The Robots are Coming!

But Should They be Gendered?

By Londa Schiebinger, PhD
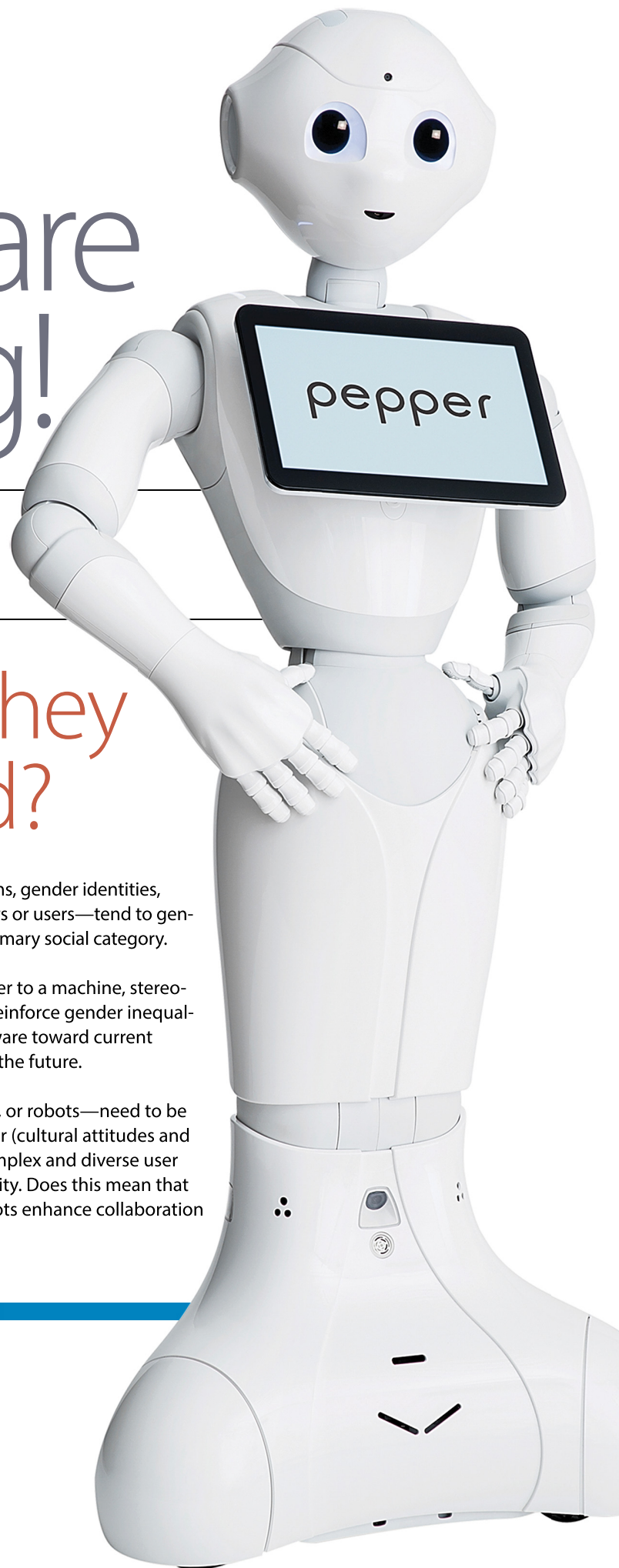John L. Hinds Professor of History of Science
Stanford University
AWIS Institutional Partner since 2013

