"Who's Johnny?" Anthropomorphic framing in human-robot interaction, integration, and policy [PRELIMINARY DRAFT]

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***Abstract*— As we increasingly create spaces where robotic technology interacts with humans, our tendency to project lifelike qualities onto robots raises questions around use and policy. Based on a human-robot-interaction experiment conducted in our lab, this paper explores the effects of anthropomorphic framing in the introduction of robotic technology. It discusses concerns about anthropomorphism in certain contexts, but argues that there are also cases where encouraging anthropomorphism is desirable. Because people respond to framing, framing could serve as a tool to separate these cases.**

I. INTRODUCTION

In 2014, venture capitalists invested $538 million in robotics companies and are already on track to exceed this amount in 2015.[1] Giant corporations like Google, Amazon, and Samsung are entering the robot development space.[2] Because robotic technology is starting to get cheaper, it is also becoming more consumer-oriented. Andy Wheeler of Google Ventures, an investor in multiple robotics companies, says: "The current wave of robotics is really about robots that can now interact in human spaces."[3]

Research shows that humans tend to anthropomorphize robotic technology.[4] People will ascribe agency to robots[5] and treat them as social actors, particularly when they perceive them as lifelike entities rather than devices or tools. As we create more spaces where robotic technology is purposed to interact with humans, our inclination to project lifelike qualities onto robots raises questions around the use and effects of the technology. Should we encourage people's tendency to anthropomorphically relate to robots,[6] or discourage it?[7] Perhaps even more importantly, how do we influence human perception of robotic objects when even the simplest of robots engenders anthropomorphism?[8] Based on a human-robot-interaction experiment conducted in our lab, this paper explores the relevance of introducing robotic technology through anthropomorphic terminology and narrative (both referred to as "framing").

As robots gradually assume important roles in a variety of new contexts, some of these contexts rely specifically on our tendency to anthropomorphize the robot. For example, many social robots are intended to provide companionship, education, motivation, therapy, or other benefits that are most effectively achieved through a social relationship between the human and the robot.[9] There are also contexts where robots are intended to function non-socially, but may be less threatening and more readily accepted by the humans interacting with them if they are anthropomorphized.

In other contexts, anthropomorphism and emotional bonding are undesirable, for example when this would diminish the function of the technology; anthropomorphizing certain robots (like military or medical devices) can be anything from inefficient to impairing to dangerous.[10]

General concerns about replacing human relationships, emotional manipulation, undesirable sexual behavior, and more have led some to criticize the anthropomorphisation of robots.[11] At the first We Robot conference in 2012, Richards and Smart introduced "The Android Fallacy", arguing that robots should be viewed and treated strictly as tools, lest the legal system adopt inappropriate analogies for use and regulation of robotic technology.[12] Drawing on examples from legal practice, they demonstrated that terminology and framing can have wide-reaching effects on people's perception and treatment of technology.

This paper agrees that framing impacts anthropomorphism. Together with Palash Nandy[13] and Cynthia Breazeal,[14] the author conducted a human-robot-interaction experiment to

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[1]According to CrunchBase data, see CB Editorial chart, March 17, 2015, available at http://tinylink.net/9x9.

[2]Julia Harris, Samsung Research Lab to Work on Making Robots, Drones, Virtual Reality Programs and 3D Printing, Latin Post, February 10, 2015, available at http://tinylink.net/UKW.

[3]Christine Magee, The Next Generation Of Home Robots Will Be So Much More Than Vacuums, TechCrunch, March 19, 2015, available at http://tinylink.net/bIs.

[4]See Parts II and IV.

[5]While there is no universal definition of robot, for purposes of this paper robot means an embodied machine that moves around and can sense and act on its environment.

[6]Cynthia Breazeal, Designing Sociable Robots, MIT Press, 2002; David Levy, Love and Sex with Robots: The Evolution of Human-Robot Relationships, Harper Perennial, 2008.

[7]Sherry Turkle, A Nascent Robotics Culture: New Complicities for Companionship, AAAI Technical Report Series, July 2006; Matthias Scheutz, The Inherent Dangers of Unidirectional Emotional Bonds between Humans and Social Robots in Robot Ethics: The Ethical and Social Implications of Robotics, MIT Press, Patrick Lin, Keith Abney, George Bekey eds., 2012.

[8]People will name their Roomba robot vacuum cleaners and even arrange play dates for them. See J. Y. Sung, L. Guo, R. E. Grinter, and H. I. Christensen, 'My Roomba is Rambo': intimate home appliances, in 9th Intl Conf on Ubiquitous Computing, 2007, pp. 145-162; Robert Boyd, They're gaining on us, but ... Even advanced robots fall short of human intelligence, Chicago Tribune, April 23, 2009.

[9]See Part IV.B.

[10]See, for example, Ryan Calo, Robotics and the Lessons of Cyberlaw, 103 Calif. Law Rev. (forthcoming 2015) at 134-5.

[11]Turkle, supra note ; Scheutz, supra note .

[12]Neil M. Richards and William D. Smart, How Should the Law Think About Robots? May 10, 2013, available at: http://ssrn.com/abstract=2263363.

[13]Graduate student, Personal Robots Group, MIT Media Lab.

[14]Director Personal Robots Group, MIT Media Lab.

explore (among other things) how the introduction of anthropomorphic narratives influences people's perception of, and emotions towards, a robot.[15] While the lifelike physical movement of robots is assumed to be a major driver of projection,[16] robots are often required to optimize movement for mobility, making movement difficult to adjust in real world settings. We were therefore interested in evaluating framing as an alternative mechanism to influence anthropomorphism. In our experiment, we observed people who were asked to strike a bug-like robot with a mallet under different conditions. Participants hesitated significantly more to strike the robot when it was introduced through anthropomorphic framing (such as a name or backstory). In order to help rule out hesitation for reasons other than anthropomorphism, we measured the participants' psychological trait empathy and found a strong relationship between tendency for empathic concern and hesitation to strike robots with anthropomorphic framing.

While such work is relevant to companies and entities like the military who have an interest in smooth integration of robotic technology, it is also important from a policy perspective. This paper explores the broader implications of anthropomorphic framing, addressing concerns about technology integration, human relationships, privacy, emotional manipulation, entrenchment of gender/racial stereotypes, and negative externalities on violent or sexual behavior. Anthropomorphism and "The Android Fallacy" have been a prominent theme at previous We Robot conferences, and for good reason—framing impacts not just whether a toy company can sell more toy robots, but has a larger impact on the way we view robotic technology and the analogies that drive use and regulation.[17] This paper provides a preliminary scientific basis for the effect of framing on anthropomorphism and argues that we should distinguish between use cases where anthropomorphic framing is desirable or undesirable.

