# Machines as a Source of Consolation: Robot Responsiveness Increases Human Approach Behavior and Desire for Companionship

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***Abstract*—Responsiveness to one's bids for proximity in times of need is a linchpin of human interaction. Thus, the ability to be perceived as responsive has design implications for socially assistive robots. We report on a large-scale experimental laboratory study ($n = 102$) examining robot responsiveness and its effects on human attitudes and behaviors. In one-on-one sessions, participants disclosed a personal event to a non-humanoid robot. The robot responded either responsively or unresponsively across two modalities: Simple gestures and written text. We replicated previous findings that the robot's responsiveness increased perceptions of its appealing traits. In addition, we found that robot responsiveness increased nonverbal approach behaviors (physical proximity, leaning toward the robot, eye contact, smiling) and participants' willingness to be accompanied by the robot during stressful events. These findings suggest that humans not only utilize responsiveness cues to ascribe social intentions to personal robots, but actually change their behavior towards responsive robots and may want to use such robots as a source of consolation.**

## I. INTRODUCTION

Socially Assistive Robotics [7] is one of the most predicted applications for social and personal robots. These robots are proposed to serve as part of assistive technologies in caregiving roles, such as elderly care, health care, nursing care, and child care. In addition to serving functional tasks, such robots will also serve a socially communicative and supportive aspect of the care they provide.

When interacting in a social way with care takers, a robot might listen to the experiences of a patient, a child, or an elderly person. Building on the literature that indicates that the way a partner's reaction to such disclosures is perceived has effects on personal and relational well-being [21], it is a crucial concept to design for when creating robots for caregiving roles. In these situations, the robot being psychologically sensitive to their care-receivers can be of paramount emotional and psychological importance.

As part of research on socially assistive robots and their response to human recounting of personal events, Hoffman *et al.* have suggested the notion of *Robot Responsiveness* [13], which they define as "behaving in a sensitive manner that is supportive of another person's needs". This is based on the notion of human responsiveness and in particular a person's Perceived Partner Responsiveness (PPR): The belief that another person understands, values and supports important aspects of the self. PPR positively affects outcomes in a host of dyads, including parent-child relationships, adult close relationships, and therapeutic relationships [22], [5].

Hoffman *et al.* evaluated the self-reported outcomes of Robot Responsiveness on people's impression of the robot (see: Section II-A). This paper extends that investigation, by examining not only self-reported perceptions, but also behavioral outcomes. It also studies the effect of responsiveness on people's desire for the companionship of the robot they interacted with. Finally, given the importance—and current drought—of replication in the Human-Robot Interaction literature, we also set out to replicate the previous paper's findings with a 3x larger participant sample and report on which of the findings replicated.

## II. RELATED WORK

Socially Assistive Robots (SAR) [7] assist users through social interaction, as opposed to merely assisting them by virtue of their mechanical capabilities (e.g., carrying things). SAR have already been used successfully in a number of therapeutic applications, in which they typically serve in three roles: companions, coaches, and play partners [20]. In these applications, a robot's multimodal communication channels allow it to communicate verbally and non-verbally with humans, enabling those to benefit from socially interacting with the robot, engage in personally meaningful relationships, and experience enhanced well-being as a result. [28]. For example, the baby seal robot PARO, designed to be held and touched, increased the level of human-to-human interactions of seniors who used it, and decreased their level of stress [30], [31]. Robots have also been found to improve the social interaction skills of children with autism [24] and help patients recover from injury by adhering to activity recommendations [10].

In such caregiving roles, robots need to possess not only multimodal communication channels but also display social and cognitive skills that enable them to interact effectively [6],

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[28]. Research suggests that people tend to perceive robots as social actors and attribute to them human-like traits, including mental states and personality [8], [16]. These and other studies also suggest that people are willing to play along with the illusion that the robot is a sentient creature appropriate for relational interaction. They are often willing to ignore the mechanical aspects of the robot and to treat it in a manner similar to how they would respond to a fellow human being [29]. For example, preschool children were as likely to share a secret with a robot that listened to them as with a human, given a similar amount of prompting questions. They also interacted with the robot using similar social conventions [1]. Adults who interacted with either a robot expressing social behaviors or a text-based assistant, saw the robot as more empathic and trustworthy than the text-based assistant, and expressed more conversational behavior toward it [17].

