Young Researchers' Views on the Current and Future State of HRI

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ABSTRACT

This paper presents the results of a panel discussion titled "The Future of HRI," held during an NSF workshop for graduate students on human-robot interaction in August 2006. The panel divided the workshop into groups tasked with inventing models of the field, and then asked these groups their opinions on the future of the field. In general, the workshop participants shared the belief that HRI can and should be seen as a single scientific discipline, despite the fact that it encompasses a variety of beliefs, methods, and philosophies drawn from several "core" disciplines in traditional areas of study. HRI researchers share many interrelated goals, participants felt, and enhancing the lines of communication between different areas would help speed up progress in the field. Common concerns included the unavailability of common robust platforms, the emphasis on human perception over robot perception, and the paucity of longitudinal real-world studies. The authors point to the current lack of consensus on research paradigms and platforms to argue that the field is not yet in the phase that philosopher Thomas Kuhn would call "normal science," but believe the field shows signs of approaching that phase.

Categories and Subject Descriptors

I.2.9 [**Artificial Intelligence**]: [Robotics]; K.2 [**Computing Milieux**]: [History of Computing]

General Terms

Human Factors

Keywords

Human Robot Interaction, HRI, student perspectives, paradigms, history of science, future, workshop panel, robotic platforms, Kuhn

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1. INTRODUCTION

Early in August 2006, an NSF-funded graduate student workshop in Human-Robot Interaction (HRI) was held in Carmel, California. The goal of the workshop (a one-time event) was to help foster the development of a stronger community among the young HRI researchers who's views and research goals will shape the field in the future. The workshop was organized around student panels, including such topics as "Social Robots" and "Robots in Teams." The workshop participants included students and faculty from across the U.S., Europe, Japan, and Korea, and represented a broad range of areas of HRI research, including social robotics, mobile robot interfaces, theory of robot interaction, and robot designers.

The authors of the present paper were asked by the workshop organizers to form a panel on "The Future of HRI," with Torrey as the panel lead. Rather than attempt to impose our own view on the other 22 graduate students and 6 faculty attending the workshop, we decided to invert the panel and ask all those assembled about their views on the present and future of HRI. In this way, we hoped we might gain a broad picture both of where the field currently is and where these young researchers intend to take it.

Others in the HRI field have attempted to characterize its central problems and future directions, but few have attempted to span the entire field of HRI, and none have explicitly inquired into conceptions of young researchers in the field. For example, Fong, Nourbakhsh, and Dautenhahn [8] surveyed the work conducted on social robots, discussing contexts of use, design methods and system components, and open questions regarding the impact on humans. Breazeal [1] also explored the topic of social robots, identifying four overarching classes of such robots: socially evocative, social interface, socially receptive, and sociable. Murphy [14] reviewed the domain-specific task of designing rescue robots. Others have attempted to guide future work in HRI by, for example, interviewing over 60 established researchers representing a broad set of fields with interests in HRI [2]. Perhaps the most recent attempt provided "common metrics" for human-robot interaction [21].

The current paper should be interpreted as a report about what a small but diverse sample of the field's youngest researchers believe the scientific field of HRI represents, if it is indeed proper to consider HRI to be a "discipline". Rather than a formal survey, we took a more informal, discussion based approach. To encourage significant interaction and feedback from all participants, the attendees were divided into groups of about five. Research has shown that groups of this size tend to foster more interactive discussions than larger groups, which tend to be dominated by a few individuals [6]. Each group was then set to a variety of exercises, and each exercise was followed by a short presentation and then a larger discussion among all the workshop attendees.

The purpose of the first exercise was to find out how the workshop participants saw the field as a whole, and whether there was a unity of vision among the attendees. Did they regard the subfields within HRI as parts of a larger structure, or did they see the field of HRI as an ad hoc alliance between disparate research interests? What did they see as the foundational questions, theories, or models underlying the science? Did the students share a common schema for the field, or was each vision unique?

The discussion of the current state of the field set the stage for the next exercise, in which each group was instructed to answer a question about the near future of HRI research, including: What important HRI research do you wish somebody else would do? What should the relationship between the different subfields be in 5-10 years? Which disciplines, theories, and methods are not being used in HRI that ought to be? What should every HRI researcher know?

