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Exploring an Interactive Measure for Preferences in Early Childhood

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Abstract

Three experiments (total N=53) examined whether toddlers show preferences for people and objects in an interactive, touch-screen paradigm. In all experiments, children watched videos of stimuli pairs displayed on two monitors in each trial, and were then given the chance to watch another video of one of the stimuli items by touching the screen on which it had appeared. Experiments 1 and 2 exposed children to interesting vs. boring objects, and engaging vs. boring speakers. Experiment 3 examined children's responses when presented with one actor who spoke English (native language speaker) compared to another actor who spoke in a foreign language (e.g. French, Korean, etc.). Across the three experiments, children failed to show trait-based (Experiments 1 & 2) or category-based (Experiment 3) social preferences. They did, however, show preferences for the target objects when the target was highly familiar, and thus more interesting than the distracter object. Possible explanations for the lack of observable preferences using this method, and the implications of this for future research are discussed.

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Exploring an Interactive Measure for Preferences in Early Childhood

Preferences are an important aspect of human life, and wherever there is free choice, preferences surface. Preferences underlie many of our decisions, and influence many personal choices including what we choose to eat, what we choose to wear, and what we choose to do with our time. There has been much recent interest in the development of preferences in children, especially as it relates to the domain of social cognition. In this vein, previous research has examined young children's preferences for social partners and their preferences for objects based on information they gain from social partners.

Social Preferences

Early in life, infants' social cognitive mechanisms apply to recognizing caretakers and close family members. On a larger scale, however, infants and young children come to categorize people by markers such as age, gender, race, and language (Kinzler, Dupoux, & Spelke, 2007; Shutts, Banaji, & Spelke, 2010). Powerful categorization skills early in life could have clear adaptive benefits. Reacting negatively towards out-group members could keep children in closer proximity to their kin, and away from out-group members who may pose a threat to or care less about the child's welfare. In contrast, favoring in-group members also has many potential benefits. One of the most important benefits is children's trust in social information from in-group members in order to learn about the world. In this vein, research shows that children value information from social in-group members over information from out-group members (Kinzler, Corriveau, & Harris, 2011). This makes sense, given that learning about the value of objects from

someone in one's social group is more likely to be beneficial, as members of the same social group may share values, cultural norms, and indeed preferences.

Category-based Social Preferences. Some of the earliest and most stable social preferences infants and young children show are based on individuals' category memberships. In addition to adults, the three visually accessible categories of race, gender, and age, have also been studied in young children. Shutts et al. (2010) showed three-year-old children pictures of either same-race or same-gender children as the child, endorsing different objects or activities. When asked which object or activity they preferred, young children chose objects preferred by another child of their own gender. However, they chose equally between objects endorsed by other-race and same-race children. Additionally, children preferred objects liked by peers over those liked by adults. Interestingly, when asked about the reasons for their choices, an overwhelming majority of children were unable to recognize the role of social categories. This study suggests three important conclusions. First, children treat gender and age as important markers when demonstrating social preferences. Second, race does not seem to be a strong social category marker in early childhood. Third, children's reasoning about social categories is implicit.

The lack of strong race-based social preferences is supported by findings from another set of experiments (Kinzler & Spelke, 2011). When offered the chance to take a toy from a White or Black female, 10-month-old White infants chose equally between the two. Further, 2.5-year-old children gave toys equally to White and Black females. However, when five-year-old children were asked whether they wanted to be friends with a White or Black female actor, they chose the White female. Thus, these studies suggest

that race-based social preferences may be absent early on, and develop later (see also Baron & Banaji, 2006; Rhodes & Gelman, 2009).

Beyond the three visually salient group category markers of race, gender, and age, language has been identified as another marker that young children rely on in their social evaluations. Infants as young as six months of age have been shown to look longer at a person who they had recently heard speak in their native language than a person who spoke a foreign language (Kinzler et al., 2007). At 10 months, infants also preferentially reached for a toy offered by a native-language speaker over a foreign-language speaker, even though both offered the same toy (Kinzler et al., 2007). Additionally, infants preferred to play with an object that they had watched a native-language speaker play with on video (Kinzler, Dupoux, & Spelke, 2012). Further, 2-1/2-year-old children also preferred to give objects to a native speaker than to a foreign speaker (Kinzler et al., 2012). Lastly, at five years of age, children prefer to be friends with a child who speaks their native language over a child who speaks a foreign language (Kinzler, Shutts, & DeJesus, 2009).

Given these findings, it is reasonable to assume that language-based social preferences favor native speakers because of the possibility of linguistic communication, which naturally does not exist with a foreign language speaker. However, the possibility of communication is not the only reason behind these preferences. Surprisingly, American children chose randomly when asked whether they would prefer to be friends with a child who spoke in French and another child who spoke English with a French accent (Kinzler et al., 2009). Had communication been the only factor underlying children's choices, they should have selected to befriend the English-speaking, albeit

accented, child. In this vein, children between four and five years of age prefer to learn about novel objects from native-accented individuals (Kinzler et al., 2009). These findings support the notion that, beyond being a communicative medium, language is a social group marker, and a robust one at that. Learning to speak a foreign language is a long and difficult task. Learning to speak with a native accent is even more difficult, and sometimes impossible in the case of older second-language learners. Thus, language, and even more importantly, accent can serve as accurate social group markers.

Further supporting the weakness of race as a social category marker, White American five-year-old children prefer to be friends with a Black child speaking with an American accent over a White child speaking English with a French accent (Kinzler et al., 2009). In light of these findings, Kinzler et al. (2009) propose that language and accent may have served as a more reliable social category marker than race in evolutionary past, as people may have been more likely to come in contact with out-language individuals than out-race individuals.

Additional evidence for the importance of social categories in social evaluations comes from studies with older children. As they enter middle childhood, children become more adept at reasoning about complex social information and relying on that information in social evaluations. Diesendruck and haLevi (2006) presented children aged between four and seven years with drawings of triads of individuals. On each trial, the main character matched with another character on a social category (gender, social status, religiosity, and ethnicity), and with the third character on a personality trait (e.g. shyness, niceness, etc.). Children were asked with which of the two others the main character would share interests or behaviors. The results showed that children chose

category-matched peers rather than trait-matched ones, whereas adults tested in the same paradigm showed the opposite pattern of choices. Although children were not asked about their own social preferences in this experiment, the results provide indirect evidence that, in the absence of other cues, categories take precedence over traits in children's social preferences. This study is noteworthy as it provides evidence for children's attention to culturally relevant group markers. In addition to relying on gender, children relied on three other category markers, social status (rich/poor), religiosity (religious/secular), and ethnicity (Jewish/Arab) in their social evaluations. Thus, the findings suggest that by middle childhood, children notice and are able to reason about the social categories most salient in their cultural environment. Indeed, children come to notice social category divisions well enough that they can even reason about individuals based on their membership in arbitrary social groups (Dunham, Baron, & Carey, 2011).

