Perceived Social Intelligence (PSI) Scales
Test Manual (August, 2018)

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The Importance of Social Intelligence in Robots

Social intelligence is the ability to interact effectively with others in order to accomplish your goals (Ford & Tisak, 1983). Social intelligence is critically important for social robots, which are designed to interact and communicate with humans (Dautenhahn, 2007). Social robots might have goals such as building relationships with people, teaching people, learning something from people, helping people accomplish tasks, and completing tasks that directly involve people's bodies (e.g., lifting people, washing people) or minds (e.g., retrieving phone numbers for people, scheduling appointments for people). In addition, social robots may try to avoid interfering with tasks that are being done by people. For example, they may try to be unobtrusive and not interrupt.

Social intelligence is also important for robots engaged in non-social tasks if they will be around people when they are doing their work. Like social robots, such task-focused robots may be designed to avoid interfering with the work of people around them. This is important not just for the people the robots work with, but also for the robots themselves. For example, if a robotic vacuum bumps into people or scares household pets, the owners may turn it off. In addition, task-focused robots will be better able to accomplish their goals if they can inspire people to assist them when needed. For example, if a delivery robot is trying to take a meal to a certain room in a hospital and its path is blocked by a cart, it may be beneficial if it can inspire nearby humans to move the cart.

While previous research on human-robot interaction (HRI) has referenced and contained aspects of the social intelligence of robots (Bartneck, Kulic, Croft, & Zoghbi, 2009; Ho, MacDorman, 2010; Ho, MacDorman, 2017; Moshkina, 2012; Nomura, Suzuki, Kanda, & Kato, 2006), the concept of robotic social intelligence has not been clearly defined. Measures of similar concepts are brief and incomplete, and often include extraneous variables. Moreover, measures of human social intelligence (e.g., Baron-Cohen, S. Wheelwright ,& Hill, 2001; Silvera, Martinussen, & Dahl, 2001) cannot be adapted for robots, because they assess skills that current and near-future robots do not have and because they omit basic skills that are essential for smooth social interactions. Therefore, we designed a set of 20 scales to measure the perceived social intelligence of robots. See the Appendix. This document explains how these scales were developed and how they can be used.

Our Conceptualization of Social Intelligence

Although we conceptualize social intelligence the same way for robots and humans, the measurement of this concept is drastically different for robots. Most humans understand that other people have thoughts, emotions, and behaviors starting at a young age (e.g., Liu, Wellman, Tardif, & Sabbagh, 2008), whereas most robots will never have these abilities. Most humans can easily distinguish humans from non-humans, know that people are individuals, and can remember their history with them; most robots cannot. Because of the tremendous differences between the cognitive abilities of robots and humans, the measurement of social intelligence in

robots must focus on much more basic skills. Therefore, we were not able to adapt existing measures of human social intelligence. Instead, we designed a set of scales that capture the aspects of social intelligence that are critical for robots.

Our scales measure perceived social intelligence in four different ways. First, the scales measure nine componential information processing abilities related to people. These are the abilities to (1) recognize, (2) adapt to, and (3) predict (a) human emotions (including desires), (b) human behaviors, and (c) human cognitions (including beliefs). See Table 1. This framework integrates fundamental concepts from psychology and HRI from psychology, emotions, behaviors, and cognitions (Weiten, 2017); from HRI, behaviors, intentions, and desires (e.g., Dautenhahn, 1997). We conceptualize desires as part of emotions, beliefs as part of cognitions, and the ability to infer someone's intentions as predictions of their behaviors.

