

THE NEW YORKER

ASK THE AUTHOR

***New Yorker* writers answer readers' questions.**

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Ask the Author Live: Jerome Groopman

This week in the magazine, Jerome Groopman writes about robots and medicine. Today, Groopman answered readers' questions in a live chat. A transcript of their discussion follows.

THE NEW YORKER: Hello, and welcome to Ask the Author Live. Jerome Groopman is here with us to talk about social robots. We'll do our best to address as many questions as possible. Enjoy!

QUESTION FROM JEFFREY CONOVER: Can you sue a robot for malpractice? Will the increased use of robots complicate legal issues in medicine?

JEROME GROOPMAN: All the studies to date with social robots have been pilot experiments. These are closely reviewed by scientific and ethical boards, and the patients participating sign informed-consent documents. It is an interesting question as the technology moves from experimental to regular use without oversight by such expert committees. I don't know how the legal and medical community would assess potential damages due to the robot, the basis for malpractice. I suspect such cases will be decided in court. Hopefully, there won't be any or many as the developers like Matarić are very aware of risks and benefits.

QUESTION FROM G: Can you explain in more detail the uncanny valley?

JEROME GROOPMAN: This is the deep and immediate reaction that we have when human forms are distorted. If you look at current ads for movies, especially around Halloween, you see that many horror movies have characters that are part human and part animal or machine. There is at times a simultaneous attraction and repulsion to these forms. As it happens, I was reading *Science* this week and there is a brief article that the uncanny valley effect may exist among lower primates and not just people. They tested macaque monkeys with distorted images of their species, and then assessed their reactions. As the monkey image became more distorted, the macaques reacted negatively. It is possible that this is a deep evolutionary aspect of perception that helps us identify friend and foe.

QUESTION FROM TESSA: Were there any other robots your encountered in your research that didn't make it into the story?

JEROME GROOPMAN: No. I included all the robots that I could identify that serve in socially assistive ways. Matarić is clearly the leader in the field.

QUESTION FROM MCCORMICK: Are you worried robots will take over?

JEROME GROOPMAN: Not really. That is very much a science-fiction tale. Certainly they do not have independent intelligence. The real concern has to do with our interaction with robots and how we can utilize them without losing the drive toward human contact.

QUESTION FROM YAAAH: What are people responding to when they are interacting with a robot?

JEROME GROOPMAN: That is a really good question. As Sherry Turkle of M.I.T. points out in the article, we tend to project our own feelings and thoughts onto the robot. So, the robot takes on the persona of a helper or friend, or even in the case of the elderly woman with dementia, a surrogate for her grandchild.

QUESTION FROM GUEST: How did you find Matarić's research? Why did you choose to open your piece with her work?

JEROME GROOPMAN: I began by searching the scientific and lay literature on social robots and it became clear that she was at the forefront. I also wanted to focus on someone who was honest and humble in her work, because too often there is hype and self-promotion. When I interviewed her, I was struck by her background and her initial interests in the arts and language. All of this came together in the context of explaining what kind of scientist would embark on such a challenging set of projects. I also sensed her heart was in the right place and she was aware of the ethical issues around the work.

QUESTION FROM SCOUT: Have you seen the documentary about men who form intense bonds with these life-size sex dolls, called "Real Dolls"? It seems like sorry replacement for human interaction, which is not dissimilar to Turkle's argument. What do engineers/scientists need to figure out in order to prevent excessive bonding with robots?

JEROME GROOPMAN: I am aware of the documentary and read commentary on it in scientific journals. I agree that there needs to be real attention to the issue of bonding. Of course, this goes beyond robots, with so many children and some adults living in a "virtual" world online. I suspect this will be an increasing concern among psychologists and therapists as technology expands.

QUESTION FROM BEN WILLIAMS: How long will it take for robots to have the equivalent complexity of cognition found in human consciousness?

JEROME GROOPMAN: I actually spoke with Rodney Brooks about this. As the article states, he was the head of artificial intelligence for many years at M.I.T., and was Matarić's mentor. When I raised the issue, he said we could wait more than three hundred or four hundred years to be concerned or delighted, depending on your attitude. Francis Crick, of the Double Helix fame, spent the last years studying the neural basis of consciousness and my impression from his work is that no one is even close. Without that understanding, you can't program.