To conclude, there is ample evidence that infants and young children treat people differently based on their social group memberships and prefer those in their own groups. Further, in-group preference findings from experiments with children converge with evidence for the phylogenetic origins of in-group preferences. In one study, rhesus macaques looked longer at out-group members (Mahajan et al., 2011). . They also evaluated in-group members more positively than out-group members using a modified version of the Implicit Association Test (Mahajan et al., 2011). Thus, these early-emerging social preferences fit in well with an evolutionary perspective that recognizes the benefits of preference for in-group members and bias against out-group members.

Trait-based and Behavior-based Social Preferences. In addition to evaluating individuals according to social category, infants and young children are also able to

evaluate other based on their traits or behavior. This ability is an essential social tool that we, as adults, constantly employ in our everyday lives. In most situations and with many social partners, our preferences and evaluations of the people around us depend primarily on their characteristics and how they behave.

An important dimension for social evaluations is the prosocial value of others' actions. As cooperative social animals, we tend to prefer individuals who help others to those who don't. Several studies suggest that infants are also able to make simplified social evaluations of this type. For instance, Hamlin, Wynn, and Bloom (2007) habituated 6- and 10-month-old children to two scenarios involving a character who seemed to be attempting to climb a hill. In one scenario, another character (helper) helped the climber by pushing it up the hill, while in an alternative scenario a third character (hinderer) tried to stop it from climbing by pushing it down. When given the choice between the helper and the hinderer, infants at both ages preferred the helper. The findings were verified with a looking time measure of surprise: Infants were surprised to see the climber approach the hinderer, but not the helper. In another study (Hamlin, Wynn, & Bloom, 2010), 3-month-old infants habituated on the mentioned scenarios preferred to look longer at the helper following habituation. Hamlin and colleagues have presented these findings as a possible basis for understanding and reasoning about morality. Regardless of the veracity of this theory, these studies have two important implications. First, infants are able to make evaluations based on a character's prosocial or antisocial behavior. Second, they are able to make such evaluations as third-party witnesses to social behavior.

Children's ability to use trait-based information in social evaluations develops and becomes more explicit with time. There is evidence suggesting that three-year-old

children prefer to be friends with those with whom they share behavioral and appearance traits. When offered the chance to choose a puppet to play with, children chose a puppet who shared their food preference or had the same hair color as them compared to one who did not (Fawcett & Markson, 2010a). This finding shows that children can recognize their own behavioral tendencies (e.g. for food) and physical features, and use these traits in social evaluative decisions.

Older children are able to reason about even more complex behavioral features. For instance, children aged 5-7 years demonstrated a preference for fictitious children who seemed lucky (Olson, Banaji, Dweck, & Spelke, 2006). In this study, short vignettes conveyed information about a character's luckiness (e.g. "the child's soccer game was rained out"). This preference for lucky individuals is robust enough that children also prefer a new member of a group made up of mostly lucky individuals to a new member of an unlucky group.

Thus far, I have reviewed a number of studies showing that infants and young children are able to make social judgments based on an individual's behaviors or physical appearance. In this vein, it would be interesting to examine whether behavioral characteristics or appearance take precedence in evaluations. One answer to this question comes from an experiment in which 4- to 6-year-old children were asked whether someone would prefer the same objects or activities as another individual with whom they shared physical similarities (e.g. both tall), or an individual with whom they shared a trait (e.g. both friendly) (Diesendruck & haLevi, 2006). Children were just as likely to choose the appearance-matched person as the trait-matched one, whereas adults were

more likely to choose the trait-matched person. Thus, children may not realize that behavioral traits are better associated with preferences than physical features.

Influence of social information on non-social choices

Above and beyond showing preference between individuals differing on a variety of characteristics, young children are able to draw on relevant social information when making their choices in the world. As adults, we attend to and emulate the preferences of those individuals we view favorably; celebrity product endorsements are a familiar example of this phenomenon. Along these lines, results from empirical studies suggest that attending to other people's preferences may aid young children in developing their own. Further, attending to other people's choices could help young children *learn* about objects, actions, and behaviors. That young children can, and do, rely on social information in their own choices is impressive, and highlights the importance of other people as sources of information.

One main question of interest here is: Who do young children look to when they make their own choices? Based on the importance of social group markers as discussed above, young children prefer objects endorsed by people of their own age and gender (Shutts et al., 2010), and functions endorsed by someone who speaks in their native language and accent (Kinzler et al., 2011).

Young children also trust the preferences of someone they share preferences with. Fawcett and Markson (2010b) showed two-year-old children two people who preferred different toys on a pair for which the child's favorite toy had been established. When offered a choice between a new pair of toys that were not visible, children chose the unseen toy preferred by the actor whose preferences they shared. Thus, children as young

as two years of age are capable of tracking other people's preferences between objects and can use that information to make choices about novel objects. However, children do not assume that shared similarity in one domain will generalize to unrelated domains. In fact, children chose randomly when offered a choice between two television shows endorsed by actors, one of whom they had previously shared a *food* preference with. Taken together, these results indicate that young children treat social information selectively, and apply it when it is relevant.

Another question with regard to the influence of others on children's preferences concerns why, and in which domains, this influence matters. The answer to this question is not yet fully understood. One approach aligns preferences and learning about preferences with other aspects of cultural learning. Humans are set apart from other primates by heightened attention to conspecifics. Preferences for in-group members could also suggest that children pay even more attention than usual to other members of their social groups. Thus, children are mindful and observant of other in-group members' nuanced behaviors. For instance, young children pay full attention when learning about artifacts and overimitate adults, meaning that they imitate all actions they have seen performed on an artifact, even those actions that do not contribute to the goal (Lyons, Damrosch, Lin, Macris, & Keil, 2011). Similarly, children could pay particular attention to other people's preferences between objects, activities, attitudes, etc.

A closer look at one particular domain, food, is illuminating. In most cultures, eating is an inherently social phenomenon, and thus food preferences are a prime example of a socially influenced domain of preference. Of course, many preferences vary between individuals, and children notice personal preferences. For instance, 18-month-

old children are able to give a person her preferred food, even if they themselves do not like that food (Repacholi & Gopnik, 1997). However, there are also many preferences that are stable within groups and reflect a culturally pervasive attitude. This stability would prompt children to choose the objects preferred by someone in their own social group. For instance, 12-month-old infants choose a novel food preferred by a native language speaker over one preferred by a foreign language speaker (Shutts, Kinzler, McKee, & Spelke, 2009). Thus, food preferences are a prime example of preferences that differ both between individuals within a culture and between cultures. Finally, food is a highly important domain in which habits and preferences can have both immediate and long-lasting health consequences (Shutts, Kinzler, & Dejesus, 2012). Therefore, understanding how young children come to form their own food preferences at the intersection of their group's preferences and the preferences of specific individuals around them would be of interest to both theory and application. To conclude, while there is still a great deal we do not know about how young children process social information in shaping their own preferences, there is ample evidence that pursuing such topics will lead to fruitful discoveries.

Issues of methodology, and overview of current study

Considering the importance and relevance of preference formation and development, it is important to measure preferences efficiently and reliably. However, developing measures to tap into preferences, especially social ones, presents numerous challenges. Two key issues contributing to the methodological challenge are: (a) how to present individuals (e.g. live, on video, as puppets, etc.); and (b) what dependent measure to use (e.g. preferential looking, reaching, etc.).