Table 1
Componential Social Information Processing Abilities

	Recognize	Adapt	Predict
Emotions (including desires)	Robot appears to detect people's emotions (including what people like)	The robot appears to adapt its behavior appropriately based upon people's emotions.	The robot appears to anticipate people's emotions.
Behaviors	Robot appears to detect people's behaviors (e.g., notices when someone moves).	The robot appears to adapt its behavior appropriately based upon people's behaviors.	The robot appears to anticipate people's behaviors (i.e., intentions)
Cognitions (including beliefs)	The robot appears to detect people's thoughts and beliefs (e.g., can figure out what people think).	The robot appears to adapt its behavior appropriately based upon people's thoughts and beliefs (i.e., theory of mind)	The robot appears to anticipate people's thoughts and beliefs.

Second, our scales measure the ability to identify people in three different ways: to detect human presence, to distinguish individuals from each other, and to determine which people are together. Identifying people in these ways allows robots to have increasingly nuanced interactions with people. Detecting human presence allows robots to keep appropriate social distance and to initiate interactions. Recognizing individuals allows robots to use previous interactions (such as user preferences and previous conversations) to adapt its behavior. Determining which people are together allows robots to generalize from one person to another (e.g., if a man doesn't know where the hotel is, perhaps his companion doesn't know, either), to avoid disrupting a social interaction (e.g., not interrupting a conversation and not walking between two friends), and to use alliances to accomplish its goals (e.g., asking a woman to request assistance from her colleague, rather than approaching the colleague itself).

Third, our scales include a measure of overall social competence. This scale can be used on its own or can be combined with the nine social information processing skills (from Table 1)

and the three identification skills to create a 13-scale composite called Social Information Processing.

Finally, our scales measure social presentation, the ability to present oneself as a desirable social partner: someone who is friendly, helpful, caring, and trustworthy, and who is not rude, conceited, or hostile. Appearing as a desirable social partner will likely increase the frequency and duration of human robot-interactions and increase human cooperation and compliance, thus assisting the robot in accomplishing its goals in the social interactions.

Empirical research (described in our upcoming publication) finds that these twenty scales measure three underlying factors. First, Mind focuses on social processing skills related to cognitions and emotions, the ability to identify individuals and groups, and overall social competence. Second, Behavior focuses on the identification of, adaptation to, and prediction of behavior, and the ability to identify humans. Finally, Social Presentation focuses on the ability to present oneself as a desirable social partner. This factor structure is largely as we expected. Research using a different selection of robots or HRI might find that the Mind and Behavior factors combine or that the Mind factor divides into Emotion and Cognition.

Having explained what our scales measure, we now explain what our scales do not measure. Many of the social presentation skills overlap with facets of agreeableness and extraversion. However, our scales do not measure personality characteristics. Instead, our social presentation concepts assess whether the robot can put on a good show, whether it can *seem* like a desirable social partner, not whether it *really* has a certain personality. For this reason, we did not seek to measure all facets of the Big Five (Goldberg, 1993) or HEXACO models of personality (Ashton et al., 2004). We only included those facets of agreeableness and extraversion that are relevant to being a desirable social partner. We decided against including socially desirable characteristics of Big Five domains (e.g., being conscientious) that were not aspects of social intelligence.

Our scales are not the first that attempt to measure the perceptions of robots' abilities to accomplish social goals. For example, the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh, Morris, Davis, & Davis, 2003) has been used to assess the extent to which social features (e.g., the extent to which the robot is experienced as an independent social entity) influence the intention to use and the actual use of caregiver robots by the elderly. (Heerink, Krose, Evers, & Wilinga, 2010). Although there is some overlap between the UTAUT and our work, our scales provide a more refined and complete measure of this area. Thus, our scales provide detailed assessment of social competence that goes beyond what is possible with existing measures in either human personality or robot rating scales.

Our scales were designed to measure people's *perceptions* of robots' social intelligence, not robots' *actual* social intelligence. These will frequently be quite different. For example, a robot may be perceived as agreeing with a speaker if it nods occasionally, but it may not be able to process natural language and thus may not know what the person is talking about. Moreover, perceptions of social intelligence may vary depending upon the perceiver. For example, people in Japan are more comfortable with conventional (i.e., non-anthropomorphic) robots, while people in the United States are more comfortable with robots that act like humans (Kamide & Arai, 2017).