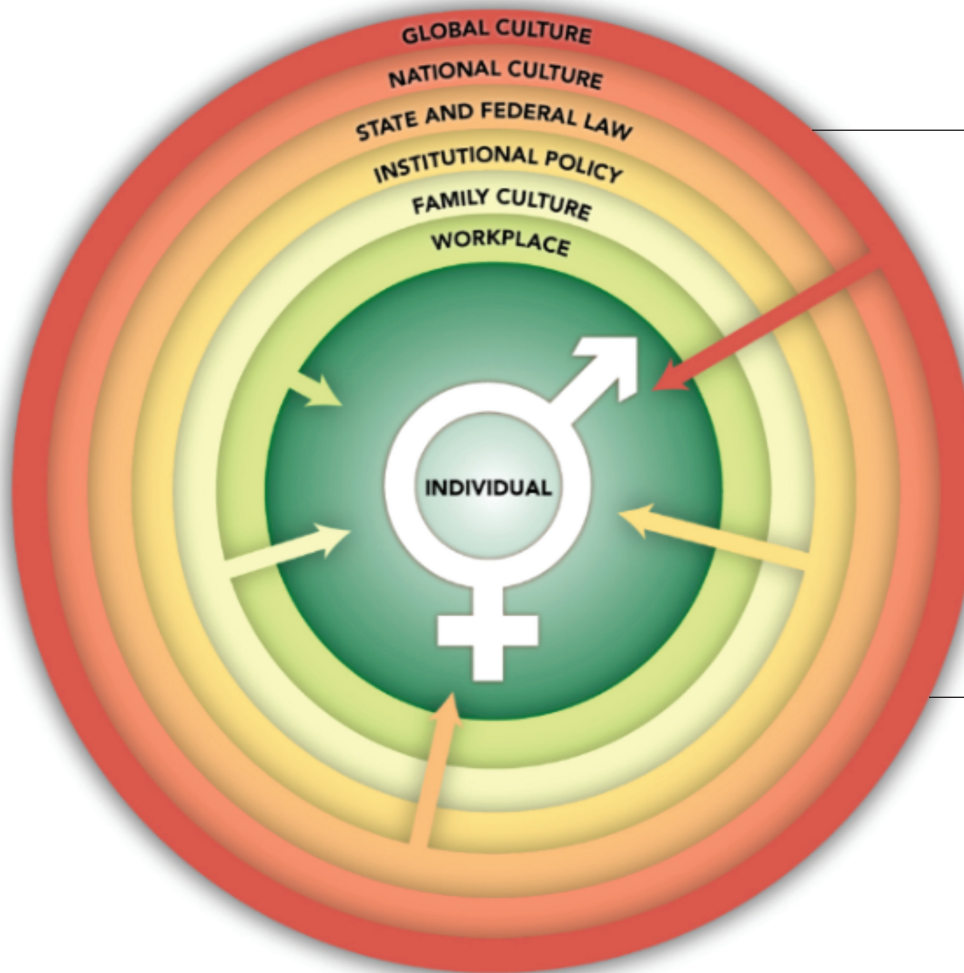**R**obots are designed in a world alive with gender norms, gender identities, and gender relations. Humans—whether as designers or users—tend to gender machines because, in human cultures, gender is a primary social category.

But there is a danger here. As soon as users assign gender to a machine, stereotypes follow. The danger is that gendering robots may reinforce gender inequalities by hardening current stereotypes. Designing hardware toward current human stereotypes may amplify those stereotypes into the future.

All products—whether cars, surgical instruments, chairs, or robots—need to be designed with sex (biological characteristics) and gender (cultural attitudes and behaviors) in mind. Products that meet the needs of complex and diverse user groups enhance global competitiveness and sustainability. Does this mean that social robots should be gendered? Does gendering robots enhance collaboration with humans?

GLOBAL CULTURE
NATIONAL CULTURE
STATE AND FEDERAL LAW
INSTITUTIONAL POLICY
FAMILY CULTURE
WORKPLACE

INDIVIDUAL

Gender norms are produced through social institutions (such as families, schools, workplaces, laboratories, universities, or boardrooms) and wider cultural products (such as textbooks, literature, films, and AI).

Gender norms refer to social attitudes about what behaviors, preferences, products, professions, or knowledges are appropriate for women, men, and gender-diverse individuals and may influence the development of robots.

The challenge for designers is: 1) to understand how gender becomes embodied in robots; 2) to design robots that promote social equality. Robots provide new opportunities to create more equitable gender norms. How can we best design both efficient and socially-responsible robots?

What genders a robot?
How would you "read" this robot? Pepper is an embodied social robot produced by the Japanese company, Softbank. Softbank insists Pepper is gender neutral (for one thing Japanese does not use gendered pronouns in the same way as English, although it has distinct masculine and feminine manners of speech). Softbank's current website nonetheless refers to the robot as "he."

How is gender is embodied in robots? How would you "read" this robot?
Voice: Voices is a primary determinant of gender. Voices are full of cultural information. Pitch indicates whether it is a male, female, or child's voice. Lower voices carry more authority in Western culture. For example, Margaret Thatch-

er, the first woman prime minister in the United Kingdom, trained with a vocal coach from the National Theatre to lower her voice. As soon as a robot is perceived as male or female, a full array of gender stereotypes is overlaid on the mechanical device. Pepper has a childish voice—childish voices are less gendered than adult voices and, importantly, perceived as non-threatening. Pepper uses natural language, meaning that phrases were spoken by either a boy or a girl, although it's hard to tell which. The makers duck this issue, saying instead that Pepper has three vocal styles: neutral, joyful, and didactic and recommend most often using Neutral.
Name: "Pepper" is nicely non-gendered.
Anatomy: Pepper's anatomy is somewhat confusing. With the absence of hair, the head looks boyish, but the clinched waist and skirt-like legs seem feminine. We should remember that long skirts were part of traditional men's attire
Color: Researchers have shown that a few gender "cues" lead people to assign gender to a robot. One human-robot interaction group found that a man's black hat or women's pink earmuffs were enough for users to perceive a robot as