QUESTION FROM ROBOT0: Can you explain more how a robot understands whether or not someone is an introvert or an extrovert?

JEROME GROOPMAN: As I write in the piece, Matarić programmed the robot to respond to different objective parameters in the person, like tone of voice and distance from the robot. Psychologists use these kinds of parameters related to personal space and apparent affect to broadly classify people as introverts or extroverts.

QUESTION FROM LAUREN: Is there any evidence on the negative effect that prolonged exposure to robots can have on patients—i.e., the realization that they are interacting with a machine and not a true helper or friend?

JEROME GROOPMAN: It is still very early days in these experiments and few people have had any prolonged

exposure. Sherry Turkle is concerned, based on her prior work with computers and virtual reality, that there can be negative effects of technology in causing people to retreat from the hard work of human social contact. I don't have any examples about people being told that the robot is not a helper or friend. I do know that experts in dementia recommend that you repeatedly tell a demented person the truth when they are mistaken in their perceptions.

QUESTION FROM IAN: Do you have an understanding of why we develop emotional attachments to fictional robots like R2D2?

JEROME GROOPMAN: Yes. The robot is very cleverly constructed in that it is small and has no threatening features. In fact, working from the uncanny-valley effect, you note that it has almost no human resonance except its apparent understanding. It beeps in a gentle way, without formed speech, perhaps making us think of a child. All of this works well. Another movie, "Polar Express," in the opinion of some experts, failed because the characters were too human and creepy, meaning they triggered the uncanny-valley effect.

QUESTION FROM ROMAIN D.: Do you think that, if robots become more and more social, some people will step down from the human social world and only interact with robots? Should one do something about this?

JEROME GROOPMAN: This is precisely Sherry Turkle's concern. I was impressed that Matarić addressed important ethical and emotional issues in her writing. My hope is that responsible researchers in the field work with those who raise such concerns, so we can avoid negative outcomes, like exempting yourself from social interactions and bonding only with machines.

QUESTION FROM ELEANOR M: I'd love to hear more about why you think robots won't "take over the world." I know it seems like a far-fetched idea, but a lot of people are scared of something like this happening. What are your thoughts on nanobots or other technological devices that could be used to alter personalities and abilities, similar to robots?

JEROME GROOPMAN: There are real issues related to nano technology. Robin Marantz-Henig did a piece on this. The concern is not so much about robots but that nano particles can enter the ecosystem and we don't have much knowledge about long-term effects.

QUESTION FROM GUEST: The studies of autistic children with robots sounded promising. I've seen an autistic child and they are very hard to interact with. Do you have more to share?

JEROME GROOPMAN: I also was impressed that there is potential to use robots to help children with autistic spectrum disorder. As I wrote, many of these children need a bridge to ultimately arrive at social interaction with people. People are too confusing for many autistic children and robots are more consistent in their expressions and movements. The research is being sponsored by very responsible and sensitive groups like AutismSpeaks. There is also work at Yale on using robots to better diagnose children with different developmental problems based on their reactions to the robot.

QUESTION FROM GUEST: Can you explain the programming Matarić had to do with the robots? That seems like an even higher hurdle than the hardware.

JEROME GROOPMAN: This is beyond my expertise, but I agree that the programming is a major challenge. It took years for her to get her Ph.D., which involved programming a flock of robots to navigate in a random space. I suspect her papers would give a clear set of references for the programming, but she is very open and collaborative, so direct queries to her or her graduate students would be most productive.

QUESTION FROM GUEST: Can you explain in more detail the role medical robots currently have in science?

JEROME GROOPMAN: Medical robots have been used for about twenty years. Most of the work is in surgery, where a robotic arm is controlled by a surgeon and reduces problems like tremor. Allison Okamura, of Hopkins, who is in the article, is also working on what is called “haptics.” This is a technology in the medical robot so that its arm transmits genuine sensation of tissue density to the surgeon. Really cool stuff!

QUESTION FROM MJ: Is there work exploring robots geared to a diversity of human types (social, racial, national, age, sexuality)? It seems that robots would have to continually adapt to modes of human signifiers through culture shifts.