Still, the social skills displayed by many caregiving robots are not sufficiently effective [28]. These concerns have been especially prominent in research robots listening to humans [9], [15], highlighting the difficulty of accurately providing the kind of responsiveness behaviors known to have positive effects on people's well-being [21], [18].

### A. *Robot Responsiveness: Previous Work*

As part of the research on Socially Assistive Robotics, Hoffman *et al.* have examined the possibility of robot responsiveness, both theoretically and empirically [13]. They suggested that a robot could theoretically act in a more or less responsive way, and that a robot's design and behaviors could support each of Maisel *et al.*'s dimensions of responsiveness [18]—*understanding*, *validation*, and *caring*.

They then conducted a laboratory study to uncover effects of some of these behaviors on people's perception of the robot. Participants had one-at-a-time sessions, in which they disclosed a recent negative event to a desktop-scale, non-humanoid robot. The robot responded with either responsive or unresponsive behaviors, using simple gestures and written text. Following this interaction, participants rated the robot's responsiveness, sociability, competence, and attractiveness.

They found that a robot displaying responsive behaviors increased its perceived responsiveness (PPR), heightened people's perception of its social, competence, and overall positive traits, and caused them to rate it as more attractive.

That said, Hoffman *et al.* focused only on the effect of robot responsiveness on people's *perception* of the robot. Their research included only self-report measures, and evaluated neither behavioral outcomes of robot responsiveness, nor its downstream effects. This is the goal of the present research.

## III. PRESENT RESEARCH

In the current study we seek to bolster and extend the previous work on robot responsiveness in three ways: First we aim to replicate the findings in Hoffman *et al.* with a larger participant sample. Given the recent appreciation for the importance of replication in Social Psychology studies [26], [14], [19], we applied a similar procedure as was used in the original study on a larger participant sample set, with differences as discussed below.

Second, we hypothesized that people not only feel that a responsive robot is more competent, social, and attractive than an unresponsive robot, but that they also react accordingly by exhibiting approach behaviors while interacting with it. We thus examine whether robot responsiveness affects not only people's attitudes towards the robot but also their behavior in the interaction.

Third, we are interested in downstream effects of robot responsiveness. To that effect, we added a measure of desire for robot consolation and companionship in times of need, which is a known outcome of human responsiveness [4], [27].

### A. *Hypotheses*

To support our research questions, we tested the following hypotheses in the current study: Hypotheses 1a–1c aim to replicate the findings in [13]. Hypotheses 2a and 2b predict behavioral differences based on the robot's behavior. Hypothesis 3 predicts participants' desire for the robot's companionship.

**Hypothesis 1a —** Participants will perceive a robot which displays responsive behaviors as more sociable compared to a non-responsive robot.

**Hypothesis 1b —** Participants will perceive a robot which displays responsive behaviors as more competent compared to a non-responsive robot.

**Hypothesis 1c —** Participants will perceive a robot which displays responsive behaviors as more attractive compared to a non-responsive robot.

**Hypothesis 2a —** Participants will display more nonverbal approach behaviors toward a robot which displays responsive behaviors compared to a non-responsive robot.

**Hypothesis 2b —** Participants will display more verbal disclosure toward a robot which displays responsive behaviors compared to a non-responsive robot.

**Hypothesis 3 —** Participants will desire the companionship of a robot which displays responsive behaviors, during stressful situations, more than that of a non-responsive robot.

## IV. METHOD

As mentioned above, our study replicated and extended the experiment in [13]. For completeness, we include a brief version of the method herein, focusing on new measures, and on divergence from Hoffman *et al.*'s protocol.