male or female. Interestingly, when no cues were present, users tend to perceive the robot as male (maybe because in many languages, German for example, the word "Roboter" is masculine; Western culture has a masculine default. Color is also an issue for ethnicity. Most robots—plastic or otherwise—are white, which places the robot culturally.

Character: Pepper was designed to be approachable, genuine, engaging, smart, polite and playful. I have not yet had a chance to study whether Pepper is harassed by humans and what the programed responses might be, but let's take Siri, Apple's well-known virtual assistant. Siri—with programed and learned responses— was designed to be "slightly sassy and demure," in her assistant role. Siri—and the other female virtual assistants—are often harassed. In

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response to human harassment, Siri's programmers have made Siri's responses less polite and more assertive. This is important; how humans treat machines might have implications for human-human interaction.

This "reading" of Pepper depends on many things: the gender norms and stereotypes in the society where the robot is used, the domain in which the robot is used, the appearance of the robot, the gender of the user, the educational background of the user, among other factors. In other words, Pepper will be read differently in its native Japan than in North America, Kenya, Korea, Iceland, or Italy. How a robot is gendered—by designers or users—is important. Gender assignment triggers gender stereotypes and evokes expectations for robot-human interactions.

Robot Touch
Social robots are entering our lives in healthcare, elderly care, teaching, and entertainment. Social touch is an important part of human non-verbal communication. Emotions such as anger, fear, and happiness can be accurately communicated by touch, and more complex emotions like envy can be communicated by people who are close, such as romantic couples.

Engineers are designing new ways to communicate touch virtually through haptic devices. Some argue that haptic interactions help humans bond with robots. This raises questions about how touch should be employed in robotics. Should robot touch follow human conventions? How does gender factor into the equation of social touch?
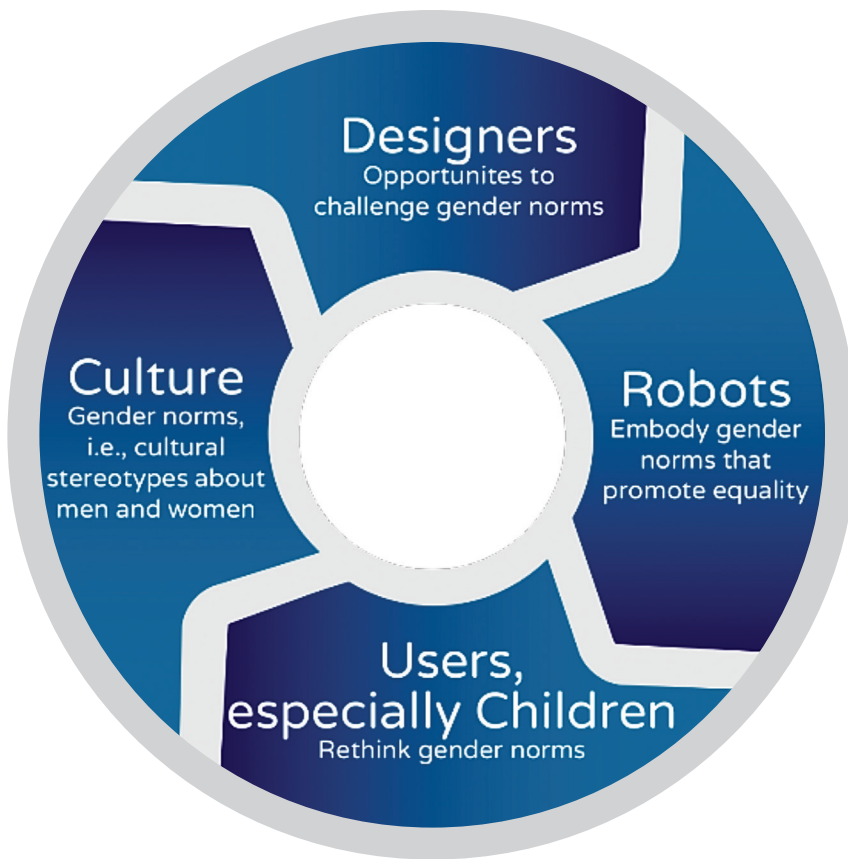

NAO robot designed by Aldebaran Robotics.

