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On sharing and caring: Investigating the effects of a robot's self-disclosure and question- asking on children's robot perceptions and child-robot relationship formation

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A B S T R A C T

Although scholars have focused on the role of self-disclosure in the context of child-robot interaction and relationship formation, little is known as to how the effects of a robot's self-disclosure vary by the information the robot shares. Moreover, the influence of a robot's question-asking on children's perception of, and relationship formation with the robot remains understudied. We therefore investigated experimentally, with a 2 × 2 between-subjects design, how children perceive and relate to a social robot when the robot engages in (personal) self-disclosure versus (factual) self-description and when the robot does or does not ask them questions. We collected self-report data from 293 children aged 7 to 10, who interacted with the Nao robot in a science museum. The robot's question-asking increased children's trust in the robot as well as their belief in its cognitive perspective-taking abilities. Self-disclosure, in contrast, decreased children's perception of the robot's capacity to adopt their affective perspective. Children's consideration of the robot as a social actor and a potential friend did not differ across conditions. A post-hoc analysis showed that the effect of question-asking on trust was mediated by children's perception of the robot's cognitive perspective-taking abilities.

1. Introduction

Children are increasingly exposed to social robots (e.g., Brink & Wellman, 2019), which are developed for social interaction with humans (Breazeal, Dautenhahn, & Kanda, 2016). As children, in particular, tend to relate socially to non-human entities (Epley, Waytz, & Cacioppo, 2007), it is timely to gain a more profound understanding of how children's perception of, and sense of relationship with, social robots come about. While research with this purpose is often embedded in scientific disciplines like communication science (Kappas, Stower, & Vanman, 2020), much remains unknown as to how interpersonal communicative processes manifest themselves in human-robot interaction (HRI; Fox & Gambino, 2021; Westerman, Edwards, Edwards, Luo, & Spence, 2020). Current social robots lack human psychological capacities (e.g., emotionality; see Damiano & Dumouchel, 2020; van Straten, Peter, Kühne, & Barco, 2020), such that not all communicative processes can currently be executed by robots in the same way as by humans – at least not without running the risk of deceiving people about social robots' actual (interpersonal) competencies (see, e.g., Scheutz, 2012). In addition, the effects of interpersonal communicative processes may differ when they are adopted by a robot rather than a human interaction partner (e.g., Westerman et al., 2020).

Research is thus needed that examines the manifestation of interpersonal processes in HRI in general and child-robot interaction (CRI) in particular. One communicative process that fosters interpersonal relationship formation, is self-disclosure (Knapp & Vangelisti, 2000). Self-disclosure can broadly be defined as the "communication of self-relevant information" (Berscheid & Regan, 2005, p. 206) and has been recommended as a robot behavior when the aim is to foster long-term CRI (Leite et al., 2014) and child-robot relationship formation (Kahn et al., 2010). However, while several CRI studies have aimed to elucidate whether and how a robot's self-disclosure affects children's perception of, and relationship formation with social robots (Burger, Broekens, & Neerincx, 2016; Gallego Prez, Hiraki, Kanakogi, & Kanda, 2019; Kanda, Sato, Saiwaki, & Ishiguro, 2007; Kory Westlund & Breazeal, 2019; Ligthart, Neerincx, & Hindriks, 2020; Ligthart, Neerincx, & Hindriks, 2019; Shiomi, Kanda, Howley, Hayashi, & Hagita, 2015; van der Drift, Beun, Looije, Blanson Henkemans, & Neerincx, 2014), it is still unclear how the particular content of the disclosed information affects children's social responses to robots.

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Another communicative process, which is particularly central to get-acquainted interactions (e.g., Douglas, 1990), is question-asking. Yet, the effects of robots' question-asking on children's perception of, and sense of relationship formation with, social robots are understudied. Two CRI studies by Leite and colleages (2016, 2017) suggest that children aged 7 to 10 are both more critical about, and more sensitive to, elements of a robot's discourse than children aged 4 to 6. These findings dovetail with developmental research which shows that children become increasingly sensitive to discourse flexibilities and social conventions in middle childhood (Stafford, 2004). In this developmental period, a robot's self-disclosure and question-asking may thus affect children's perception of, and relationship with, that robot.

Research on child-robot relationship formation is still at a relatively early stage (e.g., Stower, Calvo-Barajas, Castellano, & Kappas, 2021). Accordingly, it is not fully clear yet to what extent child-robot relationships can be compared to children's relationships with people, animals, and artifacts (see, e.g., Kory Westlund, Park, Williams, & Breazeal, 2018). In this context, assessing how children perceive social robots (i.e., in terms of characteristics and capacities) can help to interpret child-robot relationship formation. We therefore study, in a two-factorial experiment among 7- to 10-year-olds, whether a robot's self-disclosure and question-asking affect how children perceive and relate to a social robot.

2. Theoretical framework

2.1. *Self-disclosure and children's friendships with (artificial) others*

Self-disclosure is a concept central to Social Penetration Theory (Altman & Taylor, 1973), which among others describes how the mutual sharing of self-related information can facilitate the development of interpersonal relationships. Culbert (1967, as quoted in Gilbert, 1976, p. 198) defined self-disclosure as the sharing of intimate information that another person would be unlikely to obtain otherwise, and contrasted it with self-description, or conveying information "that an individual is likely to feel comfortable in revealing to most others". Archer and Berg (1978, p. 531, based on Altman & Taylor, 1973) further specify that "biographical characteristics are low in intimacy, attitudes and opinions are intermediate, and fears, self-concepts, and basic values are high in intimacy", adding that the sharing of intimate self-related information tends to express some degree of vulnerability.

Behavioral (e.g., secret-sharing, talking) and, in particular, dispositional (e.g., trust, understanding) characteristics of intimacy become increasingly important to children's friendships over primary school years (Furman & Bierman, 1984; see also; Rotenberg & Chase, 1992; Rotenberg & Mann, 1986; Rotenberg & Sliz, 1988). From about 9 years of age, children view friendship characteristics such as intimacy as an integral part of activities like self-disclosure (see Bernath & Feshbach, 1995). Although for girls, self-disclosure may earlier become central to peer friendships than for boys (see Valkenburg, Sumter, & Peter, 2011), the importance of relational intimacy to friendships continues to increase with age and may not fully emerge until midadolescence (Simpkins, Parke, Flyr, & Wild, 2006). In sum, although gradual age and gender differences can be expected between children in their engagement in and need for self-disclosure with friends, middle childhood appears to be a developmental period in which self-disclosure can meaningfully be assessed.