### A. *Design*

We employed a between subject design with two conditions, in which people disclosed a recent negative intimate event to a robot. The robot either displayed or did not display positive responsiveness behaviors after each paragraph of the human's disclosure.

Hoffman *et al.* used simple gestures such as nodding and written verbal confirmations for positive responsiveness in the experimental condition, and gestures showing disinterest such as looking away, and verbally commenting in a dismissive fashion in the control condition. They report that this manipulation resulted in perceived partner responsiveness differences similar to those found in humans engaging in similar behavior.

In a pilot study ($n = 26$) using the same manipulation, we were not able to replicate this finding, which was essentially our manipulation check, and instead found that both manipulations were perceived as equally responsive. It was our sense that this might be due to the fact that the robot does not have human-like features. In fact, the looking away gesture could well have been interpreted as "lending an ear" considering the prominent ears in the robot's design (see: Figure 1).

We then proceeded to compare both original responsiveness behaviors to a more limited behavior. In that mode, the robot seemed alive and listening, displaying gentle breathing-like movements and slight swaying, but did not engage in additional nonverbal behaviors. It also used very matter-of-factly instructions to continue speaking, not acknowledging the content of the previous speech segment of the user. This is a more neutral form of robot unresponsiveness, compared to the more negative responsiveness displayed by the robot in the original experiment.

In other words, the form of unresponsiveness we chose is more of an uninvolved nature, perhaps similar to how some professionals (e.g., law enforcement, military, or legal professionals) might be inclined to respond to disclosures. In addition, our new manipulation also more clearly represents the situation where responsiveness cues are simply not programmed into a robot. As such we find this to be a better candidate condition for understanding design implications, effectively comparing a purely functional robot to a socially communicative one.

Fig. 1. The robot and tablet used in the experiment.

### B. Participants

One hundred and two undergraduate students (49 women, 53 men) volunteered for the study in return for class credit. Sample size was determined via a priori power analysis (targeting 80% power to detect an effect size, $d$, of 0.50 at $p < .05$). Participants ranged from 20 to 34 years of age (M = 24.13, SD = 2.62). No significant differences were found between the experimental conditions for any of the socio-demographic variables we measured.

### C. Procedure

Participants who agreed to participate in a study of a new speech-understanding algorithm were individually scheduled to attend a single half-hour laboratory session. The session's protocol was adapted from [3] with changes reflecting human-robot instead of human-human interaction. Prior to each session, participants were randomly assigned to interact with either a responsive or an unresponsive robot. We used the same robot as Hoffman *et al.*, Travis [12], [11], a research platform developed to examine human-robot interaction. Travis is a small nonanthropomorphic robot with a vaguely creature-like structure, but without a face (see Figure 1), capable of basic gesturing (e.g., nodding, swaying). Travis stands about 28cm tall, sized so that, when placed on a desk, its head is roughly in line with a seated person's head in front of it.

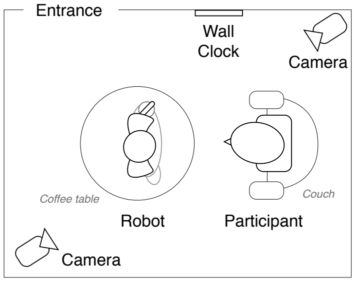

Fig. 2. Experimental room layout including the participant, the robot, and two cameras.

In this experiment, the robot was controlled remotely in a Wizard-of-Oz setup [23]. This setup allowed the operator, who was sitting in a control room, to operate the robot, controlling its gestures and the text it produced (its "speech"), without the awareness of the participants. The setup had three main control components networked through a wireless network: A PC, which was located in the control room; a smartphone, which controlled Travis and was held by it; and a tablet, which was leaning against Travis's body and displayed its responses to the participants' disclosure. The wizard operator used the PC to type in these responses. Travis displayed the text it "says" on a tablet screen, instead of using audible speech, to eliminate the possibility for estrangement, associated with a robotic voice. This screen was completely black, except when Travis presented text. Then, a single sentence appeared on the screen for five seconds, before disappearing. The wizard operator also used the PC to send commands to the smartphone, which translated them into timed motor commands. Two cameras were monitoring the experiment room to enable the wizard operator to time Travis's behaviors to the participant's speech acts.