As engineers seek to reproduce human social touch as closely as possible, it is important to understand the strong (largely unwritten) rules of etiquette governing human social touch. The social aspects of touch lie in the interaction between two humans. The meaning of touch depends on: 1) the overall *social context* in which they touch; 2) the *relationship* between the people touching; 3) the *purpose of the touch*; and 4) the broader *gender norms & relations* governing social interaction in particular cultures.

This is demonstrated in a study of 886 women and 482 men from Finland, France, Italy, Russia, and the United Kingdom. Researchers found that partners are allowed to touch all body areas, while strangers have limited access. Overall women, such as mothers, sisters, female friends, and even strangers were allowed to touch wider body areas across their entire social network than men, who may be

Roboticists can create a virtuous circle of cultural change.

Research into robot-initiated touch is in its infancy, and few studies have considered how user gender interacts with robot "gender" (as established by social cues). Human-robot interaction experts caution that effective robot-initiated touch will depend on robots following rules of appropriate social (human) behaviors.

Can Robots be Designed to Promote Social Equality?

People tend to treat robots as they treat other people, and people may also treat people in the way that they treat robots—in what one might call a vicious circle. As robots become more present social agents, the challenge is for interdisciplinary teams of designers to creating a virtuous circle of cultural change by building toward social equality. This is how it might work: Culture (consisting of gender norms and stereotypes) influences robot designers. Current gender norms are sometimes unintentionally built into hardware (robots). This can influence users, especially children, and their expectations of robot. Designers, by acting intentionally, can design robots that encourage social equality. Studies show that changing implicit attitudes and behaviors is more difficult than change implicit attitudes. Nonetheless, roboticists have the opportunity to intervene in this cultural cycle by creating hardware that promotes social equality, this is helping users rethink gender norms and eventually reconfiguring gender norms.

fathers, brothers, friends, or strangers. Women's touch was also rated more pleasant by both men and women. Hands and shoulders are the most accessible body areas; head, neck, or buttocks are typically off limits except for those in close relationships.

An important study found that norms governing access to specific body regions for humans also govern human-robot interaction. In the study, participants were told they were engaged in an interactive anatomy lesson. The robot used was the 23-inch NAO (designed by Aldebaran Robotics, a French robotics company, now owned by SoftBank) made of white plastic with various accent colors. Participants and little trouble when asked to touch accessible regions on the robot, such as its hands and feet. But they experienced increased physiological responses

(electrodermal arousal) when asked to touch the robot's buttocks or genitals, despite the fact that the plastic robot has no genitalia. In other words, they responded to the request to touch the plastic, childlike robot in the same way they would have responded to a human.

This study did not analyze gender, but other researchers have found that etiquette for humans touching robots also tends to follow gender conventions. In one experiment in which participants were asked to "clean" virtual dirt particles from a virtual person, subjects of both genders used less force with female representations than male representations. They also used more force on the person's torso than on their face.

How can robots be designed to simultaneously ensure high user uptake and to promote social equality? I see at least six options:

1. Challenge current gender stereotypes
2. Design customizable robots, where users choose features
3. Design "genderless" robots
4. Design gender-fluid robots, prioritizing gender equality
5. Step out of human social relations
6. Design "robot-specific" identities that bypass social stereotypes

We propose a Hippocratic oath for roboticists: to help or, at least, do no harm. The danger is that doing nothing, i.e., unconsciously designing robots toward current gender stereotypes, may reinforce those stereotypes in ways roboticists did not intend. Roboticists have an opportunity to intervene in the human world. With care, and through collaboration with humanists and social scientists, I do believe we can design socially-responsible robots. ✪

Further reading: See our case studies: Gendering Social Robots and Haptic Technology. To keep up-to-date, join our listserv. https://mailman.stanford.edu/mailman/listinfo/genderedinnovations.

Londa Schiebinger, PhD, *is the John L. Hinds Professor of History of Science at Stanford University. She directs Gendered Innovations in Science, Health & Medicine, Engineering, and Environment. She is a leading international expert on gender in science and technology and has addressed the United Nations on the topic of "Gender, Science, and Technology." She is an elected member of the American Academy of Arts and Sciences and the recipient of numerous prizes and awards, including the prestigious Alexander von Humboldt Research Prize and Guggenheim Fellowship. Her work on Gendered Innovations (genderedinnovations. stanford.edu) harnesses the creative power of sex and gender analysis to enhance excellence and reproducibility in science and technology.*