Several CRI studies have suggested that social robots' engagement in self-disclosure affects how children perceive and relate to such robots (Gallego Prez et al., 2019; Kanda et al., 2007; Kory Westlund & Breazeal, 2019; Ligthart et al., 2020; Ligthart, Fernhout, et al., 2019; Ligthart, Neerincx, & Hindriks, 2019; Shiomi et al., 2015; van der Drift et al., 2014). Except for Kory Westlund and Breazeal (2019), however, these studies did not manipulate self-disclosure as an isolated feature of the interaction between child and robot, so that no causal conclusions can be drawn based on their findings. Moreover, in some of these studies (i.e., Kanda et al., 2007; Ligthart, Fernhout, et al., 2019; Ligthart, Neerincx, & Hindriks, 2019; Shiomi et al., 2015; van der Drift et al., 2014), the robots shared information of low to moderate intimacy only (e.g., small talk about pets, facts about the robot's technological nature), and it may be argued that these studies investigated self-*description* rather than self-*disclosure*. However, a recent study showed that a robot's self-description (i.e., sharing of factual information about itself) is not necessarily conducive to children's perceptions of and relationship formation with a social robot (van Straten, Peter, Kühne, & Barco, 2021) – which dovetails with the findings of an experimental study among adults (Eyssel, Wullenkord, & Nitsch, 2017).

Evidence for an effect of a social robot's self-disclosure on child-robot relationship formation is still scarce and somewhat inconsistent. In the experiment by Kory Westlund and Breazeal (2019), children who had interacted with a robot that self-disclosed about its limited hearing abilities expressed a stronger desire to become friends with robots that cannot hear well than children who were not exposed to the robot's self-disclosure.[1] In contrast, an exploratory study by Burger et al. (2016) did not find a correlation between children's sense of relatedness to a virtual robot (i.e., robot avatar) and their exposure to the avatar's self-disclosure. Yet, while the intimacy of the robot avatar's disclosures was intended to increase over time, many children did not interact with the avatar often enough to be exposed to intimate disclosures. Whereas preliminary evidence was found for a correlation between children's *reciprocation* of the robot's self-disclosure and their sense of relatedness to it, the direction of this effect and potential influences of intimacy remained unclear (Burger et al., 2016).

Research among older developmental groups, in contrast, seems to more consistently suggest that self-disclosure influences human-robot relationship formation. For instance, high-school students experienced greater closeness towards, and trust in, a robot that progressively revealed feelings of worry, embarrassment, stress, and loneliness (i.e., vulnerability) than in response to a robot that conveyed only factual information (Martelaro, Nneji, Ju, & Hinds, 2016). The importance of expressing vulnerability for robots' intimate self-disclosure was also demonstrated in another study: Adults rated a robot higher in warmth when it made vulnerable rather than neutral statements (Strohkorb Sebo, Traeger, Jung, & Scassellati, 2018).

Studies on adults' interaction with agents and computers also support the relevance of artificial others' self-disclosure to human-nonhuman relationship formation. For instance, people's social attraction toward, and feelings of togetherness with, a virtual counsellor were increased by self-disclosure but not self-description (Kang & Gratch, 2011). Likewise, people felt closer to a conversational agent when they had previously engaged in reciprocal self-disclosure with it (Li & Rau, 2019). In addition, self-disclosure (and not self-description) increased people's feelings of intimacy toward a chatbot over three encounters (Y. C. Lee, Yamashita, Huang, & Fu, 2020). Research in the Computers as Social Actors paradigm has similarly shown that people felt more socially attracted toward a computer when it engaged in self-disclosure than when it did not (Moon, 2000, 2003), which also led them to engage in more extensive self-disclosure themselves (Moon, 2000). While findings among adults cannot be generalized to children, the aforementioned findings do suggest that self-disclosure has comparable effects in interactions with artificial entities and interpersonal settings.

The abovementioned studies focused on different aspects of relationship formation (e.g., social attraction, intimacy). All of these aspects overlap with two interdependent concepts that are central to interpersonal relationship formation: closeness and trust (Berscheid & Regan,

[1] In the studies by Ligthart, Fernhout, et al. (2019) and Ligthart, Neerincx, and Hindriks (2019), the robot also acknowledged its limited hearing abilities as part of an explanation of how to interact with the robot. However, this information was not a central part of the (otherwise rather superficial) self-related information that the robot provided in these studies.

2005). Closeness constitutes a feeling of intimacy and connectedness with another person that, when further developed, could lead to the establishment of friendship (Sternberg, 1987). Trust, in turn, can be defined as the belief that another person is benevolent and honest (Larzelere & Huston, 1980). Both closeness and trust are also considered primary functions of children's peer friendships (Bauminger-Zviely & Agam-Ben-Artzi, 2014). Therefore, we assess child-robot relationship formation with the concepts of closeness and trust.

In terms of children's robot perceptions, Leite et al. (2012) found that children who did not believe in a robot's ability to empathize with them often explained their answer by referring to the robot's machine nature and, by extension, it's inability to experience feelings. When a robot expresses its mechanical vulnerability through self-disclosure, a sense of *shared* vulnerability may be created (see Coeckelbergh, 2010). As a consequence, children may get the impression that even though the robot is a machine, it is able to take on the perspective of vulnerable human beings like themselves.

Eisenberg and Fabes (1998) distinguish between cognitive, affective, and perceptual perspective-taking. Cognitive perspective-taking constitutes an understanding of another person's cognitions, while affective perspective-taking refers to the ability to understand another person's emotional state. Perceptual perspective-taking concerns the capacity to take another person's perspective visually (Eisenberg & Fabes, 1998) and is arguably less central to social interpersonal understanding (see Enright & Lapsley, 1980). In the current context, the experience of shared vulnerability seems less relevant to children's perception of the robot's ability to visually imagine their spatial perspective (i.e., perceptual perspective taking) than of its capacity to understand their thoughts and feelings (i.e., cognitive and affective perspective taking). We therefore focus on children's perception of the robot's cognitive and affective perspective-taking abilities.