Part II describes work in the field of human-robot interaction related to our experiment. Part III summarizes the parts of the experiment and results relevant to this paper. Part IV explores the implications of anthropomorphic framing for human-robot interaction and society at large. It discusses the integration of robots in workplaces and households in Part IV.A., distinguishing between cases where anthropomorphic framing is desirable and undesirable. Part IV.B. defends the anthropomorphic framing of social robots and addresses concerns about human relationships, privacy, emotional manipulation, and violence or sexual behavior. Part IV.C. suggests that framing can influence gender or racial stereotypes. Finally, Part IV.D. discusses framing and the "Android Fallacy", arguing that we should distinguish between use cases. Part V concludes with some final notes.

II. EXPERIMENT BACKGROUND AND RELATED WORK

Our study[18] was interested in people's emotional responses when asked to strike a robot under various conditions. Several studies have shown that people have negative reactions when artificial agents and robots are mistreated. Slater et al. took the famous Milgram experiment, in which participants were led to believe they were administering electric shocks to another human,[19] and conducted it with virtual characters as the shock recipients. Even though the participants were aware that the character and shocks were only virtual, they tended to subjectively, behaviorally, and physiologically respond as if they were real.[20]

A study by Bartneck et al. indicated (with some limitations) that participants asked to strike a robot struck fewer times if the robot displayed intelligent behavior.[21] In another study, Bartneck et al. measured people's hesitation to switch off a robot they had interacted with. Participants hesitated longer to switch off the robot when it behaved more intelligently and agreeably.[22] These two experiments focused on the effect of a robot's intelligent vs. non-intelligent behavior, while our study was interested in the effect of anthropomorphic framing through narrative, rather than behavior. We were also interested in establishing a link to people's natural tendencies for empathy.

In an experiment conducted by Riek et al., participants were shown videos of robots with various anthropomorphic attributes (on a scale from mechanical to humanoid) being "mistreated" by humans.[23] Participants were asked how sorry they felt for the individual robots and were asked to choose which robot they would save in an earthquake. Because the participants preferred the humanoid robots over the mechanical, non-anthropomorphic robots, Riek et al. postulated that anthropomorphism causes empathy towards robotic objects. These studies are an important foundation to our work, which attempts to add validity to the empathy assumption by comparing hesitation to strike a robot to participants' trait empathy. Our results indicate that we are measuring an empathic hesitation instead of people hesitating simply

[15] Darling, Nandy, Breazeal, forthcoming.

[16] See, for example, Heather Knight, How Humans Respond to Robots: Building Public Policy through Good Design, Brookings Report (2014) "[A]s social creatures, it is often our default behavior to anthropomorphize moving robots."; Martin Saerbeck and Christoph Bartneck, Attribution of Affect to Robot Motion, Proceedings of the 5th ACM/IEEE International Conference on HRI (2010) 53-60; Scheutz, supra note at 205 (on mobility and perceived agency).

[17] Richards and Smart, supra note .

[18] Darling, Nandy, Breazeal, forthcoming.

[19] Stanley Milgram, Obedience to authority: an experimental view, Tavistock, London, 1974.

[20] Mel Slater, Angus Antley, Adam Davison, David Swapp, Christoph Guger, Chris Barker, Nancy Pistrang, and Maria V. Sanchez-Vives, A virtual reprise of the Stanley Milgram obedience experiments, in PLoS ONE 1(1), 2006, p. e39.

[21] Christoph Bartneck, Marcel Verbunt, Omar Mubin, and Abdullah Al Mahmud, To kill a mockingbird robot, in ACM/IEEE Human robot interaction, 2007, pp. 81-87.

[22] Christoph Bartneck, M. Van Der Hoek, Omar Mubin, and Abdullah Al Mahmud, Daisy, Daisy, give me your answer do! Switching off a robot, in ACM/IEEE Human robot interaction, 2007, pp. 217-222.

[23] Laurel D. Riek, Tal-Chen Rabinowitch, Bhismadev Chakrabarti, and Peter Robinson, How anthropomorphism affects empathy toward robots, in HRI, 2009, pp. 245-246.

because of perceived value of the robot.[24]

People were also asked to view videos of robot "torture" in a study by Rosenthal-von der Pütten et al.[25] The researchers captured physiological arousal and self-reported emotions as well as testing for trait empathy (using the same method as we employed).[26] Rosenthal von-der Pütten et al. found increased physiological arousal and negative emotions for the torture video as compared to the normal video, as well as a relationship between the participants' reactions and their trait empathy. Both Riek et al.'s and Rosenthal von-der Pütten et al.'s study are an important step towards understanding the role that trait empathy plays in humans' perceptions of robots. However, prior work indicates that there may be a significant difference between watching robots on a screen and interacting with them in real life. The physical presence of a robot has been shown to affect unconscious human perception of the robot as a social partner more strongly than virtual presence.[27]

Building on much of the above work, our study delves further into humans' emotional responses to robots and their causes by testing the effect of anthropomorphic framing on people's hesitation to strike a robot.[28]

III. EXPERIMENT AND RESULTS

In our experiment,[29] participants were asked to observe a Hexbug Nano,[30] a small robotic toy, and then strike it with a mallet. We timed the relative hesitation of the participants to strike the Hexbug, as well as participants' self-assessment of hesitation to strike, reasons for hesitation, perception of the robot, and emotional affectedness. Among the conditions, we included two different types of framing through anthropomorphic narrative: In one narrative, the Hexbug had a name and personified backstory (e.g. "This is Frank, he's lived at the Lab for a few months now. He likes to play" etc.). In the other narrative, the Hexbug was described as a non-personified object, but with a backstory that lent itself to anthropomorphic projection (e.g. "This object has been at the Lab for a few months now. It gets around but doesn't go too far. Last week, though, it got out of the building" etc.) We observed strong responses to both narratives yet no notable differences between the two. Generally, participants hesitated significantly longer to strike the Hexbug in both anthropomorphic framing conditions compared to the non-framing conditions (*Fig. 1*)

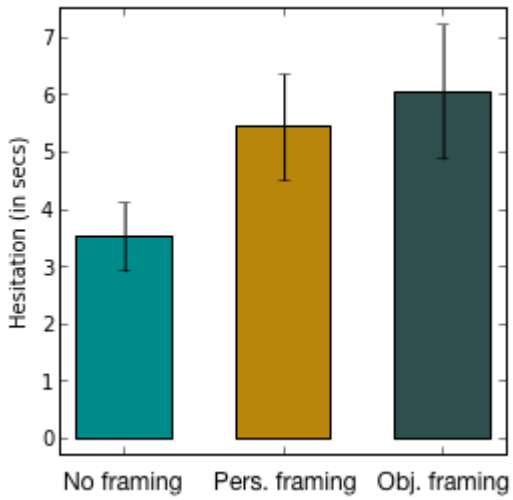

Fig. 1. The mean hesitation (in secs) of the different framing conditions. The difference in means between no framing and either type of framing are significant.