Our scales were designed to be applicable to a wide variety of embodiments and behaviors. The items do not assume that a robot has any particular type of body or is able to engage in any particular behavior. For example, the items have been designed to be usable both with robots that can and cannot speak, those that can and cannot move, and those that can and

cannot pick up objects. Moreover, these items do not assume that the robot has any particular cognitive or emotional capacities. For example, the items have been designed to be useable with robots that can and cannot understand speech, and those that can and cannot see and hear.

Uses of Our Scales

Researchers can examine a wide variety of research questions using our scales. First researchers can examine the relationships between robot behaviors and perceived social intelligence (e.g., how close should a robot follow a person to be considered friendly and respectful? Does this vary by country or if the person has Alzheimer's disease?). Second, researchers can experiment with changes to robots' bodies (e.g., is a fuzzy purple dragon perceived as more trustworthy than a shiny silver dog, but the dog considered friendlier?). Third, researchers can explore the effect of context on perceived social intelligence (e.g., do perceptions change if the robot is indoors vs. outdoors? In everyday activities and in a combat zone?). Fourth, for all of the previous scenarios, researchers can determine how perceived social intelligence influences completion of specific goals (e.g., is friendliness important for relationship building with a person with Alzheimer's disease? Does trustworthiness improve child learning of vocabulary? If a robot is perceived as able to predict human behaviors, does this change how soldiers treat it during combat situations?). Lastly, researchers can examine the relationship between social intelligence and other cognitive and personality variables (e.g., if robots are perceived as better at understanding people's minds, are they considered morally responsible for any harm they cause?).

Our scales may be useful in even wider contexts. Although our items have been designed to evaluate robots, perceived social intelligence may also be important for artificial intelligence programs that interact with people (e.g., Apple's Siri, Google's Assistant, Amazon's Alexa, and Microsoft's Cortana), for many of the same reasons that it can be important for robots. Therefore, researchers and developers are encouraged to consider whether these concepts and scales would be helpful in their research on targets besides robots.

Given the variety of research questions that our scales could be used to examine, we encourage researchers and designers to use whichever of our scales and items are relevant to their research goals. Most researchers and designers will need only a few of these scales for their particular project. Moreover, they might only need a few of the items from those scales. When they use only some of the scales or only some of the items, they should be explicit about which scales and items they used. To allow researchers to be explicit about which items and scales they used in their research, we hereby give test users permission to reproduce our items in scientific publications and other venues.

Concept Development

To generate candidate areas that we might include in our measure, we examined the literatures in robotics and psychology. Within robotics, we focused on human-robot interaction, robot social intelligence, and measures of how robots are perceived. Within psychology, we focused on human social intelligence, competence, ability, and skills, and how these areas are measured. This resulted in roughly 50 candidate areas.

Next, we organized and refined these candidate areas. We sorted concepts into related areas, noted parallelisms, and filled in missing concepts. We removed concepts that fell outside of social intelligence, either because they were not clearly abilities (e.g., assertiveness) or because they were not clearly social (e.g., the ability to learn from experience). We also

removed concepts that represented social skills that robots are unlikely to have in the near future (e.g., figuring out how to act in new social situations by modelling one's behaviors on others') and concepts that are too narrow to be of much interest (e.g., knowing that humans have emotions, cognitions, and behaviors – as separate from the ability to detect what those are). We merged concepts if one seemed to be a subset of another and the items of the smaller concept seemed to cover a very limited scope. This brought us to a set of 19 skills.

We sought feedback on these 19 skills from researchers in social intelligence, personality measurement, and robotic engineering. Incorporating this feedback led us to our final 20 scales: nine social information processing skills in the 3x3 matrix, three identification skills, seven social presentation skills, and one overall measure of social competence.