JEROME GROOPMAN: Very interesting point. The robots that Hanson has designed, in some cases, incorporate and mix all racial and ethnic features, but I imagine as you do that people might want greater specificity as well as diversity.

QUESTION FROM GUEST: I have a Roomba and I find it very useful. It seems to just *know* where the dirt is in my house. Is there more money to develop commercial robots than there is for social robots?

JEROME GROOPMAN: That Roomba was designed in part by Rodney Brooks. The company is developing other devices that can help out intelligently. Alas, I still end up doing the dishes.

QUESTION FROM GUEST: Are there any fabled stories of failed social robots?

JEROME GROOPMAN: Interesting point. Scientists usually bury their failures or learn from them to ultimately achieve success. In fact, it is hard to advance without such learning from failures. I suspect that it took many failures before Matarić succeeded with her first group of social robots. But most of the prototypes, if not all, are first assessed on graduate students and others in the university.

The only cute story I heard was that the schoolteacher in the article figured out that the robot would follow her based on the tracking devices on her limbs. So she started to leave the therapy area and wanted the robot to exit with her to the parking lot. Matarić stopped this in time.

QUESTION FROM GUEST: What do you think of the movie “Wall-E”?

JEROME GROOPMAN: I thought it was fun. Note that there is not much or any uncanny valley, since it is so clearly not human. Hollywood spends much time and money on designing these characters to avoid uncanny valley, except in horror movies.

QUESTION FROM GUEST: What kind of research/development does someone like Matarić hope to do in the future?

JEROME GROOPMAN: She is trying to advance the programming so that the robot will change according to changes in the person with regard to affect and behavior. For example, with stroke patients, as they recover they become less depressed and more active. A successful robot would advance along a similar trajectory and interact in a more active way.

QUESTION FROM GUEST: Why do people feel like they can cheat with robots? The ethical issues about humans and robots seem vast.

JEROME GROOPMAN: Interesting question. I think that people like to feel they are smarter than machines. It reinforces our sense of control, which is especially important in a setting where we have become disabled. This was the case with the teacher who tried to cheat the robot after her stroke.

QUESTION FROM JULIANA: In your article you wrote about the learned-behavior algorithm with certain robots and their ability to discern different abilities and temperaments in different people. Is there a relevant human characteristic or mood that you worry robots might never be able to detect, and that would greatly hamper communication?

JEROME GROOPMAN: This is an important point. I am very skeptical that robots can model real love, which Hanson says will occur. Maybe I am a romantic, but real love is so complex and involves vulnerability and complex behavior, making it hard to imagine in a machine.

QUESTION FROM FLORA HAAS: What do you view as the implications for war or peace?

JEROME GROOPMAN: This is an ongoing issue and a very important one. Jane Mayer wrote about drones, which are really robotic planes that fire on command. There also was a piece about robotic battle in the magazine, as well as a book recently titled “Wired For War.” On the one hand, people imagine robot wars that spare human death, but I fear that the more likely scenario is with drones where we feel a degree of separation when using a machine or robot and become less concerned about collateral damage and loss of innocent civilian life.

QUESTION FROM ANDRE: What was our first robot?

JEROME GROOPMAN: The first medical robot was developed twenty years ago for brain surgery. It worked to accurately enter the very delicate tissue and biopsy a tumor while sparing the normal brain cells. I am not certain about the first robot per se.

QUESTION FROM URSULA: Do you think we could become too technologically dependent?

JEROME GROOPMAN: This is Sherry Turkle’s concern. It is part of a larger concern about how we are becoming endlessly entangled with technology of every type. I, for one, do not have a BlackBerry and feel the need to disconnect from e-mail, etc., so that I can think better and not be so distracted when I am with people.

THE NEW YORKER: That’s all for today. Thank you, Dr. Groopman. And thank you, everyone, for participating and reading. We hope you’ll return for more. Visit newyorker.com on Friday for a live chat with Paul Muldoon.

JEROME GROOPMAN: The thank you should go to the readers. I greatly enjoyed the questions and am only sorry that I couldn’t answer all. This is a new and rapidly evolving field and I suspect we will have more questions over time.

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