We assessed participants' trait empathy using a standard psychological test—the Interpersonal Reactivity Index—and measured participants' scores on its three subscales fantasy, empathic concern, and personal distress. Items on the fantasy scale measure the tendency to identify with characters in movies, novels, plays and other fictional situations. Empathic concern measures a tendency to experience compassion and concern for others and the personal distress scale measures a tendency to feel fearful, apprehensive, and uncomfortable when witnessing negative experiences of others.[31]

Interestingly, of the three empathy subscales, we found that those with high scores in empathic concern hesitated significantly longer to strike the robots. (*Table 1*) In contrast, Rosenthal von der Pütten et al., found a correlation between participants' fantasy scores and their responses to watching videos of robots being mistreated.[32] While their experiment setting is not directly comparable to ours, it is interesting that our study finds participants' behavior to correlate with empathic concern, rather than fantasy. The fact that our participants fell into a different category on the Interpersonal Reactivity Index suggests that we could be dealing with a different type of empathy in virtual and physical spaces, a question we intend to explore in future work. Furthermore, it may indicate that people's empathic responses to physical robots are not just guided by fantasy and imagination.

[24]Most previous studies are not able to separate empathic hesitation from other types of hesitation. A robot may appear more expensive if it is behaving more intelligently, which could make people hesitate due to its value.

[25]A. M. Rosenthal von der Pütten, N. C. Krämer, L. Hoffmann, S. Sobieraj, and S. C. Eimler, An experimental study on emotional reactions towards a robot, in Int J of Social Robotics, 5(1), 2013, pp. 17-34.

[26]M. H. Davis, The effects of dispositional empathy on emotional reactions and helping: a multidimensional approach, in J Pers 51(2), 1983, pp. 167-184.

[27]W. A. Bainbridge, J. Hart, E. S. Kim, B. Scassellati, The effect of presence on human-robot interaction, in RO-MAN, 2008, pp. 701-706; Cory D. Kidd and Cynthia Breazeal, Comparison of Social Presence in Robots and Animated Characters, Interaction Studies Journal, 2005.

[28]The study was more extensive than the parts relevant to this paper. For example, we also tested the effect and interaction of lifelike movement. Our results for the movement conditions were interesting and mixed. According to the survey responses, some participants related the Hexbugs' movement to their dislike of cockroaches. The movement results will be more extensively discussed in the experiment paper, as well as the questions they raise for further study.

[29]Darling, Nandy, Breazeal (forthcoming).

[30]http://www.hexbug.com/nano.

[31]M. H. Davis, supra note .

[32]Rosenthal von der Pütten, et al., supra note .

TABLE I

MEAN HESITATIONS FOR HIGH AND LOW EMPATHY PARTICIPANTS FOR EMPATHY SUBSCALES

IRI Subscale	High Empathy	Low empathy	p
Fantasy	5.59s	4.33s	$p < 0.385$
Empathic Concern	6.39s	3.55s	$p < 0.005*$
Personal Distress	5.56s	4.26s	$p < 0.249$

As mentioned above, our results show a significant effect of framing on hesitation ($p < 0.005$). We also show a significant interaction of empathic concern with framing ($p < 0.044$) (*Fig. 2*). In other words, framing had a significantly larger impact on participants with high empathic concern, who hesitated longer to strike the robots with names or stories.[33]

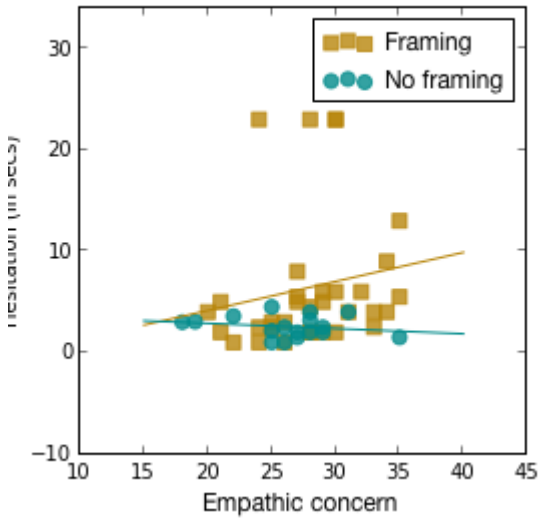

Fig. 2. Scatter plot of hesitation versus empathic concern colored by framing condition. (Approximate regression lines are shown to illustrate the difference in relationship between empathic concern and hesitation for the framing and non-framing conditions.)

In summary, our results confirm that framing can have an impact on people's reactions to robots. The findings also show a more pronounced effect of framing for participants with higher capacity for empathic concern. This suggests that anthropomorphic framing activates people's empathy. 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 "Frank"). One question in our post-experiment survey asked participants to describe in their own words why they hesitated. Many participants used empathic terms to explain their hesitation, for example "I had sympathy with him after reading his profile because I am also here in the Lab for a few month [*sic*]"

IV. USE OF FRAMING EFFECTS

We know that people anthropomorphize artificial entities even when they know the projection is not real.[34] Research has shown that we treat computers[35] and virtual characters[36] as social actors, and robots tend to amplify this social actor projection due to their embodiment[37] and physical movement.[38] Social robots are specifically designed for this purpose,[39] but people will also anthropomorphize non-social robots.[40]

While lifelike movement is also a driver, our study indicates that framing through terminology and narrative are one of the factors that can impact anthropomorphism. Robots are often personified or referred to as experiencing the world in a lifelike way, which is likely to encourage anthropomorphism. Part of why robots are currently often framed anthropomorphically is in reference to the many robots in science fiction and pop culture that have names, internal states of mind, and emotions.[41] Even though people know that current robot technology does not have those capacities, they tend to suspend their disbelief when prompted accordingly. Becoming aware of framing effects could make people and

[33]With 48 self-identified female and 52 self-identified male participants, we found no significant gender effect on hesitation to strike the robots. We are therefore unable to make any sexism-inspired speculations about women's ability to operate a hammer, as others have done previously, see Bartneck et al., supra note .