Item Writing and Selection

To facilitate the use of our scales, we wrote items using the International Personality Item Pool (IPIP) format. The IPIP is a public domain set of 3000+ items designed to measure 250+ characteristics. IPIP items and scales are available at http://ipip.ori.org/ These scales can be used for free and adapted as needed.

IPIP item stems are usually written as first-person declarative statements with the initial word "I" omitted (Goldberg, 1999). For example, "Enjoy reading". This format would not be appropriate for measuring bystanders' perceptions of robotic social intelligence. Fortunately, IPIP items can be converted into third-person format by changing the verbs and modifying the pronouns (Goldberg, 1999). For example, "Enjoys reading". Therefore, the Perceived Social Intelligence scales use the third-person format.

We read existing IPIP scales to identify items we could adapt for our measure. However, many IPIP items are not relevant to robots (e.g., referring to friends), many assume social/intellectual skills that few or no current robots have (e.g., having emotions or episodic memories), and many assume certain body types or functions (e.g., that they can hear, speak, or move). Therefore, most of our items were newly created, so that they would apply to a wide range of robots.

Item writing and selection proceeded by stages. First, we drafted dozens of items for each of our concepts. Second, we selected the best six items based upon their relevance to the construct and the clarity of their phrasing. Third, we administered these items to a large community sample and analyzed the results statistically. Finally, based upon these empirical results, we selected the best four items for each scale and the single best item for each scale. Detailed information about the development and validation of our measure will be given in our upcoming publication.

How to Use Our Scales

For people to rate the social intelligence of a robot, they first need information about how the robot interacts with people. In our validation study, raters viewed videos of robots interacting with humans. Researchers could also use text, pictures, live co-located interactions, live mediated interactions (e.g., watching a video of what is happening in the next room), or previous user experiences (e.g., with a robot that someone owns).

If the researcher wants people to rate multiple robots, the people should rate each robot separately: Each person should complete all items for one robot before moving on to the next robot. If the researcher wants summary scores across multiple robots, they should sum or average the scores after the fact.

Researchers can present participants with any combination of the items and scales given here. The full-length PSI consists of all 20 scales, with 4 items each, for a total of 80 items. The PSI-Short Form (PSI-SF) consists of the single best item from each scale, for a total of 20 items. The short and long forms are both below. For convenience, the short form is the first page of the long form.

Instructions

When administering our scales, we recommend that researchers precede the items with the title "Your Opinions" and the question, "What is your impression of this robot?" Start each page of items with the phrase "This robot…", so that the person is clearly being asked to rate the robot. If researchers are interested in evaluating the perceived social intelligence of non-robot agents, they should substitute an appropriate name or phrase (e.g., "Siri…", "This laptop…", or "This character…"). If using multiple scales, we recommend that researchers randomly intermix the items from the different scales to reduce the influence of response sets.

Response Options

Each item should be rated using a five-point agreement scale: 1 (*Strongly Disagree*), 2 (*Disagree*), 3 (*Neutral*), 4 (*Agree*), and 5 (*Strongly Agree*). Note that this differs from most IPIP items, which use an accuracy scale: 1 (Very Inaccurate) to 5 (Very Accurate). We decided that an accuracy scale was inappropriate when rating the perceived social intelligence of robots, because we are not trying to measure what abilities robots *actually* have. We are instead trying to measure what abilities robots *appear* to have. Therefore, our instructions emphasize that raters should answer based upon the impression they have of the robot, and the items use an agreement scale.

Scoring

To calculate scores for each of the 20 PSI scales, researchers should average the scores on the four items that comprise that scale. Items with an R should be reversed (i.e., reversed item score = 6 – response) before averaging. Thus, both item and scale scores range from 1 – 5.