The attendees' answers to these questions were insightful and sometimes surprising. Their descriptions of where the field is and where the field should be showed a great deal of common ground, though there was considerable variety in the overall schemas for the field. Such a state of affairs suggests that the field of HRI, while still somewhat inchoate in its vision, is making healthy progress towards building a common framework for research.

2. MAPS OF THE FIELD

2.1 Methodology

In the first exercise, the workshop participants formed four groups of 5-6, plus one group consisting of the six faculty. The faculty were excluded from the student groups to remove the potential for faculty influence on the students' conceptions. The participants had selected their own groups by their choice of table before the panel, but did not know beforehand that their table would become a working group. The groups were each given brief (6-10 word) descriptions of all 22 graduate students' primary research interests, and the groups were each given 20 minutes to construct a visual representation of the structure of the field of HRI. Participants were told to add missing fields and superstructures as necessary.

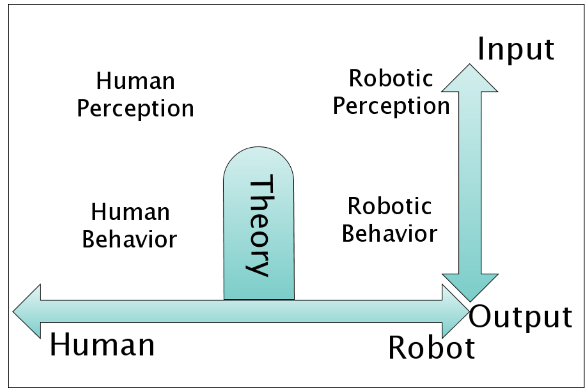

Figure 1: An input/output model of the field of HRI, presented by Group 1.

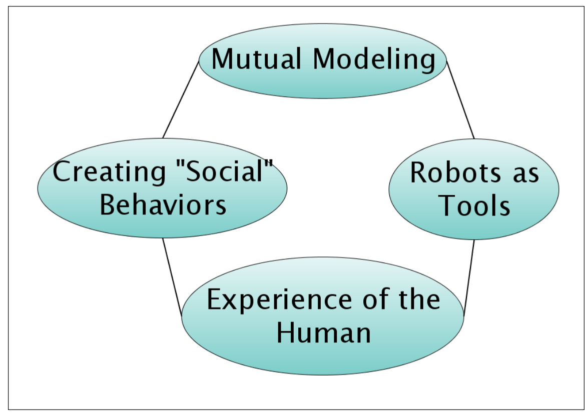

Figure 2: A map of HRI presented by Group 2.

2.2 Results

Figures 1–5 show the five different maps of the field that the graduate students and faculty created. Only the superstructures are shown; the 22 research interests that compose the subfields have been omitted for clarity. Each map was explained by a single presenter from the group.

The structure presented by Group 1 considered the two important axes of HRI research to be human/robot and input/output, with theory in the middle informing each of these (Figure 1). Theory of mind for robots [19] was added to the middle as a missing research area. This group was the only one to eschew clustering in favor of a two-dimensional approach, with theory forming the connection between input and output on both sides of the interaction.

The structure presented by Group 2 divided HRI research into four categories: mutual modeling, creating robotic social behaviors, using robots as tools, and the human's experience of the interaction (Figure 2). The map treats the social robots community and the "robots as tools" community as broadly divided, but it is worth noting that the "mutual modeling" and "human experience" categories were shown furthest apart, suggesting a divide between results-oriented and model-testing experimentation.

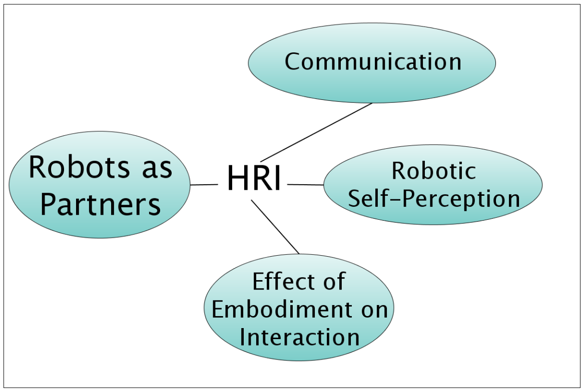

Figure 3: A map of HRI presented by Group 3, which was composed mostly of roboticists.