Upon arrival at the laboratory, participants were led to believe that we were testing a new speech-understanding algorithm developed for robots. Then, they completed a demographic questionnaire and were asked to sit on the couch, facing Travis, and to disclose a personally negative event to it. Participants were informed that the robot would try to understand what they say and respond with a relevant response, using artificial intelligence and speech recognition. Participants were given the following instructions:

> "We would like you to choose some current problem, concern, or stressor you are facing in your life. This may be something that happened before but continues to bother you, something going on now, or something you anticipate will happen in the future. Some examples could be a recent argument with a friend or a family member, a grade in class, work or financial problems, or personal illness.
> Pick something that has been on your mind recently, no matter how big or small you may think it is. While you are interacting with the robot, please feel free to talk about anything related to the personal concern by dividing it into three messages. Some suggestions would be to discuss the circumstances surrounding the concern in your first message; how you feel and what you think about the concern in your second message; and any other details or issues that you think are important, such as the implications of this event for your life, in your third message.
> At the end of each message, please use the statement 'and that's it', which would signal to the robot that the part is done and that speech recognition can begin. The robot will reply to each of your messages with a single line."

Participants and Travis then discussed the participant's negative event for up to seven minutes. These interactions were videotaped by two cameras mounted in the corners of the room, allowing for full frontal recording.

We experimentally manipulated Travis's responsiveness as described above. On the non-verbal channel, we displayed responsiveness by having Travis maintain a forward focus towards the participants, gently sway to display animacy, and nod affirmatively in response to human speech. The nodding behaviors were used consistently, three times per interaction, at roughly the same time points in the disclosure. We displayed unresponsiveness by having Travis show decreased animacy (swaying, but with a smaller amplitude), and no confirmation gestures.

On the verbal channel, we used positively responsive and neutral speech acts, following a previously established protocol of human responsiveness to negative event disclosure [2], [3]. At the end of each participants' message, the wizard operator selected a single standardized responsive message (e.g., "You must have gone through a difficult time"; "I completely understand what you have been through") or neutral message ("Please continue to the next paragraph") from a bank of preset phrases.

Upon completion of the questionnaires, participants were fully debriefed, and we made sure, especially in the unresponsive condition, that they felt good about their participation in the study.

## V. MEASURES

Participants filled out the same questionnaires as in Hoffman *et al.*, except that they completed an additional measure of desire for the robot's companionship following their interaction with it.

### A. *Self-Report Measures*

After interacting with Travis, participants completed a measure of perceived robot responsiveness, adapted from Birnbaum and Reis [3] to reflect human-robot interactions. The current version assessed perceptions of how understood, validated, and cared for the discloser felt when interacting with the robot. Participants rated nine statements, such as "The robot was aware of what I am thinking and feeling" or "The robot really listened to me." Items were rated on a 5-point scale from 1 (not at all) to 5 (very much). This scale was internally consistent (Cronbach's alpha = .94) in our sample.

Participants also rated their impression of the robotic agent on a nine-item measure, indicating positive character traits (e.g., "To what extent do you think that the robot is cooperative?" [11]). Four items tapped social perceptions of the robot (friendliness, cooperativeness, sociability, and warmth; Cronbach's alpha = .77). Five items tapped competence perception of the robot (intelligence, capability, reliability, knowledgeability, and sensibility; Cronbach's alpha = .64). Lastly, participants completed a six-item measurement of the robot's perceived attractiveness, which measured how attractive they perceived the robot to be (e.g., "How attractive is the robot?"; "How hot is the robot?"; Cronbach's alpha = .80). All items were rated on a 7-point scale from 1 (not at all) to 7 (very much).