Finally, social presence, which can be defined as the experience of an artificial entity as a social other (K. M. Lee, 2004), is a concept that closely relates to the emergence of social relationships with non-human others. Kang and Gratch (2011), for example, found that a virtual counsellor's self-disclosure increased feelings of copresence (i.e., 'togetherness'). Social presence can also be established between human communication partners in a mediated (i.e., online) rather than a face-to-face setting: In this context, Garrison, Anderson, and Archer (1999) discuss self-disclosure as a form of emotional expression through which social presence can be increased. In sum, we therefore predict that:

Hypothesis 1. **(H1).** A robot's engagement in self-disclosure, as opposed to self-description, increases children's sense of (H1a) closeness toward and (H1b) trust in the robot, as well as children's perception of the robot's (H1c) cognitive and (H1d) affective perspective-taking ability and (H1e) social presence.

2.2. *Question-asking and self-disclosure*

Question-asking is a basic social skill that helps to maintain a reciprocal conversation (Koegel, Park, & Koegel, 2014). Uncertainty Reduction Theory posits that asking questions is of particular importance to initial interactions: it can be used to gain information and reduce uncertainty about the other, which is crucial to the emergence of social relationships (Berger & Calabrese, 1975; Douglas, 1990). In a study on get-acquainted interactions, Huang, Yeomans, Brooks, Minson, and Gino (2017) found that the positive effects of being asked many (as opposed to few) questions on people's self-reported liking of their interaction partner could be explained by the fact that question-asking invites people to talk about themselves: People enjoy telling others about themselves and being asked many questions makes them like their interaction partner more. In addition, when people ask each other questions, this conveys that they are interested in, and care for, the person they address the questions to, which is conducive to interpersonal relationships (Cortes & Wood, 2019).

In a recent CRI study, Ceha et al. (2019) found that children perceived a robot that asked questions about the topic of the conversation to be more curious than a robot that did not ask questions, which suggests that children are sensitive to a robot's question-asking. When a robot asks children questions about themselves, this may thus convey to children that the robot wants to get to know them better. However, an exploratory study by Kruijff-Korbayova et al. (2014) showed that diabetic children's perception of a robot, as well as their relationship to it, were unaffected by the robot asking the children questions about themselves (e.g., related to hobbies and dealing with diabetes). Still, children who were asked such questions by the robot were more interested in having a second conversation with it, and the authors acknowledge that additional research on the topic is required (Kruijff-Korbayova et al., 2014). In an experiment among adults, however, Eyssel et al. (2017) found no effects of a robot asking personal as compared to factual questions on peoples liking of, trust in, and willingness to interact again with a robot. Despite these somewhat inconsistent research findings, we expected that question-asking will foster child-robot relationship formation in terms of closeness and trust given the general importance of question-asking to interpersonal impressions and, thus, relationship formation (Cortes & Wood, 2019; Huang et al., 2017).

Research has also shown that question-asking helps people to understand their interlocutor's perspective (Tidwell & Walther, 2002). We thus expected that children may get the impression that the robot is more capable of taking their cognitive and affective perspective when it asks them questions. Finally, question-asking is a way of being responsive to one's interaction partner (see Huang et al., 2017). Responsiveness, or the degree to which one responds appropriately to one's conversation partner (Davis & Perkowitz, 1979), in turn, has been argued to contribute to the experience of social presence (Biocca, Harms, & Gregg, 2001). We, therefore, expected that question-asking would increase children's perception of the robot's social presence. In sum, our second hypothesis posited:

Hypothesis 2. **(H2).** A robot's engagement in question-asking increases children's sense of (H2a) closeness toward and (H2b) trust in the robot, as well as children's perception of the robot's (H2c) cognitive and (H2d) affective perspective-taking ability and (H2e) social presence.

Derlega and colleagues (1993, as discussed in Collins & Miller, 1994), argued that "disclosing to another communicates that we trust that person to respond appropriately, that we value his or her opinions and responses, [and] that we are interested in knowing them *and* having them know us" (Collins & Miller, 1994, p. 471, emphasis added). Self-disclosure thus suggests an interest not only in talking about oneself but also in hearing about the other. As a consequence, the effects of self-disclosure may partly depend upon the robot's question-asking. That is, when the robot shares self-related information (of any kind) during the interaction, children may expect that it is also interested in getting to know them. When the robot engages in self-disclosure and shares intimate (as opposed to factual) information about itself, this expectation may intensify: In this condition, the robot shares more about itself (i.e., in terms of the *significance* of the information being provided) and children's expectation of receiving return questions may grow. Not receiving such questions may weaken the positive effects of self-disclosure as previously hypothesized. We thus expected that a robot's question-asking moderates the effect of self-disclosure on the outcome variables. Our third and final hypothesis thus stated:

Hypothesis 3. **(H3).** The effects of a robot's engagement in self-disclosure, as opposed to self-description, on children's sense of (H3a) closeness toward and (H3b) trust in the robot, as well as children's perception of the robot's (H3c) cognitive and (H3d) affective perspective-taking ability and (H3e) social presence will be stronger when the robot also engages in question-asking. In contrast, when a robot does not ask questions, the effects of the robot's self-disclosure will be weaker.

3. Method

We conducted a two-factorial experiment with two between-subject factors: self-disclosure (versus self-description) and question-asking (yes/no). This resulted in four experimental groups to whom the robot either self-disclosed or self-described and either did or did not ask questions. Before we started collecting the data, ethical approval was obtained from the Ethics Review Board of the Faculty of Social and Behavioral Sciences of the University of Amsterdam.

3.1. Participants

Data collection took place at the Research and Development Lab of NEMO Science Museum Amsterdam. Active informed consent was obtained from parents, who were given an information sheet explaining the content and procedure of the study. The information sheet also explained to parents that we would like to be informed about any medical condition their child might have because data from children with conditions that could interfere with the experimental manipulation might be excluded from the analyses.

In total, we collected data from 308 children aged 7–10 years old. The data of fifteen children had to be excluded from analyses for the following reasons: The questionnaire being too difficult (seven children), the child's relatives or companions interfering during the study (four children), robot malfunctions (one child), and diagnosis with Autism Spectrum Disorder (ASD; three children). As children with ASD tend to face difficulties with respect to social interactions (American Psychological Association, 2013) and the engagement in peer friendships (e.g., Eisenmajer et al., 1996), data from these children may not be representative of the broader population. A few children had difficulty answering particular items of the questionnaire. In this case, they were excluded from the analysis of the measure in question. We ultimately analyzed the data of 293 children (131 girls, $M_{age} = 9.04$, $SD_{age} = 1.09$), who were randomly assigned to the experimental groups. The randomization procedure was successful: We found no significant differences in children's biological sex ($\chi 2$ (3, $N = 293$) $= 2.947$, $p = .400$) or age F (3, 289) $= 0.933$, $p = .425$ across the groups.