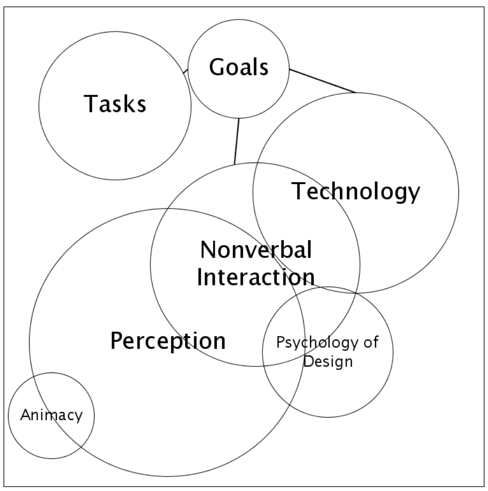

Figure 4: A map of HRI presented by Group 4, emphasizing the central role of nonverbal interaction.

Group 3 presented a structure that divided the field of HRI into four categories as well: communication, robotic self-perception, robots as partners, and the effect of embodiment on human perception (Figure 3). This group contained the highest concentration of participants with an engineering background, and the group's map primarily reflects the technical challenges facing the robot designer, who must decide how the robot is to communicate effectively; how the robot is to cooperate with humans in performing tasks; what its perceptual capabilities should be; and what to include in its external appearance.

Group 4 presented a Venn diagram with nonverbal interaction at its core, tying together the study of perception and technology (Figure 4). Specific real-world tasks for robots are shown as influencing broad research goals, which in turn influence the more specific robotic research. Two research agendas were deemed sufficiently different from the rest of the structure that the group created individual "satellites" for them on the map: these were the study of the effects of mismatches between a robot's appearance and its actual functionality (shown as "psychology of design" on our diagram), and the study of how humans mentally process animacy cues (lower left).

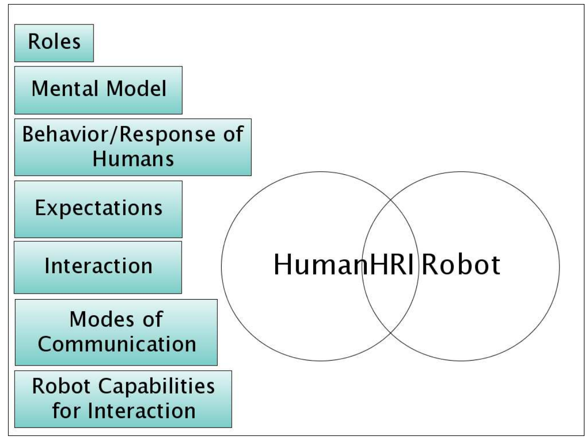

Figure 5: The faculty's general categories of HRI research. The faculty also noted that, broadly speaking, HRI was the intersection of human and robot research, as they illustrated with a Venn diagram.

The faculty's model of the field was the least structured, insofar as they created the largest number of categories but did not organize them into any superstructure (Figure 5). These categories included: research areas defined by the robot's role (companion, assistive, or testbed); research about human mental models; the behavior or response of the human to the robot; human expectations about robots; study of the interaction itself; study of various modes of human-robot communication; and robot capabilities for interaction. The faculty also provided a Venn diagram, in which HRI was loosely defined as the area in which human and robot overlap.

2.3 Discussion

All groups agreed that human perception was a clear subfield of HRI, but the remaining subdivisions varied substantially between models. Still, certain motifs were common to most or all of the maps, though these motifs were sometimes only implicit.

2.3.1 Model and Behavior

One motif was the distinction between the study of behavior and the modeling of an agent's underlying representation. Essentially, one can focus on achieving a desirable observable outcome from the human or robot, or one can use behavior to test models of the agent's underlying representation. Figures 5 and 4 show this distinction being made for the human side: the map created by the faculty distinguishes human behavior from human mental models, while the map presented by Group 4 separated mental models from perception by creating separate "satellites" for the mental model research. Figure 1 shows the behavior/representation distinction by creating a separate category, theory, that is distinct from human or robot output. Figure 2 separates "mutual modeling" from "creating social behaviors," highlighting a divide between roboticists that seek to create social behavior and those that wish to understand the underlying processes that generate it.