In addition, participants completed two items assessing their desire for the robot's companionship when alone or under stressful circumstances ("To what extent do you want the robot to keep you company during stressful events, such as a dental treatment or a difficult test?"; "To what extent do you want the robot to keep you company when you are alone?"; $r = .65, p < .001$) on a 5-point scale from 1 (not at all) to 5 (very much).

### B. *Behavioral Measures*

The video-recorded human-robot interactions were coded by a team of two trained independent judges (psychology students) who were blind to the hypotheses and to participants' self-report data. Each judge watched the interactions and rated each participant's nonverbal behavioral expressions of approach toward the robot (physical proximity, leaning toward the robot, smiling, and eye contact maintenance) in a single overall coding of approach behaviors. They also coded their verbal disclosure (the extent to which the participants revealed personal info, feelings, and thoughts to the robot). Ratings were made on a 5-point scale ranging from 1 (not at all) to 5 (very much). Inter-rater reliability was high (ICC (verbal) = 0.88; ICC (nonverbal) = 0.86). Hence, judges' ratings were averaged for each participant.

## VI. RESULTS

### A. *Responsiveness*

A t-test on perceived robot responsiveness yielded the expected effect (Figure 3), $t(100) = 9.03, p < .001$, Cohen's

$d = 1.79$, 95% CI for Cohen's $d(1.33, 2.25)$: The robot was perceived as more responsive in the responsive robot condition (M = 3.23, SD = 0.76) than in the unresponsive robot condition (M = 1.89, SD = 0.75).

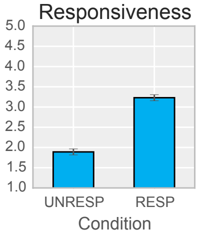

Fig. 3. Perceived Responsiveness means and standard errors by condition

### B. Perceived Robot Traits

To discover whether differences existed between the responsive and unresponsive conditions in perceived robot sociability, competence, and attractiveness, a one-way multivariate analysis of variance (MANOVA) for responsiveness condition was performed on these three measures of perceptions of the robot. This MANOVA yielded a significant difference between the two responsiveness conditions, Hotelling's Trace $= 0.53, F(3, 98) = 17.23, p < .001$, $\eta_p^2$ = .35, 95% CI for $\eta_p^2$ (.18, .46). Univariate analyses of variance (ANOVAs) indicated that this effect was significant for perceived robot sociability and competence, such that a responsive robot was perceived as more social and competent than an unresponsive robot, but not for attractiveness (see Figure 4, and Table I for means, standard deviations, and statistics).

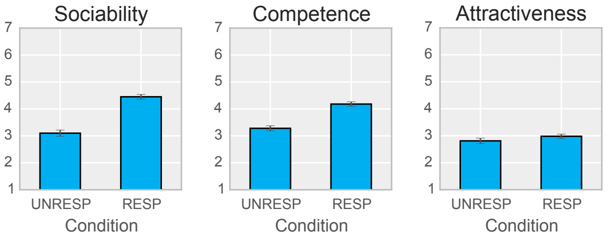

Fig. 4. Perceived Robot Traits means and standard errors by condition

### C. Behavioral Measures

To discover whether differences existed between the responsive and unresponsive conditions in participants' nonverbal approach and verbal disclosure behaviors, two independent sample t-test were performed. This t-test yielded the expected effect for approach behaviors, $t(97) = 4.28, p < .001$, Cohen's $d = .86$, 95% CI for Cohen's $d(.45, 1.27)$: Participants exhibited more approach behaviors in the responsive robot condition (M = 3.14, SD = .59) than in the unresponsive robot condition (M = 2.62, SD = 0.60). Verbal disclosure was not significantly different between the responsive robot condition (M = 3.75, SD = .71) and the unresponsive robot condition (M = 3.60, SD = 0.83): t(97) = 0.97 (Figure 5).