3.2. Interaction task and manipulation

Each child engaged in one interaction of about 3–4 minutes with the Nao robot (Softbank). We kept the interaction as short as possible. The entire study procedure (informed parental consent, introduction, CRI, questionnaire, and debriefing) took no longer than 15–20 minutes per child and thus interfered minimally with their museum visit. The interaction consisted of the child asking the robot eight pre-determined questions from a question sheet (e.g., "How old are you?", "Do you have brothers and sisters?"). In designing the questions, we drew on the questions that children who participated in earlier data collections (see van Straten, Kühne, Peter, de Jong, & Barco, 2020; van Straten, Peter, Kühne, & Barco, 2020) had asked during their interaction with the robot or the debriefing phase. Children who had difficulty reading the questions were helped by the experimenter.

To ensure that we assessed the effects of the robot's self-disclosure and question-asking rather than the effects of a social interaction more generally, any behavior of the robot that could have provided children with social cues was avoided during the interaction (e.g., it stood completely still without blinking, and did not conform to social conventions such as greetings). In the self-description condition, the robot's answers to children's questions only contained factual information (e.g., "In some time from now there will of course be newer robots, but no younger ones"). In the self-disclosure condition, the robot revealed 'intimate' information to the child that emphasized its mechanical vulnerability (e.g., "If I begin to malfunction, the researchers will replace me by a newer robot"). In addition, in the self-disclosure condition, the robot regularly used expressions emphasizing exclusivity (e.g., "I usually don't talk about this, but …").

The information that the robot provided in the self-disclosure condition was generally less positive than the information in the self-description condition. While it is possible to engage in positive self-disclosure, positive topics that typically create vulnerability are not applicable to robots (e.g., one could disclose about one's sexual preferences, which does not constitute negative information but creates vulnerability). Based on the findings presented by Moon (2000), we assumed that it would be sufficient for the robot to express its technological vulnerabilities. Following the approach by Kory Westlund and Breazeal (2019), the disclosed information thus accurately reflected the robot's limited capacities. We expected that children would not feel comfortable with engaging in self-disclosure themselves, as their relatives and companions could stay present during the experiment. Therefore, we followed Kory Westlund and Breazeal's (2019) approach in having the robot self-disclose to the children without encouraging children to reciprocate this behavior by engaging in self-disclosure themselves.

In the question-asking condition, the robot's answers to four of the questions were followed by a question to the child (e.g., "And you? How old are you?", "What sport do you like to play?") and a short response from the robot to the child's answer (e.g., "So you're quite grown-up already!"). To prevent children from getting the impression that the robot empathized with their response – which may interfere with the manipulation of self-disclosure – the robot always replied to children's responses as neutrally as possible. To limit the difference in interaction length across conditions, we only let the robot pose four return questions rather than having it pose a question after each of the child's questions. We also ensured that the robot's responses to children's questions were comparable in length across conditions. While we thus controlled for influences of interaction length across the self-disclosure and self-description conditions, interactions are inevitably longer when both interaction partners actively engage in the conversation by asking and answering questions. We discuss this point in the section "Analytical approach" (see below).

3.3. Procedure

After parents had given their active consent, children were handed an information sheet that introduced them to the study. The information sheet explained, in age-appropriate language, that they were to have a short conversation with the robot (shown in a picture), that results would be presented in an anonymized way, and that they could stop their participation at any point without providing a reason. Once they had read the information sheet – if necessary, with the help of a parent – they were given the opportunity to pose any further questions. Questions that could not be answered without potentially influencing the study outcomes were postponed until the debriefing phase.

The experiment was conducted in a room that was separated from the main hall of the museum by glass doors. The robot was activated before children entered the room. Upon entering, the experimenter introduced herself and asked relatives and companions that wished to stay in the room not to interfere with the study. Next, the child was asked to take a seat on the floor in front of the robot, at a distance s/he felt comfortable with. The experimenter then asked for the child's verbal consent. If the child still wanted to participate, s/he was handed the question sheet. The experimenter instructed the child to pose the questions, one by one and in the right order, to the robot. She introduced the robot as Nao and told the children who were to be exposed to the question-asking condition that Nao would ask them some questions as well.

The study relied upon a Wizard of Oz (WOZ) approach, in which the robot is externally controlled. Once children had no further questions, the experimenter told them that they could start asking the first question and took up position behind a laptop, out of the children's direct line of sight, to control the robot from a distance. At the end of the interaction, the robot was put in standby mode (i.e., seated position). The experimenter then asked the child to join her at a table to fill out the questionnaire together. During the questionnaire, the WOZ equipment was out of children's direct sight. Following Leite et al. (2017), the experimenter introduced children to the question format and the answer scale and then took them through some practice items (e.g., "I like candy", "I like Brussel's sprouts") to familiarize them with the question format and the answer scale. Once the child understood the procedure, the experimenter started the questionnaire.

When the questionnaire was finished, children watched a debriefing video on a tablet. In this video, we demonstrated the robot's machine nature, and explained how robots differ from humans. We revealed the WOZ set-up and the preprogrammed nature of the interaction and explained the manipulations and goals of the study in child-appropriate language. Finally, we answered any further questions and gave children the opportunity to take a picture together with the robot before leaving the experimental room.

3.4. Measures

The questionnaire consisted of closed-ended questions that children answered on a five-point Likert scale running from "does not apply at all" to "applies completely". We used the visualized answer scale by Severson and Lemm (2016), in which bars of increasing height clarify the meaning of the verbal answer options without informing children about the social desirability of the answers (e.g., using colors or smileys). The same answer scale has been successfully used in previous data collections among children of a similar age (e.g., van Straten, Kühne, Peter, de Jong, & Barco, 2020; van Straten, Peter, Kühne, & Barco, 2020). The questionnaire started with a measure of social presence, followed by measures of closeness, trust, cognitive perspective-taking, and affective perspective-taking, and finished with a treatment check. We organized the measures such that earlier ones would minimally influence those administered after. All measures, including the treatment check, used the same answer scale. The full questionnaire can be consulted in Appendix A.

3.4.1. Treatment check

The first part of the treatment check tapped into the manipulation of self-disclosure. It contained six items that assessed children's information recall, asking whether Nao had addressed certain topics during the interaction. Items one, four, and five referred to the self-description condition, while items two, three, and six referred to the self-disclosure condition. This question order was intended to prevent children from identifying the correct answer pattern based on logical reasoning. In addition, it prevented them from having to indicate that they did not recall the information in the items three times in a row, which might make them hesitate to answer truthfully.