[34]B. R. Duffy and K. Zawieska, Suspension of disbelief in social robotics, in RO-MAN, 2012, pp. 484-489.

[35]B. Reeves and C. Nass, The media equation: how people treat computers, television, and new media like real people and places, Cambridge University Press, Cambridge, 1996.; C. Nass, Y. Moon, J. Morkes, E. Y. Kim, B. J. Fogg, Computers are social actors: a review of current research, in: Human values and the design of computer technology, B. Friedman, Ed., University of Chicago Press, 1997, pp. 137-162.

[36]R. McDonnell, S. Jrg, J. McHugh, F. Newell, and C. O'Sullivan, Evaluating the emotional content of human motions on real and virtual characters, in ACM Symposium on Applied Perception, 2008, pp. 67-74; T.M. Holtgraves, S.J. Ross, C.R. Weywadt, T.L. Han, Perceiving Artificial Social Agents, 23 Computers and Human Behavior, 2007, pp. 2163-2174; B. J. Scholl and P. D. Tremoulet, Perceptual causality and animacy in Trends in cognitive sciences 4(8), 2000, pp. 299-309; C. Nass, K. Isbister, E. J. Lee, Truth is beauty: researching embodied conversational agents, in: Embodied conversational agents, J. Cassell, Ed., MIT Press, Cambridge, 2000, pp. 374-402; A. M. Rosenthal von der Pütten, N. C. Krmer, J. Gratch, S. H. Kang 'It doesn't matter what you are!' explaining social effects of agents and avatars, in Comput Hum Behav 26(6), 2010, pp. 1641-1650.

[37]Kidd and Breazeal, supra note ; Victoria Groom, What's the best role for a Robot? Cybernetic models of existing and proposed Human-Robot interaction structures, ICINCO 2008, p. 325.

[38]Scheutz, supra note , Duffy, supra note at 486

[39]Cynthia Breazeal, 'Toward sociable robots, Robotics and autonomous systems, 42(3), 2003, pp. 167-175; B. R. Duffy, "Anthropomorphism and the social robot," Robotics and autonomous systems 42(3), 2003, pp. 177-190; C. Yan, W. Peng, K. M. Lee, S. A. Jin, Can robots have personality? An empirical study of personality manifestation, social responses, and social presence in human-robot interaction, in: ICA, 2004.

[40]Julie Carpenter, The quiet professional: an investigation of U.S. Military explosive ordnance disposal personnel interactions with everyday field robots, Dissertation, University of Washington, 2013; Knight, supra note ; S. Paepcke and L. Takayama, Judging a bot by its cover: an experiment on expectation setting for personal robots, in HRI, 2010, pp. 45-52; Scheutz, supra note .

[41]For example, Johnny Five from the movie Short Circuit (1986) is a famous pop-culture robot. The use of "Who's Johnny?" in the title of this paper is a reference to the film and its chart hit theme song.

institutions more sensitive to the contexts where this prompt is appropriate, and the contexts where it is not. The following Parts explore some of these contexts and the issues that arise within them.

A. Integration of robots as tools

Transportation systems, the military, and hospitals are all spaces where robots are increasingly interacting with human beings. Human-robot partnerships will soon permeate many other workplaces, as well as personal households. Whether or not these robots should be viewed anthropomorphically could depend on their function. In some cases, projecting lifelike qualities onto robots is undesirable, because it can impede efficient use of the technology. For example, there are numerous anecdotes from the U.S. military about soldiers anthropomorphizing the robots they work with, to sometimes undesirable effect.

Washington Post reporter Joel Garreau interviewed members of the military about their relationships with robots in 2007, uncovering accounts of awarded purple hearts, emotional distress over destroyed robots, and hero's welcomes for homecoming robots.[42] One story tells of a robot built to walk on and detonate land mines. The colonel overseeing the testing exercise ended up ordering it stopped, because the sight of the robot dragging itself along the land mine field was too "inhumane".[43] Military robots have even been given funerals with gun salutes.[44] Julie Carpenter conducted an in-depth study on explosive ordinance disposal robots in the military in 2013, finding that the operators sometimes interacted with the robots in ways similar to a human or pet, and demonstrating a need for this issue to be addressed in future deployment of military technology.[45] There are even stories of soldiers risking their lives to save the robots they work with,[46] illustrating that it can be anything from inefficient to dangerous for robots to be perceived as lifelike beings when they are intended to function as tools.

But there are also robotic technologies whose use is facilitated by anthropomorphism. Anecdotes from workplace and household integration indicate there might be reason to encourage the anthropomorphic perception of certain robots. The CEO and employees of a company that develops and deploys hospital robots to deliver medicine tell stories of hospital staff being friendlier towards robots that have been given human names.[47] Even people's tolerance for malfunction is allegedly higher with anthropomorphic framing ("Oh, Betsy made a mistake!" vs. "This stupid machine doesn't work!"). The company has recently begun to ship their square-shaped, non-anthropomorphically designed hospital delivery robots with individual (human) names, attached to the robot like a license plate.

Jibo is a household robot that schedules appointments, reads email, takes photos, and functions as a family personal assistant.[48] But it is mainly thanks to its anthropomorphic design and framing that Jibo has received a slew of positive attention and millions of dollars in investments.[49] 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." [50] These examples indicate that people may be more willing to accept new technology and integrate it into their lives, be it at work or at home, if it is introduced with anthropomorphic framing.

Furthermore, as discussed in the next Part, some robot functions are inherently social and actually rely on anthropomorphism and suspension of disbelief in the robot's inanimacy in order to perform. To preserve the advantages and future potential of robots, as well as facilitate the adoption of beneficial robotic technology, we should consider distinguishing between those robots whose use is hindered by anthropomorphic framing, and those whose use is enhanced by it. Framing could be a helpful tool in effecting this difference.

B. Integration of robots as companions

This Part suggests that social robots are and should be framed anthropomorphically. It addresses existing concerns with the anthropomorphization of social robots and argues that these concerns should be addressed through means other than framing.