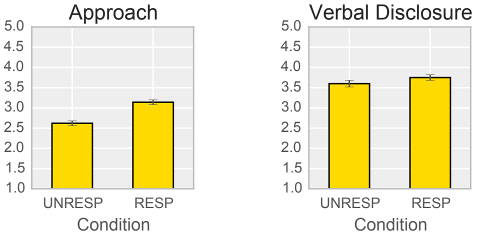

Fig. 5. Participant Behavior coding means and standard errors by condition

### D. Desire for Companionship

To discover whether differences existed between the responsive and unresponsive conditions in participants' desire for robot companionship when alone or under stressful circumstances, an independent-sample t-test was performed. This t-test yielded the expected effect, $t(100) = 2.07, p < .05$, Cohen's $d = .41$, 95% CI for Cohen's $d(.02, .80)$: Participants were more interested in robot companionship in the responsive robot condition (M = 2.20, SD = 1.11) than in the unresponsive robot condition (M = 1.79, SD = 0.88) (Figure 6).

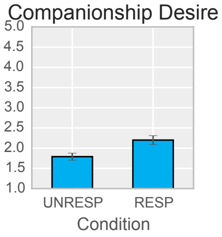

Fig. 6. Desire for Companionship means and standard errors by condition

## VII. DISCUSSION

Our results replicated the main findings of Hoffman *et al.* [13], showing that a robot can produce behaviors that are understood as it being responsive to the human. We found a larger effect size than in previous study, perhaps due to the fact that our unresponsive condition was more neutral.

Furthermore, we replicated the findings that a robot's responsiveness behavior increases perceptions of its appealing traits (Hypothesis 1a and 1b: sociability, competence), but we did not find the same for its attractiveness (Hypothesis 1c). It is possible that people tend to ascribe character traits to a nonanthropomorphic robot, but are less likely to think of it in attractiveness terms. The previous study's finding of increased attractiveness of the robot might have been due to the smaller sample used in that study.

Finally, we replicated the previous finding that the robot's responsiveness behaviors affect the robot's perceived social traits more than its competence traits, although both are significantly affected. This makes sense, as responsiveness is a predominantly social trait.

The results also support some of our additional predictions, indicating that a robot's responsiveness increases nonverbal approach behaviors towards the robot (Hypothesis 2a). We

TABLE I

Means, Standard Deviations, Statistics, and Effect Sizes of Perceptions of the Robot's Traits for the Responsive and Unresponsive Conditions. Items were on a scale of 1–7. *** $p < .001$

| | **Responsive** | | **Unresponsive** | | | | |
|---|---|---|---|---|---|---|---|
| | **M** | **SD** | **M** | **SD** | $F$ | $\eta_p^2$ | 95% CI for $\eta_p^2$ |
| Perceived Sociability | 4.45 | 0.89 | 3.10 | 1.17 | 43.19*** | 0.3 | (.16, .43) |
| Perceived Competence | 4.18 | 0.84 | 3.28 | 0.95 | 25.56*** | 0.2 | (.08, .33) |
| Perceived Attractiveness | 2.98 | 0.82 | 2.82 | 1.03 | 0.77 | 0.01 | (.08, .07) |

TABLE II

Means, Standard Deviations, Statistics, and Effect Sizes of downstream outcomes for the Responsive and Unresponsive Conditions. Items were on a scale of 1–5. ***$p < .001$, *$p < 0.05$

| | **Responsive** | | **Unresponsive** | | | | |
|---|---|---|---|---|---|---|---|
| | **M** | **SD** | **M** | **SD** | $t$ | $d$ | 95% CI for $d$ |
| Approach Behavior | 3.14 | 0.59 | 2.62 | 0.60 | 4.28*** | 0.86 | (.45, 1.3) |
| Verbal Disclosure | 3.75 | 0.71 | 3.60 | 0.83 | 0.97 | 0.19 | (.00, .08) |
| Desire for Companionship | 2.20 | 1.11 | 1.97 | 0.88 | 2.07* | 0.41 | (.02, .8) |

did not find that the robot's behavior changed the human's verbal disclosure (Hypothesis 2b). This divergence between the nonverbal and the verbal behavior is interesting, and could reflect the distance between people's rational or self-conscious attitude towards robots versus the ways that robots subconsciously affect people's behavior. It also mirrors human-human closeness patterns: In a recent human-human study, for example, participants who were manipulated to think about closeness did not report feeling closer to people they were in an intimate conversation with, but displayed closer nonverbal proxemics [25].