The first critical issue in any study dealing with social evaluations is how to introduce the social agents under evaluation. Although some studies have opted to do this live, i.e. by having two actors present during the testing session (e.g. Fawcett & Markson, 2010b), this is not always possible for logistical reasons. Including several actors in an experiment renders it more time and resource-intensive. Additionally, some infants and young children might be overwhelmed by the presence of a number of unfamiliar people, and fail to complete the experimental task. To overcome this issue, other studies have used puppets as the individuals (e.g. Fawcett & Markson, 2010b). However, this solution also has its limitations, as it is not possible to convey all the nuances of behavior through puppets. Additionally, operating puppets requires extra assistance during testing, which can present similar logistical issues as including live actors in a study. Another solution, facing similar limitations, has been to present animate-looking objects as characters (e.g. Hamlin et al., 2007).

To introduce numerous individuals in studies examining social evaluations, most studies have opted to show individuals on video (e.g. Kinzler et al., 2007), or in still pictures accompanied by voiceovers (e.g. Shutts et al., 2010). Although these methods resolve the logistical issues, they are not equally applicable to studies of children of different ages. While still pictures are effective with children aged five and above, they are not adequately engaging for infants, toddlers, and preschoolers. As a result, studies with infants and young children involving social evaluation have relied predominantly on video-based presentation of individuals.

Second, a number of different dependent measures have been used in studies of preferences. Experiments with live presentation of individuals have used preferential

looking (e.g. Hamlin et al., 2010), and preferential reaching (e.g. Hamlin et al., 2007) with infants, and pointing or verbal responses with older children (e.g. Fawcett & Markson, 2010a). However, the majority of studies that have used video as a medium for presenting individuals to children between 10 months and three years of age have relied on dependent measures that involve an object as a vessel for the preference. For instance, Kinzler et al. (2007) showed infants identical toys being offered by two individuals on video. The toys then 'magically' appeared in reality in front of the child, who could then reach and grab one of the toys. Giving and receiving of objects were also used with toddlers (Kinzler, Dupoux, & Spelke, 2012). In these experiments, the dependent measure is the choice of the individual whom child wishes to share an object with (by giving or receiving).

In short, previous experiments on young children's social preferences have been diverse in methods and varied in measurement choices. This variation in methodology poses challenges to systematically answering questions on the topic of social preferences. First, the most successful methods so far have not been direct, and have included the use of an object as a vessel for social preference. Second, comparing and tracking the development of preferences in infants and children of different ages is not easily possible, as the same set of stimuli may be more or less effective with different methods.

As a result of these methodological issues, there is a need for a reliable, stable, and flexible measure of social preferences. The current set of experiments attempts to do just that. Here, we ask whether toddlers demonstrate social and non-social preferences using an interactive, touch-screen paradigm. Our method has been adapted from infant triggered video (ITV for short), a recently developed measure of violation-of-expectation

in infants (Bernard, Luo, & Baillargeon, 2011). In our adapted method, children watch stimuli presented via video on two monitors, angled and equidistant from them. After watching both videos (one on each monitor), they see still pictures of the stimuli, and are given a chance to demonstrate their choice by touching one of the monitors. At this point, they are rewarded with another video of their chosen stimulus.

This measure holds promise for becoming a robust and flexible measure of preferences in early childhood. First, it employs a direct dependent measure of touching the presented stimulus, which bypasses the need for intermediate objects. Second, it could potentially be used with young infants (ITV has been used with infants as young as 6 months of age), and with older children. Finally, the built-in contingency of the measure, namely that the people on video are cued to respond again via a touch from the child, renders the measure more accessible to young children. Children under two years of age fail to attend to people on video in the same manner as people in real life, a characteristic that has been dubbed the 'video deficit' (Troseth, Saylor, & Archer, 2012). However, contingency, a vital aspect that is often missing when interacting with a person on video, is conserved in this method. Taking all of this into account, we will attempt to use this interactive, touch-screen method as a measure for children's preferences by testing children along dimensions for which the direction of the preference is already known. Examining children's preference for engaging individuals (Mumme & Fernald, 2003), Experiment 1 and 2 compare children's preferences for the trait-based social stimuli of engaging vs. boring actors, and also for non-social stimuli - interesting vs. boring objects. Given young children's preference for native speakers (Kinzler et al.,

2007), Experiment 3 uses this methodology to measure young children's preferences for this category-based social preference (native language vs. foreign language speaker).

Experiment 1

This experiment aimed to examine whether an interactive, touch-screen paradigm would be able to tap into toddlers' social and non-social preferences. Toward this purpose, children were shown stimuli on two separate monitors, and trained to choose their favorite stimulus by touching the screen on which it had previously appeared. Using this method, toddlers' preferences for engaging over boring individuals and interesting over uninteresting objects was measured.

Method

Participants. Sixteen children aged 2;6-3;1 (*M*=35 months, *SD*=2.2, 8 female) participated. Participants were recruited from the Cognition and Development Laboratory database of children whose parents had expressed interest in participating in child development research. Data from one additional child was excluded from analysis due to a bias in choosing the actor who spoke first.

Design. The experiment followed a within-subject repeated measures design, and consisted of (a) training phase (2 trials); (b) practice phase (2 trials); and (c) testing phase (8 trials). Each trial began with the presentation of two videos of stimuli (exposure videos), followed by still pictures of the same stimuli. After a choice was demonstrated by touch, a new video (reward videos) showed the chosen stimulus once more.

Materials. Materials consisted of two monitors on which stimuli were displayed, as well as 12 different sets of stimuli videos.

Experiment apparatus. The setup consisted of two monitors on which videos of stimuli pairs were shown. The two monitors were positioned at a 90˚ angle, and placed within 1 inch of each other on a table that was 27 inches high (See Figure 1). Both monitors were framed with a black foam core board, and a sheet of Plexiglas covered both monitor and frame. This was done to hide the monitors' control buttons, and to make them less distracting to the children. The monitors were connected to a Macbook Pro laptop, on which PsyScope software (Cohen, MacWhinney, Flatt, & Provost, 1993) was used to present all stimuli. The monitors were made to act like touch-screens by a control room assistant hidden from the child's view behind the apparatus.

A small video camera was mounted on a tripod and positioned in between the monitors, with only the camera's lens visible to the child. With the help of a fish-eye lens attached to it, the camera provided full view of the child and his or her behavior to the control room assistant on a closed-circuit television. The assistant was blind to which videos the child was viewing, but could hear the stimuli sounds. The child's behaviors, as well as both monitors, were captured on a second camera positioned behind the parent and child. Videos from the two cameras were later merged into a synchronized sequence (see Figure 2 for an example), which was used for coding.

Training materials. There were two trials in the training phase, and their stimuli were chosen such that they would be interesting to children, yet comparable with each other. The exposure videos for the first training trial showed two windup toys (a dog, and a rhino) walking across the screen. The exposure videos for the second trial showed two wooden dancing cows (one white, one black), that moved similarly to each other.

Practice materials. The exposure videos for the two practice trials were simple animations of geometric shapes, accompanied by sound effects, in which the target was objectively more interesting than the distracter (e.g. the target had a larger number of shapes which moved more complex routes).