For analyses purposes, the items were combined into two three-item scales (i.e., of self-description recall and self-disclosure recall). The self-description items loaded onto one factor explaining 35% of the variance (principal axis factoring, direct oblimin rotation; this type was used for all analyses). The scale's internal consistency was sufficient (α = .61). We averaged the items to compute an index score of self-description recall (M = 3.53, SD = 1.11, skewness = −0.381, kurtosis = −0.637). The scale comprised of items referring to self-disclosure had a one-factorial structure that explained 67% of the variance. The scale was internally consistent (α = .86). We computed an index score of self-disclosure recall (M = 3.05, SD = 1.50, skewness = −0.085, kurtosis = −1.522).

The second part of the treatment check consisted of three items that asked about the interaction content on a more general level. The first of these items addressed question-asking, while the second and third item tapped into self-disclosure. We only included one item to assess question-asking, as it is relatively easy to grasp whether children noticed the robot's question-asking behavior. The latter two items were included to assess whether children in the self-disclosure condition not only recalled what Nao had said but also were able to distill the vulnerable and exclusive nature of the disclosed information. These items were combined into a scale. The Spearman-Brown coefficient, which can be used to determine the reliability of two-item scales (Eisinga, teGrotenhuis, & Pelzer, 2013) was .68, and an index score for this second part of the self-disclosure treatment check was computed (M = 2.90, SD = 1.29, skewness = 0.082, kurtosis = −1.143).

3.4.2. Closeness

We assessed closeness through a five-item CRI scale that we developed and validated among children in a similar age range (van Straten, Kühne, Peter, de Jong, & Barco, 2020). The factor analysis confirmed its one-factorial structure for the present sample, which explained 56% of the variance. The scale was internally consistent (α = .86). An index score of closeness was computed by averaging the items (M = 3.52, SD = 0.79, skewness = −0.177, kurtosis = −0.024).

3.4.3. Trust

To assess trust, we used a four-item scale adapted from Larzelere and Huston (1980). The one-factorial structure of the scale explained 48% of the variance. The internal consistency of the scale was good (α =.76). We computed an index score of trust by averaging the items (M = 3.97, SD = 0.71, skewness = −0.617, kurtosis = 0.646).

3.4.4. Cognitive perspective-taking

Inspired by Leite et al. (2014) and Plank, Minton, and Reid (1996), we developed a four-item measure of cognitive perspective-taking. The items loaded onto one factor that explained 43% of the variance. The scale had good internal consistency (α =.75). We averaged the items to calculate an index score of cognitive perspective-taking (M = 3.20, SD = 0.79, skewness = −0.166, kurtosis = −0.143).

3.4.5. Affective perspective-taking

We developed a four-item scale of affective perspective-taking – again inspired by Leite et al. (2014) and Plank et al. (1996). The factor analysis showed that the items loaded onto one factor explaining 56% of the variance. The scale was internally consistent (α = .83). An index score of affective perspective-taking was computed by averaging the items (M = 3.35, SD = 0.88, skewness = −0.405, kurtosis = −0.013).

3.4.6. Social presence

Social presence was assessed through a four-item scale inspired by an adult measure of the concept used by Heerink and colleagues (2010). The one-factorial structure of the scale was confirmed for our sample and explained 42% of the variance. The scale had good internal consistency (α = .73). We computed an index score of social presence by averaging the items (M = 3.32, SD = 0.77, skewness = −0.135, kurtosis = 0.233).

3.5. Analytical approach

We analyzed the data using SPSS Statistics (version 25). We considered the data to be normally distributed when skewness and kurtosis were between −2 and 2 (George & Mallery, 2010). The assumption of normality was met for all dependent variables. Except for the first part of the treatment check (i.e., self-description and self-disclosure recall), the assumption of homoscedasticity was also met for all variables. The hypotheses were tested through a series of ANCOVAs with self-disclosure and question-asking as predictors and closeness, trust, cognitive and affective perspective-taking, and social presence as dependent variables (see next paragraph for information on covariates). The treatment checks were performed in a similar fashion.

When the assumption of homoscedasticity was violated, we employed the heteroskedasticity-consistent standard error HC3 (Hausman & Palmer, 2012) and consulted the parameter estimates with robust standard error. As the results proved to be stable, we report the ANCOVA outcomes rather than the parameter estimates.

In all the ANCOVAs (i.e., treatment checks and tests of hypotheses), we controlled for potential influences of mistakes in controlling the robot (e.g., ill-timed robot questions and responses) on our analyses. However, we did not control for interaction length. On the one hand, a longer conversation with the robot may cause children to form different robot perceptions than a shorter one. On the other hand, interaction length may be an unavoidable consequence of question-asking (i.e., as question-asking by definition prolongs the interaction). If longer interactions are an unavoidable consequence of question-asking, interaction length should positively and rather strongly correlate with question-asking. Indeed, we found a significant and strong positive correlation of interaction length with question-asking (r = .663, p < .001). This finding suggests that increased interaction length presents an inherent, unavoidable, meaningful aspect of question-asking rather than a confound.

4. Results

4.1. Treatment checks

Children in the self-disclosure condition more often recalled that the robot had provided them with the information presented in this condition (M = 4.31, SD = 0.76) than children in the self-description condition (M = 1.82, SD = 0.90). The difference was strong and significant, F (1, 288) = 643.044, p < .001, part. η^2 = .69. Conversely, children in the self-description condition more often recalled that the robot had provided them with the information described in the statements that were representative of this condition (M = 4.26, SD = 0.71) than children in the self-disclosure condition (M = 2.79, SD = 0.93). The difference was significant, F (1, 288) = 229.996, p < .001, part. η^2 = .44.

Children in the question-asking condition more often agreed with the statement that the robot had asked them questions during the interaction (M = 4.42, SD = 0.91) than children in the condition in which the robot did not pose any questions (M = 1.60, SD = 0.87). This difference was strong and significant, F (1, 286) = 691.512, p < .001, part. η^2 = .71. Children in the self-disclosure condition confirmed more often that the robot had shared exclusive, vulnerable information with them (M = 3.86, SD = 0.92) than children in the self-description condition (M = 1.95, SD = 0.82). This difference, too, was significant F (1, 287) = 356.622, p < .001, part. η^2 = .55. In addition, we unexpectedly found that children in the question-asking condition indicated more often that the robot had shared exclusive, vulnerable information with them (M = 3.05, SD = 1.31) than children who were not asked questions by the robot (M = 2.74, SD = 1.26). This difference was significant, F (1, 287) = 6.900, p = .009, part η^2 = .02.[2] There were no interaction effects on any of the treatment checks. As the manipulations overall worked as intended, we considered the treatment checks successful.