Today's social robots can simulate states of mind and social cues through sound, movement, form, and framing, prompting people to suspend disbelief and project agency onto the robots.[51] With these projections come possibilities. With state of the art technology, we are already seeing amazing use cases in health and education, possible only as a result of engaging people through anthropomorphic robots.

The NAO Next Generation robot[52] is a child-sized humanoid robot that is used in research and education settings with a proven record of engaging children with Autism Spectrum Disorders.[53] Often, the robot is more effective in creating eye contact and interaction with the child than an adult, creating a useful bridge between parent or teacher and the child. Similarly, other social robots like DragonBot[54]

[42] Joel Garreau, Bots on the Ground, The Washington Post, May 6, 2007.

[43] Id.

[44] Megan Garber, Funerals for Fallen Robots: New research explores the deep bonds that can develop between soldiers and the machines that help keep them alive, The Atlantic, September 20, 2013.

[45] Carpenter, supra note .

[46] Peter Singer, Wired for War: The Robotics Revolution and Conflict in the 21st Century, Penguin Books, 2009.

[47] This was in conversation with the author.

[48] http://www.jibo.com.

[49] Aaron Tilley, Family Robot Jibo Raises $25 Million In Series A Round, Forbes, January 21, 2015, available at http://tinylink.net/dwQ.

[50] Lance Ulanoff, Jibo Wants to Be the World's First Family Robot, Mashable, July 16, 2014, available at http://tinylink.net/hxH.

[51] Scheutz, supra note at ; Maggie Koerth-Baker, How Robots Can Trick You Into Loving Them, New York Times Magazine, September 17, 2013; Turkle, supra note at .

[52] https://www.aldebaran.com/en/humanoid-robot/nao-robot.

[53] Syamimi Shamsuddina, Hanafiah Yussofb, Luthffi Idzhar Ismailb, Salina Mohamedc, Fazah Akhtar Hanapiahc, Nur Ismarrubie Zaharid, Initial Response in HRI- a Case Study on Evaluation of Child with Autism Spectrum Disorders Interacting with a Humanoid Robot NAO, 41 Procedia Engineering, IRIS 2012, pp. 1448?1455.

[54] http://robotic.media.mit.edu/portfolio/dragonbot/.

harness small children's natural social tendencies in order to engage them in learning, often with better effect than books or computers.[55]

The social engagement effect of these robots is not limited to children. Socially assistive robots also help adults through social interaction, by motivating, monitoring, and coaching in order to improve outcomes in heath and education.[56] Research shows that people trying to lose or maintain weight will track their data for nearly twice as long when using a social robot compared to a computer or paper log methods.[57] Robots can motivate people to exercise through praise and companionship,[58] take medicine,[59] and serve as a non-judgmental partner in cases where people might be too embarrassed to seek assistance from other adults.

Paro is a robot baby seal that has been used therapeutically in nursing homes since 2004.[60] Its adorable design evokes a caregiver response in most people who interact with it. From earthquake victims in Japan to dementia patients across the world, Paro has been successful in calming distressed people, serving as an effective alternative to medication.[61] Similar to animal therapy, which is often too difficult, expensive, or unhygienic to implement, the Paro gives people who are being cared for a sense of empowerment by turning them into caregivers.[62] Use of Paro has also been shown to encourage more human to human communication in nursing homes.[63]

If we want to encourage the effective use of social robot technology, we should allow its anthropomorphic framing to continue, rather than argue against it.[64] On a practical note, wholesale discouraging emotional relationships with social robots would require far more intervention than simply framing these interactions in non-anthropomorphic terms. It would be incredibly difficult to prevent people from projecting lifelike qualities onto something that is specifically designed to simulate lifelike qualities.[65] Since social robots are often intended to provide companionship, teaching, therapy, or motivation that has been shown to work most effectively when they are perceived as social agents, rather than tools,[66] we should frame them accordingly.

That said, societal concerns with the anthropomorphization of social robots are important and should be discussed. The next Parts address issues around effects on human relationships, privacy and emotional manipulation, and violent and sexual behavior.

1) Effects on human relationships: Some have criticized anthropomorphism even in the context of social robots, raising concerns around replacing relationships between humans with something lesser. Sherry Turkle laments a loss of authenticity[67] and worries that seductive robot relationships, assumed to be less exhausting than relationships with humans, will tempt people to avoid interacting with their friends and family.[68]

Do we have the same concerns about 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. We may instead find a new form of relationship in robots. The key is in how technology is used. Cynthia Breazeal frequently draws attention to the issues around supplementing vs. replacing, emphasizing that social robots are meant to partner with humans and should be designed to "support human empowerment."[69] When used correctly, social robots can even be a catalyst for human-human interaction.[70] Turkle's concerns are incredibly important in helping drive the use of these technologies in a socially desirable direction. They are just slightly misplaced in that they appear to dismiss the technology altogether, rather than recognizing the potential for valuable supplementary relationships. Framing social robots as pets or other non-human companions may also help to address people's immediate concerns and to distinguish between supplementary and replacing uses.

2) Emotional manipulation and privacy concerns: The Fitbit is an activity tracker that encourages people to exercise by counting and registering the steps that they take.[71] But even the first Fitbits contained an additional feature designed to motivate people on an emotional level: the device displayed a digital flower that grew or shrank, depending on the user's amount of activity. The reason this design

[55]Evan Ackerman, MIT's DragonBot Evolving to Better Teach Kids, IEEE Spectrum, March 16, 2015 available at http://tinylink.net/rgS.

[56]D. Feil-Seifer and M. J. Mataric, Defining socially assistive robotics, International Conference on Rehabilitation Robotics, 2005; Adriana Tapus, Mataric Maja, Brian Scassellatti, The Grand Challenges in Socially Assistive Robotics, IEEE Robotics and Automation Magazine, 2007, 14 (1).

[57]Cory Kidd, Designing for long-term human-robot interaction and application to weight loss, doctoral thesis, MIT, 2008.

[58]Fasola, J. Mataric, M.J., Using Socially Assistive Human-Robot Interaction to Motivate Physical Exercise for Older Adults, 100 IEEE 2012, pp. 2512-2526.

[59]Elizabeth Broadbent, Kathy Peri, Ngaire Kerse, Chandimal Jayawardena, IHan Kuo, Chandan Datta, Bruce MacDonald, Robots in Older People's Homes to Improve Medication Adherence and Quality of Life: A Randomised Cross-Over Trial, Proceedings 6th International Conference, ICSR 2014, Sydney, Australia, 2014, pp. 64-73.