Testing materials. The testing materials consisted of four social and four non-social stimuli pairs.

Non-social stimuli pairs. Stimuli consisted of pairs of objects (or toys). All objects were novel to the children (see Figure 3). In each pair, target and distracter were matched for their actions in the exposure videos, but the target was a more interesting object than the distracter. Table 1 contains a description of all objects, and the exposure and reward actions for the target. The actions for distracter objects were similar to those for target objects.

Social stimuli pairs. The social block consisted of four exposure video pairs showing the same pair of actors. In each pair, the target actor was engaging, while the distracter actor was boring. Both actors were young Caucasian women who spoke with a standard American accent, and were shown wearing the same color t-shirt as each other on each trial (yellow t-shirts on half the trials, and green t-shirts on the other half).

In the exposure videos, the engaging speaker consistently smiled during speaking, looked at the camera, and spoke in a friendly and child-directed tone. The boring speaker did not smile, occasionally looked away from the camera, and spoke with flat intonation. The content of the actors' speech was similar, and they both spoke about topics interesting to young children (e.g. zoo, playing outside, etc.) (See Appendix A). When it was time for the child to choose, still pictures of the actors matching their persona were

shown, with the engaging actor smiling, and the boring actor showing a neutral expression. Finally, the reward video showed the chosen actor, still in persona, silently engaging in a simple and short activity (flipping through a book, opening a water bottle, opening a present, or playing with a ball). Exposure and reward videos lasted for 9.3 and 5.4 seconds on average, respectively. The match between actor (actor 1 or actor 2) and persona (engaging or boring) was counterbalanced across different children.

Procedure. Children were greeted and welcomed into the lab upon arrival. They were given a chance to play in the lab waiting room while the study was explained to the parent and consent was elicited. In order to keep the procedure consistent across children, and to avoid parent interference, the experimenter instructed parents to:

1. Refrain from speaking about the content of the videos they saw
2. Look straight ahead or down at the child whenever the child had to make a choice
3. Make sure not to angle or position their body in a way that could influence the child's choice.
4. Provide encouragement if the child needed it, and to elicit a response if the child was hesitating by asking a question such as, "Which one is your favorite?"

Upon entering the testing room, parents were asked to sit on a swivel chair facing two flat-screen monitors, and to seat their child on their lap. Once comfortably seated, presentation of the stimuli began. The experiment consisted of a total of 12 trials, with different sets of trials serving different purposes: Trials 1 and 2 were training trials during

which the parent demonstrated the use of the setup. Trials 3 and 4 were practice trials for the child, and trials 5 through 12 were the testing trials.

Regardless of their function, all trials consisted of the same succession of events (see Figure 4 for an example):

1. Two exposure videos were played presenting the alternative stimuli on the two opposing monitors, with one video playing on each monitor.
2. Still pictures of the two stimuli appeared on their corresponding monitors.
3. The first touch to a monitor triggered the play of a reward video of the chosen stimulus on that same monitor, and the still picture of the unchosen stimulus disappeared from the opposing monitor.

Videos were presented centered on a 19" flat-screen monitor, and the area surrounding the video on the monitor was black. There was no delay between playing of the two exposure videos. Side of presentation for the first exposure video was kept constant across children for training and practice trials (e.g. all children saw the first exposure video on trial 1 on the right-hand monitor). However, side of presentation for the first exposure video was randomized across children for experimental trials.

Immediately after the end of the second exposure video, still pictures of the presented stimuli appeared on corresponding monitors. Still pictures were centered on each monitor, and were outlined by a black and white checkered frame. The unoccupied screen area was white, and not black as it had been during video play. At the same time as the pictures appeared, a one-second-long audio file of ascending tones on a harp was heard. On all trials, the white background, the still pictures with the checkered frame, and

the harp sound were used to signify that it was now time to make a choice between the two alternatives.

As soon as one of the monitors was touched, a reward video of the chosen stimulus played on the chosen monitor. The size and manner of play for reward videos was identical to that of exposure videos. On each trial, only one reward video could be watched. However, unbeknownst to the child, both reward videos showed the stimuli objects or persons engaging in similar actions. After the end of the reward video, the subsequent trial started with no delay. Each trial lasted for 30 seconds on average, and the whole experiment took around six minutes.

Training procedure. The first two trials served as training trials for the child, who would learn how to use the setup by observing the parent make a choice. Parents were informed ahead of time that at the right moment during the first two trials, the experimenter would tap them on one of the shoulders. At that moment, they were to touch the monitor on the corresponding side, and say, "This is my favorite." For all children, the parent was guided to choose the right hand stimulus on the first trial, and the left hand stimulus on the second trial. Demonstration of choices on opposing sides was deemed necessary to avoid a side bias in the child's later choices. By touching both monitors, parents demonstrated that both monitors could be chosen and functioned in the same manner, and were thus viable choice options.

Practice procedure. Trials three and four were introduced to give the child a chance to practice performing the task. These trials would also provide the opportunity for more demonstration by the parent if the child failed to learn the task after the first two training trials. It should be noted, however, that most children learned the task

sufficiently well by trial three. At the beginning of the third trial, the child was explicitly told that it would be his or her turn to choose.

Testing procedure. The procedure for experimental trials was the same as other trials. If needed, the child was encouraged to choose one of the two monitors using phrases such as "Touch your favorite one," and "Which one is your favorite?" The experimental trials consisted of two blocks of four trials, with one block showing social and the other block showing non-social stimuli.

Coding. Coding was carried out offline by two coders for these behaviors: (a) the child's chosen response on each trial; and (b) the amount of time the child took to exhibit a touching response. Reaction time was calculated from the moment the still pictures appeared until a touch was visible on one of the screens. Any disagreements between coders were resolved through discussion.

After coding, decisions were made to exclude trials on which a distracting event took place (e.g. parent's cell phone rang), or on which the child the child was not attentive (e.g. child repeatedly talked about unrelated topic during trial).

Results

All participants learned the task during the training phase, and made their own choices starting with the first practice trial on trial 3. In order to determine whether children preferred the target significantly above chance, one-sample t-tests were carried out against chance, which is 50% in our forced-choice paradigm. Children chose the target object 59% of the time for the non-social trails, $t(15) = 1.38$, $p = .18$, and the target actor 55% of the time for the social trials, $t(15) = 0.61$, $p = .55$. Neither of these results is significantly different from chance. Figure 5 shows the results from this experiment.

Additionally, a mixed-model logistical regression analysis was carried out to predict choice (i.e. for target or distracter) as the dependent variable, with trial type as a fixed effect, while order, subject, and trial number were treated as random. Similar to the results from the t-tests this test did not reveal a significant result, b = -.16, SE_b = .36, p = .66, odds ratio = .85.

With regard to reaction time, children took 6.32 seconds to make a choice on social trials, and 5.96 seconds on non-social trials (reaction time data was not available for one child). There is no significant difference between these reaction times, $t(14)=1.30$, p = .22, or between reaction times for trials on which the children touched the target, and those on which they touched the distracter, $t(13) = 1.03$, p = .32[1]. Table 2 shows reaction times broken down by trial type and response.