In some ways, this is a surprising subdivision. One would think that behavior would best be explained or produced by an underlying model, and that models are best testable through the behavior they predict or create. On the other hand, the division in these models does not necessarily mean that these two branches do not communicate; it is perhaps only natural to see a trend for a science to divide into "theorists" and "experimentalists." The only cause for worry would be if the two groups were to cease communication; yet in all the diagrams that make this distinction, the two subdivisions are shown as close and connected.

2.3.2 One Direction of Interaction is More Canonical

The map of HRI shown in Figure 1 gives equal weight to input and output for both human and robot; interestingly, it is the only diagram to do so. Of the other four models, only one lists robotic perception as a subfield (Figure 3), and only in the context of self-perception. The faculty map lists human behavior but not robotic perception (Figure 5). Perception is implicitly human in Figure 4, as it does not overlap with technology. Nor is robotic perception mentioned in the one map that explicitly creates a subfield for robotic behavior (Figure 2).

In short, there appears to be more of a consensus on one direction of communication – that of the behaving robot and perceiving human – than the other, in which the robot perceives human behavior.

There are several reasons why this could be the case. One is that it is much easier to create a robot that acts in a preprogrammed manner than it is to create a robot with nontrivial perceptual abilities. In other words, it is simply easier to conduct experiments in which the robot acts in a preplanned manner. Another possible explanation is that the emphasis in creating usable robots should arguably be on the human's experience, since the robot is ultimately being created for some human's benefit. A third, related explanation could be that HRI has its roots in HCI, where the problem of the system's perception of the user is less difficult, and the user's experience is paramount. Finally, it may be simply the case that robotic perception already has several allied fields in which to publish, such as computer vision and speech recognition.

Regardless of the reasons, the maps of the field produced by the attendees primarily focused on one direction of the interaction, from robot to human. Though research on robot perception and learning from humans was in evidence at the workshop, it was generally not seen as belonging to a single cohesive subfield.

2.3.3 Tools and Social Robots

Though we had expected to see a major divide between the "robots as tools" community and the "social robots" community, only one group chose to make this distinction (Figure 2). Of the remaining groups, Group 1 ignored this distinction in favor of its input/output model, Group 3 explicitly grouped these communities together under "robots as partners," Group 4 merged the two groups by their common interest in "nonverbal interaction," and the faculty map only alluded to the distinction under the category of "roles."

We had expected a divide because the two communities are generally interested in different questions, and use different research platforms. The social robots community typically uses humanoid platforms and employs the theories and frameworks of social psychology, treating the robot as a separate social entity from the user (e.g., [10, 17, 22, 23]), while the "robots as tools" community typically uses mobile robots, treats the robots as extensions of the user instead of separate entities, and focuses on clear user interfaces (e.g., [4, 20, 15]). With such broad divides in current methodologies, research platforms, and models, it is somewhat surprising that the groups generally chose not to emphasize this distinction.

Group 3 presented some of its arguments for combining the two fields later (see below). It is likely that the other groups that did not include this distinction between social robots and tool-like robots were also creating a model of the field as they felt it should be, rather than how it currently stands.

3. FIVE QUESTIONS ABOUT THE FUTURE

Having charted the present, the workshop attendees were then asked five questions about how the field of HRI should proceed. Each group was asked one of the following five questions, and given 20 minutes to prepare their responses.

3.1 What important HRI research do you wish someone else would do?

With this question, we were looking for examples of research that would remove stumbling blocks for other scientists, answer key questions, or simply employ exemplary methodology. We stipulated that "someone else" should do the research so that respondents would avoid touting their own line of work as the most important in the field.

Robust systems that could provide common platforms for research were the most fervent request from the graduate students. Creating a robot is a time-consuming and error-prone process, they said, and often the mechanical and control aspects hold little interest for the HRI researcher, beyond being functional.

The respondents also cited long-term studies and studies in natural environments as two methods that were underutilized but vital to the field's practical relevance. Often experiments are performed in laboratory conditions with subjects that have never encountered the robot before, causing perhaps an undue emphasis on first impressions. Studies of the long-term use of robots in real environments could reveal long-term trends that do not manifest until the users are familiar and comfortable with the robot. The group cited a long-term ethnographic study of Roomba use [9] as an example.