Hypothesis 3 was also supported. Participants significantly showed more desire for the robot's companionship when alone or during stressful events. This last finding indicates that people do not just like a robot more when it is responsive than when it is unresponsive. Instead it suggests that if a robot displays responsiveness cues, people might want these robots to serve as a haven of safety and to use them as a source of consolation in times of need.

Overall, our findings support the suggestion that the human mind utilizes responsiveness cues to ascribe social intentions not just to humans, but to some extent also to technological entities.

Given the continued support we find here for the positive effects of robot responsiveness, this work strengthens the design implication that robots serving in caregiving roles, and in particular when listening to humans' intimate events and disclosures, need to display appropriate behavior in order to support the humans' psychological needs. Furthermore, our findings suggest that responsiveness cues designed into personal robots could provide their human counterparts with a source of consolation when alone or during stressful events.

The robots' positive psychological effects also open up the possibility beyond assistive care, for example for robots interviewing people and taking testimony, especially after traumatic events such as natural disasters or violence. Given the fact that people understand that robots are not conscious, the robot's responsive behavior could provide humans with some of the psychological support they need, without being judgmental (see, also: [29]). Thus their supportive responses may validate one's experiences while providing an even more secure environment than a human interlocutor.

Moreover, robots are unlikely to arouse intimacy concerns because they do not demand intimacy. As a result, robot responsiveness may reduce defenses among insecure people. These people are often sensitive to critique or are intimidated by intimacy demands. Thus, they may be relatively relaxed when interacting with a robot that would not judge or reject them, or be emotionally demanding.

## VIII. FUTURE WORK

Previous work has established that a robot's responsive seeming behavior affects people's perception of the robot. We extended this by demonstrating that it also increases their nonverbal approach behavior toward the robot and their desire for the robot's companionship in times of stress or other need.

A next step would be to continue exploring the positive downstream effects of a responsive robot, and evaluate whether a robot's companionship can indeed reduce stress or boost confidence in a stressful situation, as well as improve performance in such situations.

We are also working on replicating our findings in a setting of positive disclosure, i.e. instead of participants recounting a negative intimate event, we want to see whether responsiveness cues affect humans who disclose a positive intimate event.

Finally, as responsiveness is closely tied to attachment processes, and previous research showed that people with different attachment personality types react differently to partners' perceived responsiveness, we want to investigate whether this interaction also occurs in human-robot relations.

## IX. CONCLUSION

To design robots for caregiving roles we need to be cognizant of the effect of their behavior on the humans they support. Given the central role responsiveness plays in human relationships, this work is a step toward understanding how responsiveness plays into human-robot relationships.

We replicated previous findings that a robot's nonverbal and verbal behavior can increase people's perception of the robot's responsiveness, and that it significantly affects their perception of the robot as a social and competent partner. We extended this by showing that the robot's behavior also increases the human's own nonverbal approach behavior (proximity, eye contact, leaning toward the robot, smiling), indicating that they seek the robot's psychological proximity to some extent. Participants who interacted with a responsive robot were then also more likely to want that robot to accompany them in a stressful situation.

Be it in assistive caregiving roles, interviewing survivors of trauma, or in any other situation where a robot might listen to a human's intimate disclosure, robots will need to be psychologically sensitive to them and behave in a manner that is supportive of their needs. With that in mind, we want to take into consideration the growing understanding we have about the effects of robot behavior on these needs when we design socially assistive robots, in order to help improve the well-being of people being cared for by these machines.

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