Discussion

Contrary to our hypothesis, children in Experiment 1 did not show a preference for the more interesting object in the non-social trials, or for the more engaging actor in the social trials, using our newly developed methodology. A potential reason for the lack of observable preferences could be that the difference between the two objects was not salient enough to the children. To address this question, Experiment 2 tested the same research question but used stimuli designed to be even greater in contrast than those used in Experiment 1. For the social stimuli, the engaging actor talked about interesting topics, while the boring actor talked about uninteresting topics. With regard to the non-social stimuli, the target objects were highly familiar characters from children's television shows or movies, while the distracter objects were much less interesting novel toys.

[1] One child chose the target on all trials, so his reaction times for correct and incorrect responses could not be compared.

Additionally, and in an attempt to validate the method as a measure for preferences, children were also asked explicitly about their preferences immediately following the task.

Experiment 2

The second experiment once again aimed to measure children's social and non-social preferences using an interactive, touch-screen paradigm. The materials were similar in theme to Experiment 1, but the relative interestingness of the target to the distracter was increased. Additionally, following the procedure, children were shown the stimuli again (photos of the actors from the social trials, and the real objects from the non-social trials), and explicitly asked about their preferences.

Method

Participants. Sixteen children aged 2;6-3;0 (*M*=33 mos, *SD*=1.8; 10 female) participated in this experiment. Children were recruited from the same population as Experiment 1.

Design. The design was the same as that of Experiment 1.

Materials. The experiment apparatus was the same as for Experiment 1. Twelve pairs of stimuli were shown in videos, and are described in detail below.

Training and practice phase materials. The materials for these trials were identical to those of Experiment 1.

Testing phase materials. The materials for the experimental trials were similar to those of Experiment 1, but with some changes, described below.

Non-social stimuli pairs. In each pair, the target object was a recognizable character from a children's television show or movie. Each target object was matched

with an unfamiliar object or toy, which was visually less interesting than the target. Parents were not asked if their child knew the target characters, but even if a child was unfamiliar with a character, the target object was more visually appealing. The four stimuli pairs were: Thomas the Train Engine vs. a green wooden block with two round holes, Dora the Explorer vs. a generic wooden figurine, Nemo vs. a red plastic container, and Elmo vs. an orange sponge (see Figure 3).

In each exposure video, the object was visible at the corner of the shot at the beginning. Then, a hand took the object and placed it in the center of the shot. If chosen, a hand was shown performing a simple action on the object. Exposure videos and reward videos for objects lasted for 5 seconds each.

Social stimuli pairs. In addition to the differences between the two speakers in Experiment 1, the content of the actor's speech was also made different. The engaging speaker used sentences that were used by both actors in Experiment 1, which talked about interesting topics (e.g. going to the zoo, playing outside). She always began by saying "hi" or "hello", and finished her speech by asking a question (e.g. "Do you like going to the zoo?"). The boring actor, on the other hand, spoke about uninteresting topics (e.g. pouring water into a glass). She did not greet the child at the start of her utterance, and did not ask a question at the end. For all engaging and boring sentences, see Appendix A.

Procedure. The procedure was identical to Experiment 1. As there was no difference based on order of blocks (e.g., social first or non-social first) in Experiment 1, order of block was not counterbalanced in the current experiment, and all children saw the non-social trials first.

After children completed the task with all 12 trials, they were questioned about the stimuli explicitly by the experimenter. For the social stimuli, the experimenter showed the child printed pictures of both actors, in which the engaging actor was smiling, and the boring actor was not. She then told the child that she intended to give a present to the child's favorite person, and encouraged the child to point to their preferred actor. After this, the experimenter showed the child with the same pairs of objects presented in the videos, and asked the child which one he or she preferred.

Coding. Data were coded in the same manner as Experiment 1.

Results

Children chose the target objects 64%, demonstrating a significant preference for the target objects, t(15) = 2.18, p = .045. However, once again, they did not show a preference for the engaging actor, choosing the target only 50% of the time, $t(15) = .00$, p = 1.00. Reaction times for non-social and social trials were 4.63 and 5.83 seconds respectively (see Table 2 for more detailed reaction times), which were not significantly different from each other, $t(15) = 1.13$, p = .27, nor were differences significant between correct and incorrect responses, $t(15) = .77$, p = .44. A logistic regression analysis did not reveal significant results, and thus will not be reported here.

With regard to the explicit questions, the target actor was chosen 53%, while the target objects were chosen 68% of the time, which is significantly above chance, $t(15) = 2.55$, p = .022. The correlation between choices on the video task and explicit choices was .31. Testing this correlation coefficient revealed that it was not significant, $t(14) = 1.22$, p = .24.

Discussion

Children in this experiment did not show a preference for the engaging actor, even though the difference between actors was increased from Experiment 1. However, children did show preferences for interesting non-social stimuli when the difference between the target and the non-target was very strong. Children may have shown this preference as a result of the added interestingness of the target objects. Alternatively, children may have showed this preference because the target objects were familiar, and it was easier for them to recognize their preferences for the target.

If the first reason is correct, there is no reason to think that this measure (in its current form) will be able to measure social preferences, especially because the stronger social stimuli in Experiment 2 did not elicit preferences. However, if preferences are observed because of the second reason, the current measure may be able to tap into social preferences when recognizing preferences takes less effort for children. Put differently, children may have not shown a preference for the target actor in the social trials because the evaluation was too difficult. To highlight where this difficulty may come from, it is important to note that in order to show a preference for the engaging actor over the boring one, children should process the behavior of both actors, and then apply that information in a comparative evaluation between the two. However, children may have more success at demonstrating a preference for the target actor using this measure if processing the actor's behavior were made easier. Language-based social categories are would be a suitable test case for this. If children prefer people who speak their language, they may have cohesive language-based category representations. Thus, when viewing a new individual, recognizing the individual's language group membership should be relatively automatic. In fact, children will only need to categorize language out-group members.

After all, they come across unfamiliar language in-group members all the time. Thus, they need to evaluate an individual's language group membership only when faced with a foreign-language speaker. As a result, measuring category-based social preferences may be more suited to the current methodology. This possibility was explored in Experiment 3.

Experiment 3

Method

Participants. Twenty-one monolingual children aged 1;5-3;11 (*M*=32.2 months, *SD*=12; 8 female). An additional 10 children excluded due to side bias (4), distraction (2), technical issues (1), and failure to finish task (3). Children were recruited from the same population as Experiments 1 and 2.

Design. The design was the same as that of Experiment 1.

Materials. The experiment apparatus was the same as for Experiments 1 and 3. Different pairs of stimuli were shown on different trials, and are described in detail below.

Training phase materials. The training stimuli for this experiment showed the same windup toys (dog and rhino) as in trial 1 for Experiments 1 and 2.

Practice phase materials. Four pairs of interesting and boring objects, similar to those used in the non-social trials in Experiment 1 were shown to the children. In this experiment, these trials were only for practice purposes, and their data were not analyzed.

Testing phase materials. Four pairs of speakers were shown to children. In each pair one actor spoke in English, while the other spoke in a foreign language. The languages spoken were French, Spanish, Portuguese, Korean, Thai, Mandarin, Hebrew, and Urdu. Each child heard four of these languages, while the speakers of the other four languages spoke English. All actors were native bilinguals, and had standard American

accents when speaking English. All actors spoke in infant-directed tone and smiled when speaking.