Finally, the group requested more user studies that could directly inform robot design.

3.2 What should the relationship between the different subfields be in 5-10 years?

We left this question open-ended to allow for the possible response that HRI should not attempt to merge its subfields at all. On the contrary, all of the graduate students in this group agreed that the subfields would benefit from closer collaboration and communication.

This group pointed out as an example that the subfields of assistive robotics and rescue robotics could communicate more, since they share a theme of mobile robots providing assistance to humans that may be physically impaired. But the group also went further and argued that the distinction between social and non-social robotics is largely artificial, since people treat even non-anthropomorphic robots socially [18]. The students reported that they often perceived disdain or lack of trust from HRI researchers outside their subfield, and identified mutual respect as one of the key challenges for building an HRI community.

The group was generally wary of creating interdisciplinary degree programs, which they felt left students with merely a hodgepodge of courses and marginal status in the university. The general consensus was that the field would best be served by its practitioners remaining in traditional departments, but establishing better communication across disciplines and sharing resources. The group pointed out the importance of being able to find the right person in a related discipline, and added that when attempting to muster help from other departments, establishing a shared vocabulary can help clarify what research is being proposed and what is necessary from the other department.

3.3 Which disciplines, theories, and methods are not being used in HRI that ought to be?

This group argued that ethicists should be included in the HRI community; the long-term effects of raising children in an environment with humanoid robots is unknown, and may need to be considered carefully. Like the "someone else's research" group, this group also concluded that more long-term studies of human-robot interaction outside the lab would be beneficial.

3.4 What should an HRI graduate curriculum consist of? What does everyone doing HRI research need to know?

This group presented a model HRI curriculum consisting of four areas: theory, design, methods, and applications. The theory portion of the suggested curriculum would include coursework in social psychology, control theory, and artificial intelligence. Design would include an overview of the major robots to date that have been designed for human interaction. Methodology would include courses on statistics, ethnography, and experimental design. Finally, "applications" would be an integrative project course in which each student must combine two or more of the four core areas in a single HRI study, intended to be suitable for publication at an HRI or related conference or journal.

3.5 What institutional structures would help to support a vibrant HRI research community?

We asked this question of the faculty. Like the earlier groups, the faculty concluded that cheap, reliable robot platforms that were commonly available for research would be a great boon to the HRI community. The faculty also stressed that a textbook, or even a practitioner's handbook, should be created to help train future researchers. The faculty admitted, however, that such efforts were time-consuming endeavors that would stymie their creator's research. Other resources the faculty cited as important to the aspiring researcher included a high quality journal and a network of colleagues.

Finally, the faculty stressed the importance of creating an international presence by holding HRI conferences in Asia and Europe, and the importance of "speaking with a loud, unified voice" to the NSF.

4. HRI AS A SCIENTIFIC FIELD

The students' answers to the above questions were themselves thoughtful and insightful, but one could also want a broader picture of the state of HRI from the perspective of the philosophy of science.

Thomas Kuhn has written that a science can be in one of three different kinds of phases. All sciences, writes Kuhn, begin with a "pre-scientific" phase in which there is no accepted common paradigm in which to perform research. Following this is a phase of "normal science," in which research progresses using techniques and theories which, by consensus, are seen as exemplary. Eventually, if these techniques and theories produce inconsistencies, become increasingly complex, or become otherwise implausible, the science may enter a period of "revolutionary science" in which another method gradually gains favor, primarily by attracting the younger practitioners in the field [13]. Given Kuhn's emphasis on the perception of a field among its younger practitioners, which our informal survey has addressed, we are compelled to pause here and consider: what is the current status of HRI within this framework?

From our results in Section 2, we note that there is no common taxonomy for HRI research, but this in itself would not preclude the existence of a paradigm of "normal science." More important to Kuhn was the existence of techniques and theories that are seen as exemplary by the community, which can be used for routine "puzzle-solving." Kuhn used the term "paradigm" to refer to specific examples of exemplary science which other research attempts to emulate, such as Ptolemy's computations of planetary positions or Newton's *Principia Mathematica*. Such paradigms provide not only theories, but tools (often mathematical) and solutions to important problems.