Researchers can also calculate three total scores for the four-item scales: the total of the 13 social information processing scales, the total of the 7 social presentation scales, and a grand total of all 20 scales. Scales with an R should be reversed (i.e., reversed scale score = 6 – scale score) before calculating totals. Thus, Social Information Processing total scores range from 13 – 65, Social Presentation total scores range from 7 – 35, and Social Intelligence total scores range from 20 – 100.

The same three total scores can be calculated for the PSI Short Form scales by using the single-item score in place of each scale score. Thus, researchers can calculate the total of the 13 social information processing items, the total of the 7 social presentation items, or the grand total of all 20 items from the short form.

Table 1 (below) shows example calculations. For the short form, the Social Information Processing total score is 43, the Social Presentation total score is 21, and the Social Intelligence total score is 64. For the full length form, the Social Information Processing total score is 45.75, the Social Presentation total score is 20.75, and the Social Intelligence total score is 66.50.

Table 1
Example Calculations of Item Scores and Scale Scores

Scale [a]	Original Responses to the Four Items (with Short Form Item Given First) [b]				Item Scores [c]				Scale Scores [d]
RE	4	2R	2	5	4	4	2	5	3.75
RB	2	5	5	4	2	5	5	4	4.00
RC	5	1	3	5	5	1	3	5	3.50
AE	1	5	5R	4	1	5	1	4	2.75
AB	4	5	5	4	4	5	5	4	4.50
AC	4	4R	2	4	4	2	2	4	3.00
PE	5	2R	2	4	5	4	2	4	3.75
PB	1	5	1R	3	1	5	5	3	3.50
PC	5	3	5	3	5	3	5	3	4.00
IH	3	2R	2	1R	3	4	2	5	3.50
II	1	3	2R	2	1	3	4	2	2.50
IG	3	2	2R	5	3	2	4	5	3.50
SOC	5	3	2R	2	5	3	4	2	3.50
Social Information Processing Total Score					43				45.75
FRD	1	3	4	1R	1	3	4	5	3.25
HLP	5	2	5	4	5	2	5	4	4.00
CAR	3	5	1	4R	3	5	1	2	2.75
TRU	5	4	1	2	5	4	1	2	3.00
RUD-R	5	4	3R	4R	5	4	3	2	3.50
CON-R	3	5	4	3R	3	5	4	3	3.75
HST-R	3	2	1R	2	3	2	5	2	3.00
Social Presentation Total Score					21				20.75
Social Intelligence Total Score					64				66.50

a. In this column, the symbol R indicates that the scale scores need to be reversed before calculating total scores.
b. In these columns, the symbol R indicates which responses need to be reversed to calculate the item scores. For example, in the RE scale, the second item has a response of 2. This item is reversed scored. Therefore, the item score is 6 – response = 6 – 2 = 4.
c. These columns show the scores for each item. Note that the score on the first item is the score on the short form for this scale.
d. This column calculates the scores for each four-item scale as the average of the item scores.

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Appendix: Perceived Social Intelligence (PSI) Scales

Each scale consists of 4 items. The single best item is given first and can be used in the PSI short form. If multiple scales are used, the items from the scales should be intermixed to reduce the influence of response sets. See the next section for an administration form containing all 20 scales.

Items with R should be reversed (i.e., reversed score = 6 – item score) before computing scale scores.

Scale scores are calculated as the average of the item scores. Thus, scale scores range from 1 – 5.

Social Information Processing

Recognizes Human Emotions (RE)
The robot appears to detect people's emotions.

1	recognizes human emotions
2R	has trouble understanding what people are feeling
3	notices people's emotional reactions
4	knows what people like

Recognizes Human Behaviors (RB)
The robot appears to detect people's behaviors.

1	notices when people do things
2	detects human movement
3	can figure out what people are doing
4	notices when people try to interact with it

Recognizes Human Cognitions (RC)
The robot appears to detect people's thoughts and beliefs.

1	can figure out what people think
2	knows when people are missing information
3	can figure out what people can see
4	understands others' perspectives

Adapts to Human Emotions (AE)
The robot appears to adapt its behavior appropriately based upon people's emotions.