Procedure. The general procedure for this experiment was similar to Experiments 1 and 2. However, in order to keep parents blind as to who the native language speaker was, headphones were used. Parents were instructed to close their eyes whenever they heard music through the headphones. Music was played when the actors were speaking, but not when the child was choosing or during the silent reward videos. Thus, parents were unable to see or hear the actors when they spoke, but they could see their child making a choice, and watch the reward video with the child.

Training procedure. The training trial for this experiment showed two toys, but the opportunity to make a choice was offered thrice. After watching both exposure videos, the parent was asked to choose the right hand stimulus (i.e. the dog). After the reward video played, the still pictures appeared again, and this time the parent was asked to choose the left hand stimulus (i.e. the rhino). The third choice point was offered to the child, who was encouraged to make a choice by touching one of the monitors.

Testing procedure. The testing phase procedure was the same as the previous experiments.

Coding. Children's choices as demonstrated by first touch were coded, as well as the amount of time they attended to the exposure videos.

Results

On average, participants were inattentive during the exposure videos for 1.01 seconds for the English speakers, and for 1.47 seconds for the foreign language speakers, which were significantly different from each other, $t(82) = 2.29$, $p = .02$. Children chose

the native language speaker 61%, which was not significantly different from chance, $t(20) = 1.37$, $p = .18$. There were no speaker pair effects, and no trial order effects.

Discussion

The results from Experiment 2 showed that children preferred familiar, interesting objects to novel, non-interesting objects in an interactive, touch-screen paradigm. If children demonstrated these preferences because it was easier for them to recognize their preferences when the object was familiar, they may have been able to show social preferences when the target actor was familiar (i.e. she spoke their native language, like all other adults they knew). However, in Experiment 3, children did not show a preference for the native language speaker over the foreign language speaker. Interestingly however, they did attend for longer times to the English speaker, indicating that they did notice a difference between the two speakers. Despite this however, they did not prefer the English speaker when making a choice.

General Discussion

Exploring infants' and young children's developing social preferences can enrich our understanding of the mechanisms behind social cognitive development. In this field, measuring preferences at each age presents its own challenges. The current set of studies aimed to adapt an interactive, touch-screen method to measure social and non-social preferences. In this method, children were shown videos of stimuli items on two monitors, and then given the chance to touch the screen of their preferred item. They would then be rewarded with another video of their preferred item.

With regard to the non-social stimuli, children did not show a preference for target objects that were more interesting than their paired distracters (Exp. 1). However,

they did prefer target objects when they were highly familiar characters from television programs and movies (Exp. 2). In terms of the social stimuli, young children failed to show preferences for an individual who was more engaging than the non-target individual (Exp. 1), even when the degree of engagingness was increased (Exp. 2). Additionally, children did not show a preference for an individual who spoke in their native language (Exp 3).

These surprising findings fail to fulfill the initial aim of this study, which was to develop an interactive, touch-screen method as a reliable measure for social preferences. This method was examined because it was seen as a highly intuitive and simple task in which children could demonstrate their preferences. This is because it is reasonable to assume that, if someone has a preference between two items, he or she would opt to see the preferred item for a longer amount of time. However, the current experiments do not reveal such a pattern in children's choices between individuals.

It is possible that the current paradigm is in fact able to measure preferences, but considering the number of children in our experiments, and the number of trials they each saw, there was not enough statistical power to detect significant preferences. However, as other methods have found significant results with similar sample sizes and trial numbers (e.g. Kinzler et al., 2007), our paradigm–even if underpowered—is unsuccessful at acting as a robust measure for preferences.

To examine the possible reasons for the current findings, it is fruitful to consider the different stages at which the method could have fallen short of its intended goal. First, children may have not understood how to perform the task, or not understood that they could demonstrate preferences using this task. Second, children may have not had a

strong preference for the stimuli used in these experiments. Third, they may have a preference for the stimuli, but choose not to act on it in their manifested choices. These possibilities are explored in more detail below.

First, the method could be ineffective in its current format, because children may not have learned the task correctly. Admittedly, since almost all children learned how to operate the videos after demonstration by their parent, they learned the basics of the task well enough. However, they may have approached the task with a different purpose in mind than to demonstrate their preference, in which case it could be argued that they did not learn the task the way it was intended to be learned. Perhaps the lack of observable preferences using our method stems from the *action* that elicits a preference. In all experiments, children learned to choose one of two items by touching the screen it had appeared on. In contrast to giving and receiving objects, which are highly common ways of interacting with others, touching or tapping someone is a less natural mode of social interaction. This, in addition to watching individuals on video (instead of live), may have made the situation less socially relevant to young children than was needed. If this is the case, children would not have experienced adequate social connection to the target individuals, and chosen the target and distracter actors equally as a result. In other words, children may have not made all their choices in this paradigm based on their social preferences. They may have acted on preferences in some trials, and on curiosity in others. Even if this is the case, however, the current data is unable to differentiate between such bases for children's choices.

Second, children may have not had a strong preference for the target individuals in our stimuli, and not demonstrated the predicted pattern of preferences as a result of that.

The fact that children significantly preferred the highly familiar and interesting target objects in Experiment 2 would support this possibility, as they have strong preferences for these objects. Thus, perhaps this paradigm is only able to measure preferences when the difference in valence between paired objects is particularly strong. If so, according to our lack of observable social preferences, none of the social stimuli targets used across our three experiments were desirable enough to invoke a preference. Consequently, it may be that children would show predictable preferences if even stronger differences could be shown between two individuals in the stimuli videos (e.g. an engaging and happy person vs. a mean and angry person). Meanwhile, other studies employing different dependent measures have been able to tap into social preferences with video stimuli similar to ours (e.g. English vs. foreign language speakers). Thus, we know that young children *are* sensitive to the difference between the social stimuli we have shown them. Consequently, if the reason for the current unexpected findings is that the method is not sensitive enough, following up with this method would not be fruitful.

Third, perhaps children learn the task well enough to recognize that what was asked of them is their preference, and did in fact have a preference between the paired individuals, but elected not to demonstrate that preference. There could be two reasons for this. First, perhaps the reward is not socially salient enough to make the choice worthwhile. Children may be motivated to show a social preference only if the choice has relevant repercussions (e.g. choosing food), but perhaps watching a short and relatively neutral video is not rewarding enough to merit a real and well-considered choice. If this is the case, future experiments can change the format and content of the reward videos to make them more appealing to children. If the reward videos for the target actor were

made appealing enough, children would be more motivated to demonstrate choices that would guarantee them a chance to watch those videos. Second, children may not choose the target actor out of curiosity for exploring the distracter actor. In our experiments, children are welcomed into a highly stimulating and engaging environment, and subsequently performed the experiment while seated on their parent's lap. Thus, the situation is a highly positive one, and one in which it is exceedingly safe to explore. So, although social preferences exist in early childhood, they may manifest in differing degrees depending on the situation. Perhaps children demonstrate these preferences in most situations (as they have done in previous experiments), but opt to explore out-group members and less socially desirable individuals in our setup which combines several reassuring elements such as a positive and safe situation, close proximity to parent, interacting with social partners on video instead of live, and low cost of choosing distracter individuals. If this is the case, it may suggest that although social preferences are robustly present in early childhood, they fail to surface in specific situations. It may be that, although young children prefer in-group members and socially desirable individuals, there are also many situations in which they are willing to overcome their bias against these 'others' and explore less direct social engagement with these individuals. For instance, 18-month-old children are just as likely to imitate native language speakers as foreign language ones (Howard & Woodward, 2012). In conclusion, although other experiments are needed, the current findings may provide initial evidence for the resilience of children's interest towards other social partners, regardless of their group status or dispositions.