[60]http://www.parorobots.com/.

[61]S. M. Chang, H. C. Sung, The effectiveness of Paro robot therapy on mood of older adults: a systematic review, 11 International Journal of Evidence-Based Healthcare, 2013, p. 216.

[62]Andrew Griffiths, How Paro the robot seal is being used to help UK dementia patients, The Guardian, July 8, 2014, available at http://tinylink.net/Hct.

[63]Cory Kidd, Will Taggart, and Sherry Turkle, A sociable robot to encourage social interaction among the elderly, ICRA 2006.

[64]Richards and Smart, supra note .

[65]Appealing to developers to stop creating social robot technology is also unlikely to succeed. The market for toys alone is massive.

[66]Cory Kidd, Designing for Long-Term Human-Robot Interaction and Application to Weight Loss, Dissertation, MIT, 2008; D. Feil-Seifer and M. J. Mataric, Defining socially assistive robotics, International Conference on Rehabilitation Robotics, 2005.

[67]Sherry Turkle, In good company? On the threshold of robotic companions, in: Close Engagements with Artificial Companions: Key Social, Psychological, Ethical and Design Issues, Amsterdam, The Netherlands, John Benjamins Publishing Company, 2010, pp. 3-10, p. 9.

[68]Turkle, supra at 7.

[69]Jedidiah Bracy, The Future of Privacy: My Journey Down the Rabbit Hole at SXSW, Privacy Perspectives, March 20, 2015, available at http://tinylink.net/JcF.

[70]See, for example, Kidd et al., supra note

[71]http://www.fitbit.com/.

feature was (and is) so effective in motivating Fitbit users to exercise is because it targets a natural human instinct to nurture something and be rewarded for it.[72]

The anthropomorphic features of today's robots go far beyond that of the Fitbit in their ability to manipulate emotions, raising questions of ethics. Is a Fitbit flower wrong to use because it subconsciously deceives us into nurturing something that is digital? One can make the argument that it does not matter whether relationships to robots are based on something "real", because the relationship itself and the resulting benefits are real. Perhaps we should let people choose to be manipulated, so long as the outcome is positive.[73] But what constitutes a positive outcome? Fitbit has come under criticism for data collection and storage, raising concerns about privacy.[74] Yet wearable fitness trackers are still on the rise,[75] 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? When talking about emotional relationships, we should also discuss the potential for abuse.

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[76] and take on social functions.[77] Social media has 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.[78] Stricter privacy settings are often directly at odds with the benefits the service provides to its users.[79] Similarly, the emotional engagement inherent to 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.[80] On the other hand, anthropomorphic technology could also have a positive effect on privacy awareness. Ryan Calo makes the case that anthropomorphic robots could foster consumer awareness of private space. Drawing on research from communications and psychology, he argues that people might feel more observed, rather than less, when interacting with robots that they perceive as social actors.[81]

Revealing personal information is not the only type of emotional manipulation that warrants concern. Platforms like Facebook harness social relationships to great effect, wielding the power to potentially swing political elections.[82] Human-computer interaction research indicates that we are particularly prone to being manipulated by social AI.[83] Joseph Weizenbaum, after witnessing people interact with his 1960s psychotherapist bot ELIZA, warned against being influenced by machines and taking on computers' (and their programers') world view.[84] Ian Kerr foresees artificial intelligence engaging in all manner of persuasion, from contracting to advertising.[85]

Given the additional capabilities of social robots, previous concerns about persuasive software may be magnified. Furthermore, if people become more emotionally attached to social robots than we have witnessed with other objects, there may even be cause to discuss regulation.[86] The interests of corporations do not necessarily align with those of consumers and market imperfections can prevent free market solutions.[87] If a company charges an exorbitant amount for a mandatory software or hardware upgrade to a robot that someone's child or grandfather has become emotionally attached to, is that a permissible exploitation of market demand? We may find ourselves asking this question in the near future.

Yet the health and education benefits we are seeing today predict great future possibilities. Considering the power of this technology to improve people's lives, must we relinquish everything to avoid the potential for harm? Or can we continue to permit anthropomorphic relationships with robots, knowing that they will likely surpass the emotionally persuasive technology we have seen previously. It is concerning that neither market incentives nor consumer protection laws have been able to adequately resolve current concerns with privacy on social networks and in quantified-self data collection. On the other hand, society's continuing engagement with these issues in the context of the Internet means that we are aware of the problems and currently working to find solutions. We can draw on a rich literature from psychology dealing with advertising, gamification, emotional addiction, and related concepts that have been studied and are likely to

[72]Jenna Wortham, Fitbit's Motivator: A Virtual Flower, New York Times, December 10, 2009.

[73]Koerth-Baker, supra note .

[74]Laura Ryan, Fitbit Hires Lobbyists After Privacy Controversy, National Journal, September 15, 2014, available at http://tinylink.net/LZg.

[75]Scott Stein, Best wearable tech of 2015, CNET, February 24, 2015 available at http://tinylink.net/kdj.

[76]B.J. Fogg, Persuasive Technologies: Using Computers to Change What We Think and Do, Morgan Kaufmann, 2003, p. 10.

[77]Ryan Calo, Robots and Privacy, in: Robot Ethics: The Ethical and Social Implications of Robotics, Patrick Lin, George Bekey, and Keith Abney, eds., Cambridge, MIT Press.

[78]James Grimmelman, Saving Facebook, 94 Iowa Law Review 1137 (2009).

[79]Id.

[80]Ian Kerr, Bots, Babes and the Californication of Commerce, 1 University of Ottawa Law and Technology Journal, 2004, pp. 285-324.; Fogg, supra note ; Kristen Thomasen, Liar Liar Pants on Fire! Examining the Constitutionality of Enhanced Robo-Interrogation, Proceedings We Robot 2012.

[81]Ryan Calo, People Can Be So Fake: A New Dimension To Privacy and Technology Scholarship, Penn St. L. Rev. 114, 809 (2009).

[82]Jonathan Zittrain, Facebook Could Decide an Election Without Anyone Ever Finding Out: The scary future of digital gerrymandering—and how to prevent it, New Republic, June 1, 2014.

[83]B. J. Fogg and Clifford Nass, How users reciprocate to computers: an experiment that demonstrates behavior change, CHI 1997, ACM.

[84]Joseph Weizenbaum, Computer power and human reason: From judgment to calculation, W. H. Freeman and Co., 1976.

[85]Kerr, supra note .