1	responds appropriately to human emotion
2	knows what to do when a person is emotional
3R	acts the same regardless of how people feel
4	is good at responding to emotional people

Adapts to Human Behaviors (AB)
The robot appears to adapt its behavior appropriately based upon people's behaviors.

1	adapts effectively to different things people do
2	appropriately changes what it is doing based on what others around it are doing
3	knows how to react to what people do
4	adapts its behavior based upon what others do

Adapts to Human Cognitions (AC)
The robot appears to adapt its behavior appropriately based upon people's thoughts and beliefs.

1	adapts its behavior based upon what people around it know
2R	ignores what people are thinking
3	selects appropriate actions once it knows what others think
4	knows what to do when people are confused

Predicts Human Emotions (PE)
The robot appears to anticipate people's emotions.

1	anticipates others' emotions
2R	has no idea how people will feel in different situations
3	knows ahead of time how people will feel about its actions
4	knows what people are going to want in different situations

Predicts Human Behaviors (PB)
The robot appears to anticipate people's behavior.

1	anticipates people's behavior
2	predicts human movements accurately
3R	has no idea what people are going to do
4	knows how people will react to things it does

Predicts Human Cognitions (PC)
The robot appears to anticipate people's thoughts and beliefs.

1	anticipates others' beliefs
2	figures out what people will believe in the future
3	knows ahead of time what people will think about certain situations
4	anticipates what people will think

Identifies Humans (IH)
The robot appears to detect human presence.

1	notices human presence
2R	mistakes humans for inanimate objects
3	knows when a human is nearby
4R	fails to notice when humans are around

Identifies Individuals (II)
The robot appears to identify and recognize people as individuals.

1	recognizes individual people
2	remembers who people are
3R	cannot tell people apart
4	remembers its shared history with each person

Identifies Social Groups (IG)
The robot appears to discern which people are with each other.

1	knows if someone is part of a social group
2	knows which people are together
3R	ignores the fact that people are together
4	figures out which people know each other

Social Competence (SOC)
The robot appears to have strong social skills.

1	is socially competent
2	is socially aware
3R	is socially clueless
4	has strong social skills

Social Presentation

Friendly (FRD)
The robot appears to enjoy social interactions.

1	enjoys meeting people
2	likes spending time with people
3	is sociable
4R	prefers being alone

Helpful (HLP)
The robot appears willing to assist in tasks.

1	tries to be helpful
2	is cooperative
3	values cooperation over competition
4	wants to help people

Caring (CAR)
The robot appears to care about the well-being of others.

1	cares about others
2	is compassionate
3	feels concern for people who are in distress
4R	feels little concern for others

Trustworthy (TRU)
The robot appears deserving of trust.

1	is trustworthy
2	is honest
3	is sincere
4	is ethical

Rude (RUD) R
The robot appears rude and disrespectful.

1	is impolite
2	is rude
3R	is respectful
4R	is nice to people

Conceited (CON) R
The robot appears overly proud of itself or its abilities.

1	thinks it is better than everyone else
2	is self-centered
3	is condescending
4R	is modest

Hostile (HST) R
The robot appears antagonistic and violent.

1	tries to hurt people
2	is violent
3R	is peaceful
4	is mean to people

Perceived Social Intelligence (PSI) Scales
Administration Form

The following four pages contain the Perceived Social Intelligence (PSI) Scales, with items in the recommended order for administering all 20 scales. The first page is the PSI-Short Form.

Your Opinions

What is your impression of this robot?