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Table 1. Description of target and distracter objects, and target actions used in Experiment 1

Target	Distracter	Exposure action for target	Reward action for target
Multi-colored wooden train wagon	Blue wooden block	Rolled along table three times	Slid across the table
Orange & green stick that made a sound when moved	Blue ruler	Held up, then turned upside down three times	Shaken back and forth
Multi-colored spin top	White crumpled paper	Half-spun in clockwise and counterclockwise directions 3 times, then spun for 2 seconds	Spun once
Red cylinder with fuzz ball on top, mounted on a spring	Green cylinder	Red top pulled down to function spring three times	Object picked up, and swayed back and forth

Table 2. Reaction times from onset of still pictures to touch (sec), broken down by experiment, trial type, and response.

	Trial type		**Response**	
	Social	Non-social	Target	Distracter
Experiment 1	6.32	5.96	6.54	5.10
Experiment 2	5.83	4.63	5.23	4.61

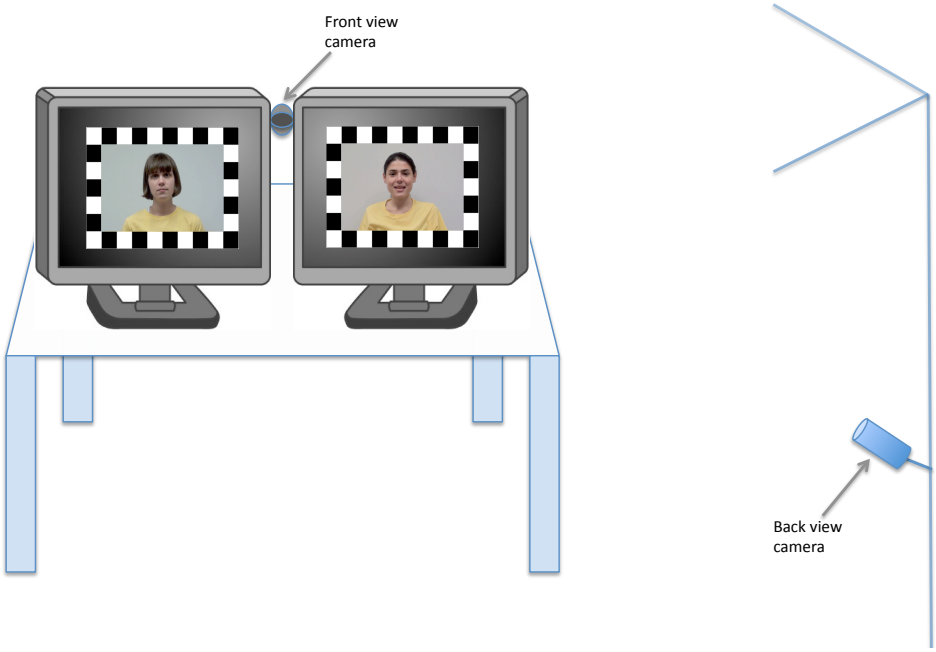

Figure 1. Schematic of methodology used in all three experiments

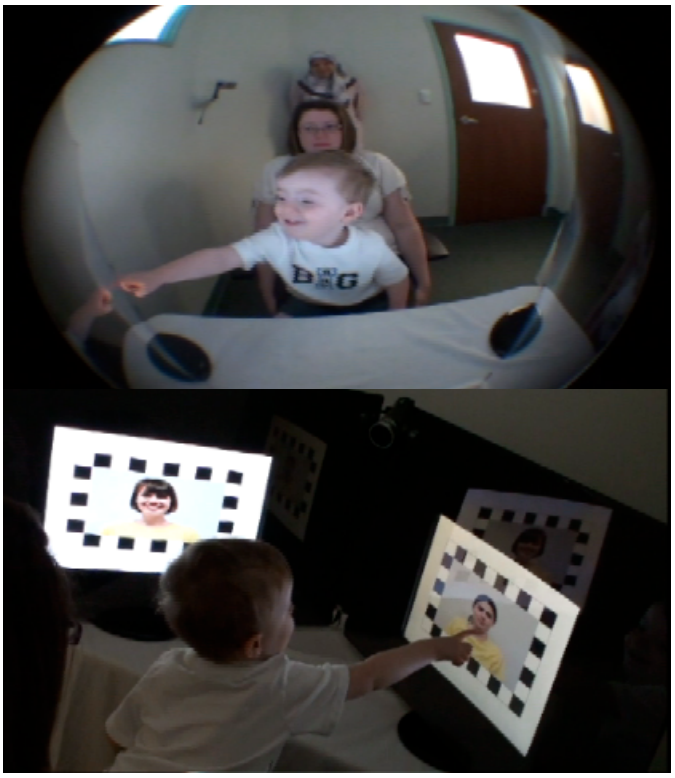

Figure 2. View of the child making a choice by touch from control room assistant's view (top), and from back camera (bottom)