4.2. Tests of hypotheses

Table 1 provides an overview of the means and standard deviations for the dependent variables per factor level. According to H1, self-disclosure, as opposed to self-description, increases children's (H1a) closeness toward and (H1b) trust in the robot, as well as children's ratings of the robot's (H1c) cognitive and (H1d) affective perspective-taking abilities and (H1e) social presence. In contrast to what H1 predicted, children's feelings of closeness and trust were unaffected by the robot's self-disclosure, F (1, 288) = 0.286, p = .593, part. η^2 = .00 and F (1, 288) = 0.002, p = .964, part. η^2 = .00 respectively. Self-disclosure did not have an effect on cognitive perspective-taking, F (1, 286) = 0.224, p = .636, part. η^2 = .00. Contrary to our expectation, children rated the robot higher in affective perspective-taking in the self-description condition than in the self-disclosure condition, F (1, 288) = 4.107, p = .044, part. η^2 = .01. Children's ratings of the robot's social presence did not differ across these conditions, F (1, 288) = 0.268, p = .605, part. η^2 = .00. Thus, H1 was not supported.

Table 1
Means and standard deviations of dependent variables per factor level

	No question-asking	Question-asking	Self-description	Self-disclosure
Closeness	M = 3.49 SD = 0.78	M = 3.55 SD = 0.81	M = 3.54 SD = 0.80	M = 3.50 SD = 0.79
Trust	$M = 3.85^a$ SD = 0.76	$M = 4.09^a$ SD = 0.64	M = 3.97 SD = 0.71	M = 3.98 SD = 0.70
Cognitive perspective-taking	$M = 3.06^a$ SD = 0.74	$M = 3.34^a$ SD = 0.82	M = 3.22 SD = 0.82	M = 3.19 SD = 0.77
Affective perspective-taking	M = 3.28 SD = 0.88	M = 3.42 SD = 0.87	$M = 3.45^b$ SD = 0.90	$M = 3.25^b$ SD = 0.85
Social presence	M = 3.28 SD = 0.76	M = 3.36 SD = 0.79	M = 3.29 SD = 0.80	M = 3.35 SD = 0.74

Note. For each row, means with superscripts in common differ significantly from each other at at least p < .05 when compared between 'no question-asking' and 'question-asking', and 'self-description' and 'self-disclosure' respectively.

According to H2, question-asking increases children's (H2a) closeness toward and (H2b) trust in the robot, as well as children's ratings of the robot's (H2c) cognitive and (H2d) affective perspective-taking abilities and (H2e) social presence. Whereas children's feelings of closeness were not affected by question-asking, F (1, 288) = 0.484, p = .487, part. η^2 = .00, children in the question-asking condition had greater trust in the robot than children who were not asked questions by the robot, F (1, 288) = 8.903, p = .003, part. η^2 = .03. In addition, children in the question-asking condition rated the robot higher in cognitive perspective-taking than children who were not asked questions, F (1, 286) = 10.762, p = .001, part. η^2 = .04. Question-asking neither affected children's affective perspective-taking ratings, F (1, 288) = 1.983, p = .160, part. η^2 =0.01, nor their ratings of the robot's social presence, F (1, 288) = 1.085, p = .298, part. η^2 = .00. In sum, H2 was partly supported.

Finally, H3 predicted that the effects of a robot's engagement in self-disclosure, as opposed to self-description, on children's sense of (H3a) closeness toward and (H3b) trust in the robot, as well as children's perception of the robot's (H3c) cognitive and (H3d) affective perspective-taking ability and (H3e) social presence, would be stronger when the robot also asked questions. In contrast, when the robot would not ask questions, the effects of the robot's self-disclosure were expected to be weaker. However, no interaction effects were found for closeness, F (1, 288) = 0.374, p = .541, part. η^2 = .00, trust, F (1, 288) = 0.227, p = .634, part. η^2 = .00, cognitive perspective-taking, F (1, 286) = 0.643, p = .423, part. η^2 = .00, affective perspective-taking, F (1, 288) = 0.241, p = .624, part. η^2 = .00, and social presence, F (1, 288) = 2.055, p = .153, part. η^2 = .00. H3 was not supported.

4.3. Explorative post-hoc mediation analysis

As outlined earlier, the findings of previous research did not allow us to meaningfully predict mediation patterns between the variables we investigated. However, the significant effects of question-asking on both children's trust in the robot and their perceptions of the robot's

[2] This treatment check consisted of two items: "Nao told me things that aren't nice for Nao" and "Nao told me things that Nao doesn't tell others". Upon further inspection, question-asking only had a significant effect on the first item (F(1,282) = 8.993, p = .003, part. η^2 = .03). We have no substantive explanation for this finding.

cognitive perspective-taking abilities empirically support the possibility that children's trust in the robot was mediated by their perception of its ability to understand their thoughts. To explore this possibility, we performed a post-hoc mediation analysis using Hayes' PROCESS macro (model 4, 5000 bootstrapped samples), controlling for mistakes in operating the robot and self-disclosure. In the model, both the effects of question-asking on perceived cognitive perspective-taking, $b = 0.305$, $SE = 0.093$, $p = .001$, [95% CI 0.121; 0.488], and the effect of perceived cognitive perspective-taking on trust, $b = 0.357$, $SE = 0.049$, $p < .001$, [95% CI 0.261; 0.452], were significant. Taken together, the effect of question-asking on trust through perceived cognitive perspective-taking was significant, $ab = 0.109$, $SE = 0.038$, [95% CI 0.039; 0.190]. In contrast, the direct effect of question-asking on trust that we found in the main analyses was no longer significant in the mediation model, $b = 0.141$, $SE = 0.078$, $p = .073$, [95% CI -0.013; 0.294].