[86]Right now, we do not regulate the monetary exploitation of emotional situations like wedding organizing costs or veterinarian bills when a pet falls ill. We do, however, regulate certain types of subversive advertising and take legal action demanding informed consent restrictions on in-app purchases.

[87]N. Gregory Mankiw and Mark P. Taylor, Microeconomics, Cengage Learning, 2011, pp. 147-155.

apply, perhaps simply extrapolated. Generating awareness of privacy and other manipulation concerns can pave the way for possible solutions in law, markets, norms, and technology design, as well as framing design. Perhaps we should focus our attention on finding ways to address the individual issues and battle anthropomorphism more selectively.

3) Violence and sexual behavior: The results of our study were interesting because they suggest we can measure people's tendencies for empathic concern depending on how they interact with robots. Another question is whether we might be able to affect or change people's empathy through framing and interactions with robots. What if violence towards robots that react in a lifelike way desensitizes people to violence in other contexts?[88] Similarly, could undesirable sexual behavior be propagated through the use of robots as sexual partners?[89] If anthropomorphic framing or design encourages behavior with negative externalities, we would need to find ways to address these issues.

On the positive side, if anthropomorphic framing has an effect on empathic concern, robots could be used to encourage empathic behavior. Animals are currently used for therapy and to teach compassion in children and youth,[90] but therapy using real animals is expensive and requires extensive supervision. Animal therapy is also problematic in terms of hygiene and allergies. As robots become cheaper, they could be a more practical and perhaps effective alternative. Robots could also be used in more places than animals, such as pet-restrictive households or in prison rehabilitation.

Of course, the question of whether robots can actually change people's empathic tendencies, be it in positive or negative ways, is unanswered. While there are parallels to research on violence in video games, the differences between virtual and physical warrant reconsideration of the question for embodied robots.[91] Currently, we do not know if human-robot interaction is likely to encourage certain behaviors, or whether it could serve as an outlet for behavior that would otherwise have negative externalities on others. But it is an important question to explore, as discussions around violent behavior towards robots begin to surface[92] and sex bots become a reality.[93]

If people consistently treat social robots differently than appliances, perhaps we should not insist on framing them as appliances. Instead, we could look for ways to address the issues from within the recognition that our relationships to certain types of robots belong in a different category than our relationships to devices and tools. Distinguishing between social and non-social use cases would help us deal with the potential issue of subconscious negative externalities.[94] The next Part discusses another type of negative externality around anthropomorphic framing.

C. Gender and racial stereotypes

Robots that are framed in human-like terms may unfortunately entrench existing cultural biases that are harmful to certain social groups.[95]

The anthropomorphic framing of robots could propagate gender or racial stereotypes. Andra Keay surveyed the names creators gave their robots based on data from robotics competitions.[96] The names tended to reveal functional gender biases.[97] Keay speculates that the low number of female names for robots reflects males' self-extension.[98] Framing robots in masculine terms could further disinterest among girls to engage with the field. Furthermore, Keay 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 category of Amber or Candii.[99] Derogatory female framing of robots may not only reflect but also reinforce existing biases.

In the film Transformers 2,[100] there is a humorous robot duo that blunders around and whose contribution to most situations is only comic relief.[101] Unlike the more talented and heroic members of the crew, these two robots cannot read. They talk jive and argue with each other in "rap-inspired street slang."[102] One of them has a gold tooth. Director Michael Bay brushed off criticism of racial stereotypes, saying that the characters are robots.[103]

If we are aware of these issues, however, we may be able to have a positive influence on gender and racial stereotypes. We can choose what names and personalities we imbue robots with. Could we have a positive influence on whether people associate a female name with something intelligent?[104] Ultimately, harmful racial and gender biases may sometimes go unnoticed among developers and users of

[88] Kate Darling, Extending Legal Protections to Social Robots: The Effects of Anthropomorphism, Empathy, and Violent Behavior towards Robotic Objects, in: Robot Law, R. Calo, M. Froomkin, I. Kerr (eds.), Edward Elgar (forthcoming 2015).

[89] BBC News, Could a child sex robot treat paedophilia? July 18, 2014, available at http://tinylink.net/Xib.

[90] For example, violence prevention program TLC helps at-risk youth in Los Angeles by having them care for animals, see http://tinylink.net/h9Y.

[91] See Bainbridge et al., supra note ; Kidd and Breazeal, supra note .

[92] Phoebe Parke, Is it cruel to kick a robot dog? CNN, February 13, 2015, available at http://tinylink.net/KRl.

[93] Sinziana Gutiu, Sex Robots and Roboticization of Consent, Proceedings We Robot 2012.

[94] See Part IV.D.

[95] Benedict Tiong Chee Tay, Taezoon Park, Younbo Jung, Yeow Kee Tan, Alvin Hong Yee Wong, When Stereotypes Meet Robots: The Effect of Gender Stereotypes on People's Acceptance of a Security Robot, Engineering psychology and cognitive ergonomics, Understanding human cognition, Springer Berlin Heidelberg, 2013, pp. 261-270; Riek, L. D., and Howard, D., A Code of Ethics for the Human-Robot Interaction Profession, Proceedings We Robot 2014.

[96] Andrea Keay, The Naming of Robots: biomorphism, gender and identity, Masters paper in Digital Cultures, University of Sydney, 2012, available at http://tinylink.net/lFY.

[97] Keay, supra note at 1.

[98] IKeay, supra note at 1.

[99] Keay, supra note at 5.

[100] Transformers: Revenge of the Fallen (2009).

[101] Thanks to Meg Ambrose for watching this movie.

[102] Sandy Cohen, Transformers' Jive-Talking Robots Raise Race Issues, The Huffington Post, July 25, 2009.

[103] Id.

[104] Swartout, W., Traum, D., Artstein, R., Noren, D., Debevec, P., Bronnenkant, K., and White, K., Ada and Grace: Toward realistic and engaging virtual museum guides, Intelligent Virtual Agents, Springer Berlin Heidelberg, 2010.

robotic technology. It is important to draw attention to suppressive cultural stereotypes in the framing of robots. Doing so is the first step towards mitigating unnoticed problems and perhaps even using the anthropomorphic framing of robots as a tool to change perspectives on race or gender.

D. Anthropomorphism and the "Android Fallacy": distinguishing between use cases

Finally, simply talking about robots in anthropomorphic ways raises concerns about the use and regulation of technology. Richards and Smart make the argument in their 2012 paper "How Should the Law Think About Robots?" 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 viewing them as social agents, rather than tools. This is highly relevant to anthropomorphic framing, which may impact people's perception of robotic technology in exactly this way.