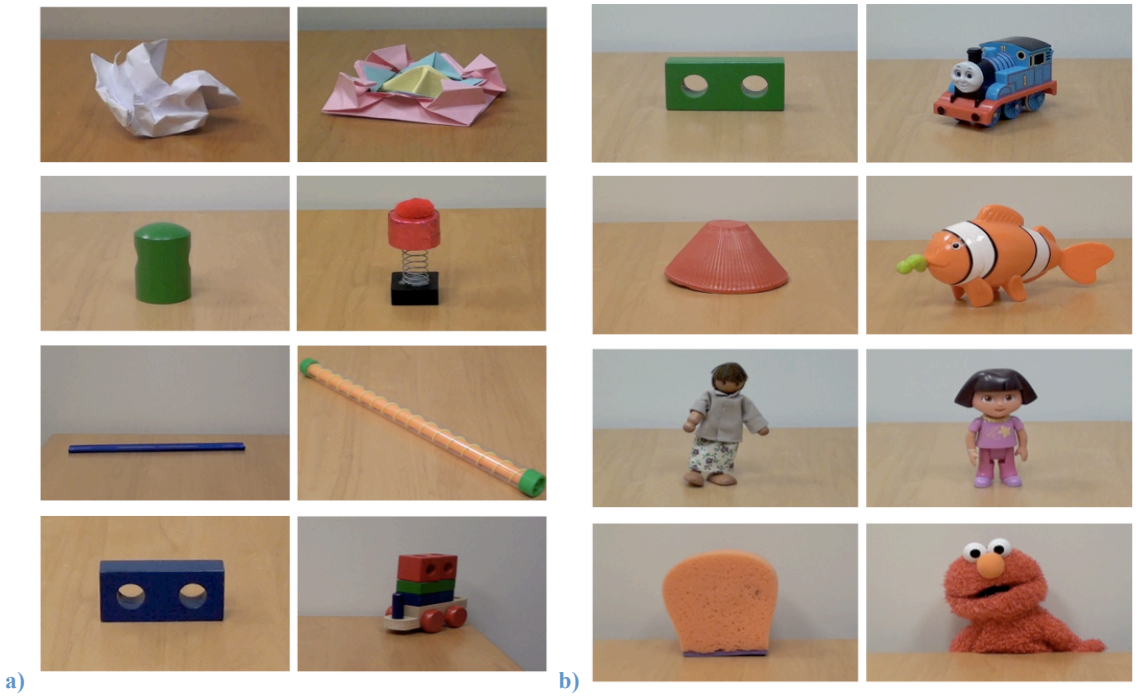

Figure 3. Non-social stimuli pairs with target on right and distracter on left for Experiment 1 (a), and Experiment 2 (b).

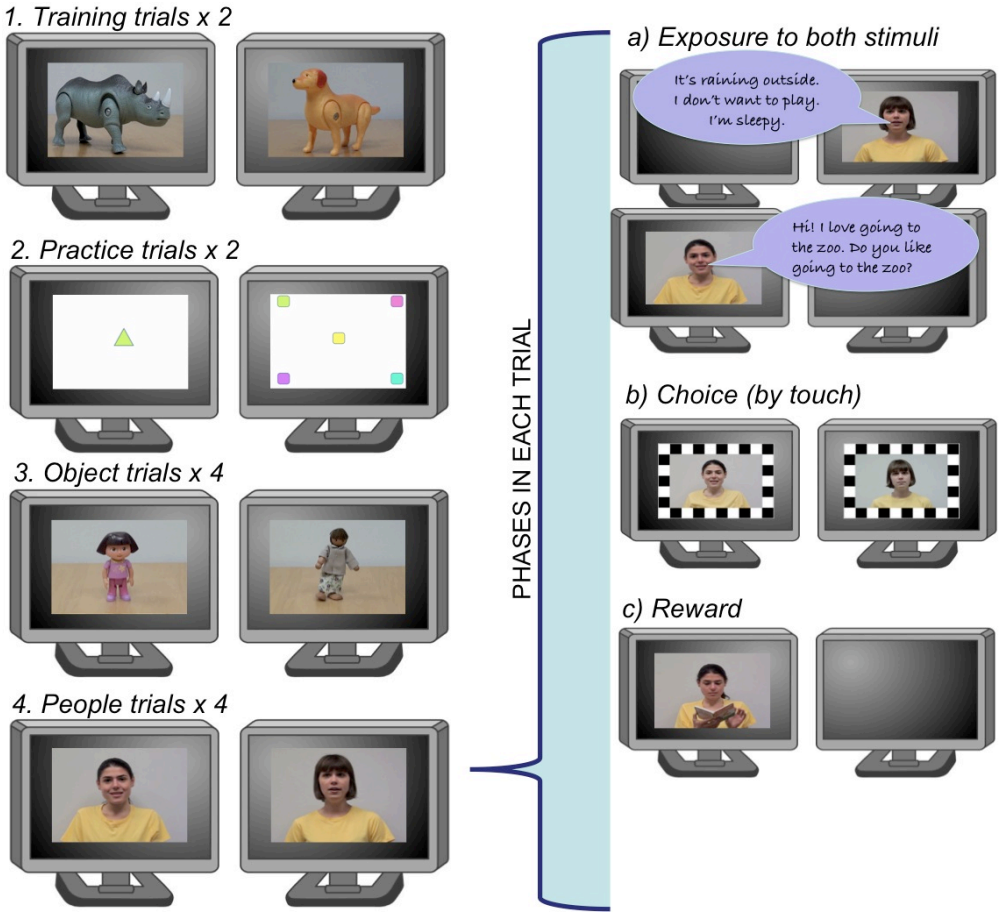

Figure 4. The procedure, and different stages of each trial, demonstrated here for a sample social trial from Experiment 2.

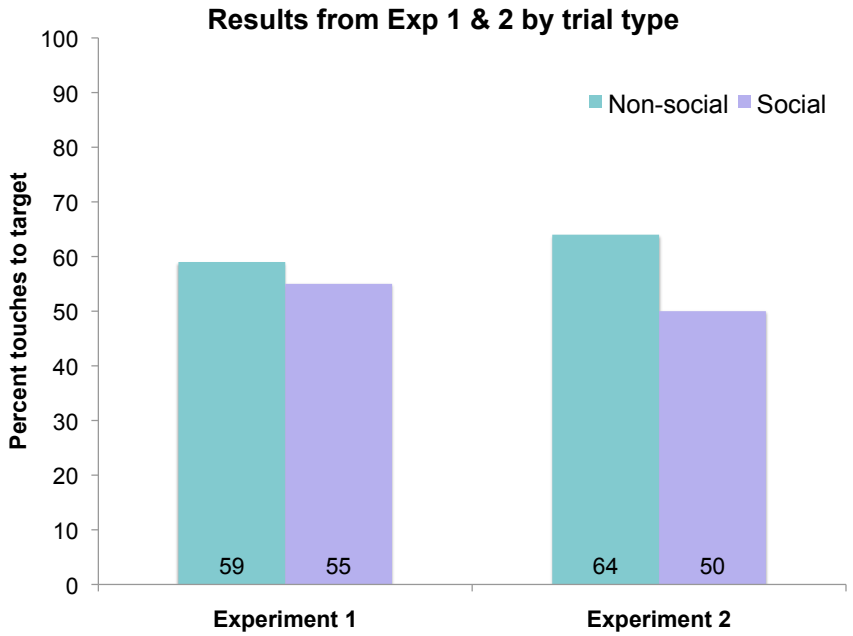

Figure 5. Percent correct choices to target as demonstrated in Experiments 1 and 2, broken down by trial type.

Appendix A

Content of speech spoken by engaging and boring actors

Engaging content. These sentences were spoken by target and distracter actors in Exp. 1, and by target actor only in Exp. 2:

1. Hello! It's a beautiful day outside! The sun is shining, and the birds are singing. I love playing outside! Do you like playing outside too?
2. Hi! I saw a nice dog in the park today! He was brown and he had a tail! He said 'woof woof'! Did you see a dog too?
3. Hi! There are lots of animals at the zoo! There are elephants, and tigers, and bears! I love going to the zoo! Do you like going to the zoo?
4. Hi! Birds can fly in the sky. Birds are pretty, and they sing. I saw some birds today. Did you see any birds today?

Boring content. These sentences were spoken by the distracter actor in Exp. 2:

1. It's raining outside. I don't want to play. I'm sleepy. I'm going to take a nap.
2. I can't find my shoes. They were in my room before, but they're gone now. I'm wearing just socks.
3. I went in the basement, and washed all the towels. They were dirty. Now, they are clean.
4. I poured water into my glass. It was empty before, but now it's full. The water is cold.