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

This robot…

notices human presence	1 2 3 4 5
enjoys meeting people	1 2 3 4 5
recognizes individual people	1 2 3 4 5
notices when people do things	1 2 3 4 5
adapts effectively to different things people do	1 2 3 4 5
anticipates people’s behavior	1 2 3 4 5
tries to be helpful	1 2 3 4 5
is trustworthy	1 2 3 4 5
cares about others	1 2 3 4 5
recognizes human emotions	1 2 3 4 5
responds appropriately to human emotion	1 2 3 4 5
anticipates others' emotions	1 2 3 4 5
tries to hurt people	1 2 3 4 5
can figure out what people think	1 2 3 4 5
knows if someone is part of a social group	1 2 3 4 5
adapts its behavior based upon what people around it know	1 2 3 4 5
thinks it is better than everyone else	1 2 3 4 5
anticipates others’ beliefs	1 2 3 4 5
is impolite	1 2 3 4 5
is socially competent	1 2 3 4 5

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

This robot…

mistakes humans for inanimate objects	1	2	3	4	5
likes spending time with people	1	2	3	4	5
remembers who people are	1	2	3	4	5
detects human movement	1	2	3	4	5
appropriately changes what it is doing based on what others around it are doing	1	2	3	4	5
predicts human movements accurately	1	2	3	4	5
is cooperative	1	2	3	4	5
is honest	1	2	3	4	5
is compassionate	1	2	3	4	5
has trouble understanding what people are feeling	1	2	3	4	5
knows what to do when a person is emotional	1	2	3	4	5
has no idea how people will feel in different situations	1	2	3	4	5
is violent	1	2	3	4	5
knows when people are missing information	1	2	3	4	5
knows which people are together	1	2	3	4	5
ignores what people are thinking	1	2	3	4	5
is self-centered	1	2	3	4	5
figures out what people will believe in the future	1	2	3	4	5
is rude	1	2	3	4	5
Is socially aware	1	2	3	4	5

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

This robot…

knows when a human is nearby	1	2	3	4	5
is sociable	1	2	3	4	5
cannot tell people apart	1	2	3	4	5
can figure out what people are doing	1	2	3	4	5
knows how to react to what people do	1	2	3	4	5
has no idea what people are going to do	1	2	3	4	5
values cooperation over competition	1	2	3	4	5
is sincere	1	2	3	4	5
feels concern for people who are in distress	1	2	3	4	5
notices people's emotional reactions	1	2	3	4	5
acts the same regardless of how people feel	1	2	3	4	5
knows ahead of time how people will feel about its actions	1	2	3	4	5
is peaceful	1	2	3	4	5
can figure out what people can see	1	2	3	4	5
ignores the fact that people are together	1	2	3	4	5
selects appropriate actions once it knows what others think	1	2	3	4	5
is condescending	1	2	3	4	5
knows ahead of time what people will think about certain situations	1	2	3	4	5
is respectful	1	2	3	4	5
Is socially clueless	1	2	3	4	5

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

This robot…

fails to notice when humans are around	1	2	3	4	5
prefers being alone	1	2	3	4	5
remembers its shared history with each person	1	2	3	4	5
notices when people try to interact with it	1	2	3	4	5
adapts its behavior based upon what others do	1	2	3	4	5
knows how people will react to things it does	1	2	3	4	5
wants to help people	1	2	3	4	5
is ethical	1	2	3	4	5
feels little concern for others	1	2	3	4	5
knows what people like	1	2	3	4	5
is good at responding to emotional people	1	2	3	4	5
knows what people are going to want in different situations	1	2	3	4	5
is mean to people	1	2	3	4	5
understands others' perspectives	1	2	3	4	5
figures out which people know each other	1	2	3	4	5
knows what to do when people are confused	1	2	3	4	5
is modest	1	2	3	4	5
anticipates what people will think	1	2	3	4	5
is nice to people	1	2	3	4	5
has strong social skills	1	2	3	4	5

As you saw from the previous pages, no item numbers are included when items are given to participants. So that we can explain the scoring system below, we have numbered the items here.