5. Discussion

This study aimed to investigate experimentally whether a social robot's self-disclosure and question-asking would influence children's perception of, and relationship formation with, a robot in terms of closeness, trust, cognitive and affective perspective-taking, and social presence. We found that question-asking increased children's trust in the robot and led them to perceive the robot as more capable of cognitive perspective-taking. Contrary to our prediction, self-disclosure *decreased* children's ratings of the robot's affective perspective-taking abilities. Neither question-asking nor self-disclosure affected children's feelings of closeness toward the robot or their experience of its social presence. Thus, while self-disclosure and question-asking influenced children's reasoning about their relationship with the robot, their experience of the robot as a socially present actor that they could befriend remained unaffected. Finally, a post-hoc analysis showed that the effect of question-asking on children's trust in the robot was mediated by their belief in the robot's cognitive perspective-taking abilities.

As posited in Uncertainty Reduction Theory (URT; Berger & Calabrese, 1975), asking questions is an important way in which people gain information to reduce uncertainty about each other in initial interactions. Therefore, it makes sense that children perceived the robot as more capable of understanding their thoughts (i.e., taking their cognitive perspective) when it had asked them questions during the interaction. In addition, URT postulates that uncertainty reduction is central to the development of interpersonal relationships (Berger & Calabrese, 1975). In line with this idea, the finding that children's perception of the robot's cognitive perspective-taking abilities mediated their level of trust in the robot suggests that children's perception of a robot's reduced uncertainty about them may advance child-robot relationship formation. It is important to keep in mind that we had kept the robot's responses to children's answers as neutral and concise as possible. On the one hand, this explains why question-asking did not increase children's ratings of the robot's *affective* perspective-taking abilities: the neutrality of its acknowledgements did not contain any sign of affective understanding. On the other hand, a minimum level of responsiveness appears to suffice for children to believe that a robot can share their *cognitive* perspective.

Self-disclosure reduced affective perspective-taking, while cognitive perspective-taking and trust remained unaffected. The negative effect of self-disclosure on children's perception of the robot's affective perspective-taking may signal the violation of a social convention. That is, over-disclosing during initial encounters can be interpreted as a maladjustment: the discloser is perceived to share too much too soon (Collins & Miller, 1994). As described by Kennedy, Meese, and van der Nagel (2016), oversharing can cause feelings of discomfort because one may feel obliged to reciprocate the other's self-disclosure although one considers the level of sharing inappropriate. In turn, we can express our discomfort and disapproval of the other's disclosure by choosing not to reciprocate (Kennedy et al., 2016) – a choice that may in fact be easier to make when interacting with an artificial entity.

In the present study, we observed that children never shared private information with the robot in response to the information it provided or the questions it posed. The factual nature of the robot's questions (e.g., "What's your favorite color?") may not have invited the sharing of personal thoughts and feelings. In the self-disclosure condition, children may, in addition, have felt uncomfortable with the information disclosed by the robot. This may explain why children exposed to self-disclosure rated the robot lower in affective perspective-taking capacities: Its inability to pick up their discomfort may have decreased their belief that the robot understood their feelings.

The fact that children did not reciprocate the robot's disclosures may also explain absent effects of self-disclosure. Burger et al. (2016) found a correlation between the amount of self-related information children shared with a robot avatar and their sense of relatedness to it. Similarly, Ligthart, Fernhout, et al. (2019) reported that children's perception of the amount of self-related information they shared with a robot predicted their positive affect change over the course of their interaction with the robot. Rather than anything the robot does or does not do, children's sense of closeness may thus depend on children's own sharing of self-related information. This idea dovetails with Ho, Hancock, and Miner's (2018) finding that people evaluated their relationship to a chatbot, as well as its ability to understand them, more positively after engaging in one-way emotional as compared to factual disclosure toward the chatbot.

Perhaps, then, artificial entities do not need to reciprocate people's self-disclosure for people to experience a social relationship with them. This may signal an important difference between the manifestation of self-disclosure in interpersonal contexts on the one hand and in interactions with artificial others (e.g., social robots) on the other hand. Social Penetration Theory (Altman & Taylor, 1973), for example, centers on the effects of *mutual* self-disclosure on the development of interpersonal relationships (for an illustration of the importance of mutuality to interpersonal relationship formation, see also Sprecher & Treger, 2015). Thus, if children's contributions are indeed more important than those of robots in determining CRI outcomes, findings on self-disclosure in research on interpersonal communication may not directly transfer to CRI. In this context, Westerman et al. (2020) have argued that while parallels may exist between interpersonal and human-machine relationship formation, the applicability of interpersonal communication theories depends on the context and type of relationship at hand (Westerman et al., 2020).

Fox and Gambino (2021, p. 5) go one step further, arguing that interpersonal theories are "likely unsuitable" to the study of people's interactions and relationships with social robots because of robots' shortcomings as humanlike social actors. Our findings suggest that some interpersonal processes may play a similar role in child-robot relationship formation as they do in the establishment of relationships between humans. At the same time, the absence of several expected findings may also point to the different manifestation of interpersonal concepts and principles in a CRI context. By studying the direct effects of self-disclosure and question-asking on children's perceptions of and relationship formation with a social robot, our study initially helps clarifying how interpersonal theory can be applied to CRI settings. Future work may build upon our findings to elucidate more complex relationships between CRI-related concepts, which eventually may allow CRI research to move from the application of interpersonal theories toward the development of CRI-specific ones (see also Fox &

Gambino, 2021, on HRI).

Our study has at least three limitations. First, some children who had been exposed to self-disclosure pointed out that although the robot had indicated the exclusiveness of the information it provided them with (e.g., "I usually do not tell this to children, but …"), they doubted this to be true (e.g., because many children participate in the same experiment or because robots cannot decide for themselves what they do or do not tell). Thus, the absence of self-disclosure effects on any outcome variable other than affective perspective-taking may result from children's skepticism about the actual exclusiveness of the disclosed information, if not from the alternative abovementioned explanations.

Second, the interaction task that was used did not encourage children to reciprocate the robot's self-disclosure, which may explain the absence of the expected effects. We opted for having the robot engage in unidirectional self-disclosure because we expected that children would not feel comfortable with engaging in self-disclosure themselves in the presence of their relatives and companions. However, we encourage future researchers to pursue this issue further.

Third and finally, in the question-asking conditions, children provided rather concise responses to the robot. The experimental set-up may have prevented them from engaging in more elaborate self-description. In addition, to create sufficient difference between the self-disclosure and self-description conditions, the robot's responses to children's questions had to be quite elaborate. As a consequence, several children pointed out that the robot provided rather lengthy responses to the questions as compared to their own replies. As an interaction partner's excessive responses to questions can frustrate the listener (Berger & Calabrese, 1975; Davis, 1982), the robot's lengthy answers may have influenced our findings.