The most telling response that students gave to our questions that pertains to the existence of an HRI paradigm was their answer to the paired questions, "What should an HRI graduate curriculum consist of? What does everyone doing HRI research need to know?" A paradigmatic theory or finding in HRI probably would have appeared here if it were commonly accepted as exemplary, but the students had no such suggestion to offer. Rather, their answer reflected the fact that most of the experimental techniques and underlying theories of HRI are borrowed from other disciplines.

The methods and theories of social psychology, in particular, have had a large influence on HRI research, and it is probably not a coincidence that our respondents listed it first. Likert scales, the emphasis on tests for statistically significant differences between populations (as opposed to, for instance, mathematical models of underlying mechanism), and the basic theories of when and why people like each other (e.g., ingroup/outgroup bias) can all be carried over wholesale from the field of psychology, substituting a humanoid robot for one of the humans in classic experimental designs. To a certain extent, then, there is a subfield of HRI that can be considered "normal science" with regard to social psychology.

In terms of engineering and human factors, however, the lack of a dominant paradigm makes it difficult, perhaps impossible, for there to be a common robotic platform for HRI research. Certainly, desire for such a platform exists, as demonstrated above by the respondents' answers to questions 1, 3, and 5. But to arrive at a common robot platform would require an agreement on the critical scientific questions of HRI, which clearly are still in their early stages of development.

Consider the following hypothetical set of central questions for HRI:

(A) What kinds of communication between human and robot are most computationally efficient for each?

(B) How can robots be designed to maximally reduce human workload?

(C) What factors influence whether a given robot will trigger social reactions?

(D) What determines whether a given human will use a given robot?

Finding the answers to these questions will require many different physical robot designs. For instance, communication can require different kinds of embodiment: a robot designer may want a robot to gesture, or to give or receive haptic feedback. Human reactions can depend on a robot's appearance, and indeed it is not even clear what the range of possible human reactions is. But to the extent that preliminary answers are available to HRI's central questions, the range of possibly necessary physical forms will diminish until creating a few common platforms is feasible. For instance, if it is discovered that social reactions to robots depend more on a sense of unpredictability than on the presence of facial features, the need to vary robot face designs will diminish. Common platforms become possible as a research consensus builds.

Uniformity in platforms comes at a price: it is possible that interesting questions will be overlooked if popular platforms do not support certain kinds of inquiry. But to postpone creating a common platform for fear that it will prove insufficient is to postpone entering the period of normal science, fearing that it may give way to what Kuhn would call revolutionary science. It is worthwhile to remember that every science has had to make sacrifices in complexity and diversity for simplicity's sake. Occam's Razor reminds us that "entities should not be multiplied beyond necessity" – an interesting maxim to keep in mind when considering the question of common platforms.

Nevertheless, it would not do to needlessly stifle diverse research in the hopes that this would bring about a new age of HRI. Paradigms are not enforced, but adopted. To the extent that HRI is entering a period of normal science, we might identify this shift toward consensus by the widespread adoption of popular platforms and designs. Our student responses suggest that this is has not yet happened, but the desire is there.

Indeed, there appears to be a convergence of interests from many different fields, a desire to create a community within which a common set of terms may be agreed upon, and a common belief that putting humans and robots together is truly a new *thing* that can and should be studied. If this is not yet "normal science," perhaps it could qualify as what physician Ludwig Fleck would call a "thought-collective" [7]. Little by little, as the field develops, a common robotic platform may emerge – but for the moment, it seems more likely that the best thing we can hope for is a set techniques and parts and operating system components from which robots suited to exploring the range of possible human-robot interactions might be quickly and easily assembled. We thus might expect our tools to resemble our current theories: individually small in scope but useful, and combined uniquely by each researcher.

5. GENERAL DISCUSSION

The future of a scientific field is always difficult to predict. The factors we have considered here are how a group of young researchers perceive the structure of the field, and how they feel the field ought to be, which will affect what research they pursue and how they might change the way HRI research is done. The field is not yet large, and the opinions of even this small group will surely influence the future course of the field.