1	notices human presence
2	enjoys meeting people
3	recognizes individual people
4	notices when people do things
5	adapts effectively to different things people do
6	anticipates people's behavior
7	tries to be helpful
8	is trustworthy
9	cares about others
10	recognizes human emotions
11	responds appropriately to human emotion
12	anticipates others' emotions
13	tries to hurt people
14	can figure out what people think
15	knows if someone is part of a social group
16	adapts its behavior based upon what people around it know
17	thinks it is better than everyone else
18	anticipates others' beliefs
19	is impolite
20	is socially competent
21R	mistakes humans for inanimate objects
22	likes spending time with people
23	remembers who people are
24	detects human movement
25	appropriately changes what it is doing based on what others around it are doing
26	predicts human movements accurately
27	is cooperative
28	is honest
29	is compassionate
30R	has trouble understanding what people are feeling
31	knows what to do when a person is emotional
32R	has no idea how people will feel in different situations
33	is violent
34	knows when people are missing information
35	knows which people are together
36R	ignores what people are thinking
37	is self-centered
38	figures out what people will believe in the future
39	is rude
40	Is socially aware

41	knows when a human is nearby
42	is sociable
43R	cannot tell people apart
44	can figure out what people are doing
45	knows how to react to what people do
46R	has no idea what people are going to do
47	values cooperation over competition
48	is sincere
49	feels concern for people who are in distress
50	notices people's emotional reactions
51R	acts the same regardless of how people feel
52	knows ahead of time how people will feel about its actions
53R	is peaceful
54	can figure out what people can see
55R	ignores the fact that people are together
56	selects appropriate actions once it knows what others think
57	is condescending
58	knows ahead of time what people will think about certain situations
59R	is respectful
60R	is socially clueless
61R	fails to notice when humans are around
62R	prefers being alone
63	remembers its shared history with each person
64	notices when people try to interact with it
65	adapts its behavior based upon what others do
66	knows how people will react to things it does
67	wants to help people
68	is ethical
69R	feels little concern for others
70	knows what people like
71	is good at responding to emotional people
72	knows what people are going to want in different situations
73	is mean to people
74	understands others' perspectives
75	figures out which people know each other
76	knows what to do when people are confused
77R	is modest
78	anticipates what people will think
79R	is nice to people
80	has strong social skills

Scale Name	**Item Numbers**
Recognizes Human Emotions (RE)	10, 30**R**, 50, 70
Recognizes Human Behaviors (RB)	4, 24, 44, 64
Recognizes Human Cognitions (RC)	14, 34, 54, 74
Adapts to Human Emotions (AE)	11, 31, 51**R**, 71
Adapts to Human Behaviors (AB)	5, 25, 45, 65
Adapts to Human Cognitions (AC)	16, 36**R**, 56, 76
Predicts Human Emotions (PE)	12, 32**R**, 52, 72
Predicts Human Behaviors (PB)	6, 26, 46**R**, 66
Predicts Human Cognitions (PC)	18, 38, 58, 78
Identifies Humans (IH)	1, 21R, 41, 61**R**
Identifies Individuals (II)	3, 23, 43**R**, 63
Identifies Social Groups (IG)	15, 35, 55**R**, 75
Social Competence (SOC)	20, 40, 60**R**, 80
Friendly (FRD)	2, 22, 42, 62**R**
Helpful (HLP)	7, 27, 47, 67
Caring (CAR)	9, 29, 49, 69**R**
Trustworthy (TRU)	8, 28, 48, 68
Rude (RUD) **R**	19, 39, 59**R**, 79**R**
Conceited (CON) **R**	17, 37, 57, 77**R**
Hostile (HST) **R**	13, 33, 53**R**, 73

Items with **R** should be reversed (i.e., reversed item score = 6 – item score) before computing scale scores.
Scale scores are calculated as the average of the item scores. Thus, scale scores range from 1 – 5.
Scales with **R** after their abbreviations should be reversed (i.e., reversed scale score = 6 – scale score) before computing total scores.

Return to Multiple Constructs