Against this background, we have three suggestions for future research. First, studies on the effects self-disclosure in a CRI context should create an interaction task that more actively encourages children's own contributions to the interaction. Instead of posing each other questions, the child and robot could, for instance, take turns telling each other about pre-determined topics. This approach has widely been used in social-psychological research (see Aron, Melinat, Aron, Vallone, & Bator, 1997; Sedikides, Campbell, Reader, & Elliot, 1999 for interaction tasks designed to induce interpersonal closeness).

Second, the effects of question-asking could further be elucidated by having the robot pose questions of varying intimacy. We refrained from having the robot pose more private questions as we did not want to make the children feel uncomfortable. Longitudinal research could, however, increase the intimacy of the robot's questions over encounters to prevent this. Third, longitudinal studies with a repeated-interaction design may also help to better understand the effects of self-disclosure. Although self-disclosure, as opposed to self-description, can already foster closeness and liking in initial encounters (see, e.g., Collins & Miller, 1994), a shift from self-description to self-disclosure usually occurs as a relationship develops (Gilbert, 1976). A longitudinal research design may investigate whether children respond differently to a robot's self-disclosure after their initial encounter with it.

In conclusion, we found question-asking to be conducive to child-robot relationship formation in terms of children's trust in the robot, and to increase children's belief in its cognitive perspective-taking abilities. Upon further inspection, perceived cognitive perspective-taking mediated the effect of question-asking on trust. Self-disclosure had an adverse effect on perceived affective perspective-taking. Children did not differ in their consideration of the robot as a socially present actor and potential friend, regardless of the condition they were exposed to.

Author contributions

Caroline L. van Straten (CS), Jochen Peter (JP), Rinaldo Kühne (RK), & Alex Barco (AB); CL: conceptualization, methodology, data collection, analysis, writing (original draft preparation), writing (review & editing). JP: conceptualization, methodology, analysis, writing (review & editing), funding acquisition, RK: conceptualization, methodology, analysis, writing (review & editing). AB: conceptualization, methodology, writing (review & editing)

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Questionnaire

Table A1
Social Presence

Item	Dutch	Backtranslations into English
1	Toen ik met Nao aan het praten was, voelde het alsof Nao een echt mens was.	When I was talking to Nao, it felt as though Nao was a real person.
2	Toen ik met Nao aan het praten was, voelde het alsof ik met een mens praatte.	When I was talking to Nao, it felt as though I was talking to a person.
3	Toen ik met Nao aan het praten was, leek Nao net een echt mens te zijn.	When I was talking to Nao, Nao nearly seemed to be a real person.
4	Toen ik met Nao aan het praten was, voelde het alsof ik samen met een mens was.	When I was talking to Nao, it felt as though I was with a person.

Table A2
Closeness

Item	Dutch	Backtranslations into English
1	Nao is een vriendje.	Nao is a friend.
2	Ik voel me op mijn gemak als ik met Nao ben.	I feel comfortable around Nao.
3	Nao en ik zijn vriendjes aan het worden.	Nao and I are becoming friends.
4	Nao en ik passen goed bij elkaar.	Nao and I are a good match.
5	Nao voelt als een vriendje voor mij.	Nao feels like a friend to me.

Table A3
Trust

Item	Dutch	Backtranslations into English
1	Ik heb het gevoel dat ik Nao kan vertrouwen.	I feel that I can trust Nao.
2	Ik heb het gevoel dat Nao een geheim van mij kan bewaren.	I feel that Nao can keep one of my secrets.
3	Ik heb het gevoel dat Nao eerlijk is.	I feel that Nao is honest.
4	Ik heb het gevoel dat te vertrouwen is.	I feel that Nao is trustworthy.

Table A4
Cognitive Perspective-Taking

Item	Dutch	Backtranslations into English
1	Nao snapt hoe ik over dingen denk.	Nao gets how I think about things.
2	Nao begrijpt waarom ik over dingen denk zoals ik dat doe.	Nao understands why I think about things the way I do.
3	Nao weet wat ik denk, ook al vertel ik dat niet.	Nao knows what I'm thinking of, even though I don't tell.
4	Nao begrijpt mijn gedachten.	Nao understands my thoughts.

Table A5
Affective Perspective-Taking

Item	Dutch	Backtranslations into English
1	Nao snapt hoe ik mij voel.	Nao gets how I feel.
2	Nao begrijpt waarom ik mij voel zoals ik mij voel.	Nao understands why I feel the way I feel.
3	Nao weet hoe ik mij voel, ook al vertel ik dat niet.	Nao knows how I feel, even though I don't tell.
4	Nao begrijpt mijn gevoelens.	Nao understands my feelings.

Table A6
Treatment Check (part 1)

Item	Dutch	Backtranslations into English
1	Nao vertelde mij dat je kan instellen dat Nao Engels, Frans, of Chinees tegen je praat.	Nao told me that you can program Nao to speak English, French, or Chinese to you.
2	Nao vertelde mij dat Nao, als iedereen naar huis gaat, in een kast wordt bewaard.	Nao told me that, when everyone goes home, Nao is stored in a closet.
3	Nao vertelde mij dat als niemand Nao uitzet, Nao's motor te warm wordt en niet meer goed werkt.	Nao told me that if nobody turns Nao off, Nao's motor can overheat and stop working well.
4	Nao vertelde mij dat Nao is gemaakt door een bedrijf in Japan.	Nao told me that Nao is made by a company in Japan.
5	Nao vertelde mij dat zolang Nao aan het stopcontact vastzit met een stekker, Nao altijd aan kan blijven staan.	Nao told me that as long as Nao's power chord is plugged in, Nao can remain switched on forever.
6	Nao vertelde mij dat als iemand de verkeerde taal instelt, Nao met niemand kan praten of spelen.	Nao told me that if someone sets the wrong language, Nao can't chat or play with anyone.

Table A7
Treatment Check (part 2)

Item	Dutch	Backtranslations into English
1	Tijdens het praten stelde Nao ook vragen aan mij.	When we were talking, Nao also asked me questions
2	Nao vertelde mij dingen die niet leuk zijn voor Nao.	Nao told me things that aren't nice for Nao.
3	Nao vertelde mij dingen die Nao niet aan anderen vertelt.	Nao told me things that Nao doesn't tell others.

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