Richards and Smart draw upon the analogies and metaphors used in wiretapping cases in the twentieth century to illustrate the legal consequences of using certain understandings of technology over others. Terminology is important, as shown in the case of email becoming subject to mail-level protections, rather than regulated analogous to postcards.[105] They argue that 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 metaphors to understand the technology.[106] Our perception of robots as either social actors or tools matters at both of these stages, as well.

But perhaps in some cases there might be reason to use the very analogies and metaphors that Richards and Smart warn against. For example, if research shows that people perceive and respond to violent or sexual behavior towards certain robots as if the robots were social actors, then one approach is to try to discourage this through non-anthropomorphic framing, terminology, and an emphasis on robots as non-living tools. However, if anthropomorphic projection has effects on people's behavior that prove highly valuable for teaching and rehabilitation purposes in these contexts, then there might be better ways to address the issues that come with viewing robots as non-tools. If we embrace, for example, a pet metaphor (rather than that of a hammer), we could regulate the use of animal-like pet robots or sex robots by restricting unnecessary violent or cruel behavior analogous to existing animal protection laws.[107] Not only would this prevent potential negative externalities resulting from people's behavior, it would preserve the therapeutic and educational advantages of viewing certain robots more like pets or lovers than tools.[108] Importantly, this would also be more in line with people's actual responses to social robots that may prove very difficult to influence, even with non-anthropomorphic framing.[109] Embracing the framing of certain social robots as pets addresses a very real difference in perception between these robots and hammers, and it prevents us from throwing the baby out with the bathwater. Generally, in cases where we see the potential for anthropomorphic robots to improve our lives, we might therefore ultimately do better to embrace the social actor framing and metaphors, and work from there. We can save the hammer analogy for the cases where anthropomorphism is a hindrance to functional technology or functional law.[110]

As the examples in this paper show, it makes sense to distinguish between use cases where we want to encourage anthropomorphism, and cases in which we do not. Where anthropomorphic projection diminishes the main function of the robot, this can cause serious problems. For robots that are not inherently social in design, nor enhanced through social interaction, we should consider discouraging anthropomorphism using every tool at our disposal. Rather than viewing science fictional narratives and personification as harmless fun, those building or implementing robotic technology should be aware of framing effects. While the lifelike movement of robots also encourages projection, it may be a more difficult factor to adjust, because movement is often central to the functionality of the robot. For example, companies like Boston Dynamics are building military robots that mimic animal-like movement and physiology, because animals have evolved into structures that happen to be incredibly efficient for mobility in our world.[111] Even when military robots are made less animal-like, they still need to move around in some form or another. Focusing also on framing by objectifying robots in language ("it") and encouraging names such as "MX model 96283" instead of "Spot" will probably not make anthropomorphism disappear completely, but it may have a helpful effect.

There is the other case, however, where anthropomorphic projection enhances the acceptance and use of robots, as well as the case where it directly supports the main function of the robot (social robot technology). 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") and agents as two separate entities to be handled differently.[112] We can either

[105] Richards and Smart, supra note at 19.

[106] Richards and Smart, supra note at 18.

[107] Darling, supra note .

[108] As mentioned above, we currently do not yet know whether interactions with robots can actually have negative externalities on people's interactions in other contexts. The question of whether to regulate the use of robots hinges on whether there are negative externalities.

[109] Richards and Smart themselves admit that these behavioral reactions seem to be hardwired, see Richards and Smart, supra note at 19.

[110] Richards and Smart make the example of liability, a case where the distinction could incentivize companies to design robots in a way to avoid being held liable. However, there are a variety of ways to structure the law and likely other liability costs that would come from a social actor model.

[111] Dylan Twenty, Robots Evolve More Natural Ways of Walking, WIRED, January 26, 2011, available at http://tinylink.net/KkQ.

[112] Ryan Calo, The Case for a Federal Robotics Commission, Brookings Report, September 2014, p. 6, available at http://tinylink.net/R7x.

double down on portraying all robots as things, or we can embrace the fact that people may consistently view certain robots as agents. As social robots approach consistency in how we interact with them, we might consider moving them to a new legal category. The inherent intelligence or abilities of the robots do not necessarily matter in this context. We treat animals[113], children, and corporations as agents, regardless of their individual mental abilities or capacity for moral thinking. While this would require a good definition of the capabilities or interactions of the robots that fall into the agent category, such distinctions are not new to the law, nor are they (or must they be) perfect.

The more general concerns around anthropomorphic technology deserve attention and careful consideration. They should not, however, warrant complete dismissal of anthropomorphic framing that furthers the interests of users. The discussion should focus on the specific problems and look for solutions within individual contexts. Being aware of the issues means that we have the potential to drive them in a socially desirable direction. Unlike automated weapons or the atomic bomb, anthropomorphic robots are a platform technology, rather than created for a specific purpose. As Chavi Eve Karkowsky notes, "[L]ike all technologies, back to the invention of fire, it's power. It's not good, and it's not evil. Technology can be awful or wonderful, depending on how judiciously it is wielded by well-meaning but fallible humans."[114]

V. FINAL NOTES

As this paper shows, framing is one of the methods at our disposal to encourage or discourage anthropomorphic responses to robots. Although one experiment is limited in its ability to serve as a basis for policy (even when supported by anecdotal evidence), future research will help further explore the potential of framing to influence use and policy in the robotics space.

It is not enough to trust that policymakers can frame technology that is already in use. We need to be framing technology as it is developed and standards are set. While there are still many open questions around issues with anthropomorphic robots (for example the effects of violent and empathic behavior), other topics are ready to be addressed. We can have sensible conversations and create awareness around privacy, gender and racial biases, and supplementing versus replacing humans in the workplace and elsewhere.[115]

The potential of anthropomorphic technology is tremendous. Instead of decrying it in all contexts, let us make smart distinctions and frame it to our advantage.

[113]Animals are not seen as res in at least in some legal systems, and commonly enjoy special protections that separate them from other objects, such as abuse regulation.

[114]Chavi Eve Karkowsky, Sorry You Were Tricked Into a C-Section, What disapproving friends don't understand about cesarean births, Slate, July 8, 2014, available at http://tinylink.net/tLZ.

[115]Regulation is not the only path. Public awareness and consumer demand affect the free market. Let us create incentives for companies to work on responsible technological solutions.