The most striking thing about the group discussions was the near unanimity of the students in believing that the subfields of HRI did have meaningful contributions to offer one another, even in the case of the "robots as tools" and social robots communities. The argument that people treat even non-humanoid robots in a social manner is a philosophy that certainly could help to unite the field if it is true. If even unmanned aerial vehicle (UAV) operators anthropomorphize their robots to some degree, then a wide body of researchers may have more to gain from social psychology than they might have thought; but this is would be a surprising finding on the face of it. In the other direction, social robotics sometimes seems to operate in a taskless vacuum, with "social interaction" treated as a goal when it is perhaps more usefully construed as a medium. Once humanoid robots become more widely employed to aid users in achieving something, studies of robots as teammates and situational awareness [5] may become more relevant to these researchers. Other pairs of currently separate fields, such as assistive robotics and rescue robotics, are even closer. Though we might expect researchers to remain focused in one area or another, better communication and recognition of connections between fields could help researchers in each subfield make more informed decisions about those areas which are not their specialty.

Though there has been considerable research showing that humans are quite willing to ascribe intentionality to inanimate objects [18], it is not clear whether this pattern extends to even robots that function more as extensions of the user than as autonomous agents. It may be the case that when users exert more direct control over robots, the perception of the robot as an extension of the self dampens social feelings toward the robot. Nevertheless, we would expect direct control over the robot to lessen as artificial intelligence algorithms improve. Streamlining interfaces may reduce an operator's cognitive load, but they cannot do so nearly so well as offloading tasks onto the robot completely. As mobile robots increase in autonomy, the relevance of research conducted on people's social and moral relationships to robots [16] is likely to increase in kind.

The current lack of autonomy in most robots is also probably the primary reason for the focus on the effect of robot behavior on humans, rather than vice versa. Robots that do not learn from their environment and possess little in the way of autonomy or perceptual abilities are not very interesting subjects in their own right. Still, robots will eventually be more useful to their users if they are able to make correct inferences about the user's goals and monitor the user's state. This is true of humanoid and mobile robots alike, though they may differ in their goals; a humanoid robot may need to decide whether it is appropriate to attempt to continue an interaction, while a rescue robot might monitor whether the user is beginning to make errors due to exhaustion.

Though the subfields of HRI may eventually draw more on each other's work, HRI will in all likelihood continue to be seen as an interdisciplinary collaboration rather than a discipline in its own right. Students were skeptical about the prospects for an interdisciplinary graduate degree in HRI, and perhaps rightly so. Such programs can become little more than a bundle of unrelated courses when there is no core theory that is unique to the field. If there is such a core in the curriculum suggested earlier, it would probably be in the robot design section of the curriculum; yet a field needs more than a list of past experiments at its core if it is to draw students. This lack of a core theory or model would also make writing a textbook for the field difficult, though the first HRI textbook might well provide a de facto default model.

A default robotic platform would shape the field as much as a common textbook, insofar as it would constrain what kind of experiments could be easily performed. On the other hand, it is difficult to imagine a platform that could accomodate the needs and interests of all current HRI researchers. Such a platform would directly conflict with the desire to explore the effects of different design choices on interaction, which was another requested direction of research. Nevertheless, as the science of HRI progresses, research questions may settle into following the examples of established paradigms, thinning the number of common mobile platforms and allowing the creation of a common humanoid platform. (Mobile robotics researchers have more choices for common platforms than humanoid researchers; see [3] for a list of platforms recommended for the educational community.)

The existence of robust robots that accomplish useful tasks should enable more long-term studies of robots being used "in the wild," which was another recurring suggestion from the workshop. One of the best examples of such a study from last year's HRI conference tracked families' attitudes toward their Roomba vaccum robots over time [9]. It is important to note that the families were primarily interacting with the robot because it solved a useful task, namely that of cleaning their floors; such a study would have been much more difficult if the families had no particular reason to interact with the robot. Unfortunately, there is neither a common platform nor an agreed-upon useful task for humanoid social robots at this point, making such longitudinal studies difficult. Some longitudinal research has tracked childrens' interactions with a robot as a playmate over time, but even children get tired of robots that have only a limited repertoire of responses [12]. Still, there is some research showing that mobile robots can exert social pressure on patients to engage in their exercise regimens [11]. More opportunities for long-term research may be discovered as the technology improves.

Our predictions, such as they are, are limited by our sample, which was only from 22 students and a smaller number of institutions. Moreover, the future is a moving target: to predict it openly is possibly to change it. Our one certainty is that the future of the HRI will be shaped by individual researchers coming together to discuss how the field is, and how it ought to be.

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