differently than, for example, agents or people (Calo 2014). We can either double down on portraying all robots as things, or we can embrace the fact that people may view certain robots differently. If people's interactions with social robots are overwhelmingly social, we might consider creating a new legal category. The inherent intelligence or abilities of the robots matter little in this context. We grant animals, small children, and corporations special legal treatment, regardless of their individual mental abilities or capacity for moral thinking. While this would require a good definition of the capabilities or functions of the robots that fall into this category, such distinctions are not new to the law, nor are they (or must they be) perfect.

Our concerns about the uses of anthropomorphic technology deserve attention and careful consideration. They do not, however, warrant the complete dismissal of anthropomorphic robots. Legal scholars, engineers, social scientists, and policymakers should work together to find solutions to the issues while recognizing the positive aspects of robot companionship. We can have constructive conversations about privacy, gender and racial biases, and supplementing versus replacing humans. The potential of anthropomorphic technology is tremendous. Instead of decrying it, let us make smart distinctions and frame it to our advantage.

Acknowledgments

Thank you, Meg Leta Jones, Laurel Riek, Woody Hartzog, James Hughes, Ann Bartow, and all of the participants at "We Robot 2015" and the "Man and Machine" conference at St. Gallen University for helpful comments and for providing some of the examples presented here.

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III APPLICATIONS

From Love to War

Introduction

In part III, we focus in on specific types of robots and their (sometimes controversial) applications, from love to war. As with our invocation of robot cars as a case study in part I, each use-case in robotics seems to hold general lessons for the broader field.

Our first case study here concerns robots that have already garnered a great deal of press: those designed for sexual use by humans (a.k.a. "sexbots"). Academic studies in the field were jump-started by David Levy's book *Love and Sex with Robots*. While human–robot romantic and intimate relationships were long a topic in science fiction, Levy's 2007 book turned the subject into an academic research discipline in its own right. Levy termed his work "Lovotics," and the authors of chapter 13 (and Levy's collaborators), Adrian David Cheok, Kasun Karunanayaka, and Emma Yann Zhang, explain that they mean the term to refer to all intimate relationships, such as love and sex, between humans and machines, especially robots.

A Lovotics robot is supposed to be capable of experiencing complex and human-like biological and emotional states that are governed by artificial hormones within its system. The authors discuss Levy's contention that the robot's intimacy software should employ parameters derived and quantified from five of the most important reasons for falling in love—proximity, repeated exposure, attachment, similarity, and attraction—and give examples of designs in progress for such a robot. They also discuss recent work on the ethical permissibility of using Lovotics robots from scholars as diverse as David Levy, who openly advocates robot prostitutes, to Islamic scholars Yusuff Amuda