

“Are You *Really* Sad?” Infants Show Selectivity in Their Behaviors Toward an Unconventional Emoter

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We examined whether 18-month-olds understand how the emotional valence of people's experiences predicts their subsequent emotional reactions, as well as how their behaviors are influenced by the reliability of the emoter. Infants watched a person express sadness after receiving an object that was either inappropriate (conventional emoter) or appropriate (unconventional emoter) to perform an action. Then, infants' imitation, social referencing, and prosocial behaviors (helping) were examined when interacting with the person. Results showed that during the exposure phase, the unconventional group showed visual search patterns suggesting hypothesis testing and expressed less concern toward the person than the conventional group. In the social referencing task, the conventional group preferred to search for the target of a positive expression as opposed to the disgust object. In contrast, the unconventional group was more likely to trust the person's negative expression. As expected, no differences were found between the groups on the instrumental helping tasks. However, during the empathic helping tasks, the conventional group needed fewer prompts to help than the unconventional group. These findings provide the first evidence that the congruence between a person's emotional responses and her experiences impacts 18-month-olds' subsequent behaviors toward that person.

Children constantly observe and interact with others to gain knowledge about the world (e.g., Csibra & Gergely, 2009; Harris & Koenig, 2006). As not all individuals have accurate or relevant knowledge about a given topic, children must be selective in whom they choose to learn from (Harris, 2007). Thus, understanding the developmental factors that underlie infants' ability to selectively choose whom to learn from becomes a critical component of our understanding of how children learn. Evidence for selective trust has begun to be documented during the infancy period. For example, 8-month-olds are able to monitor the reliability of an individual's gaze and prefer to

follow the gaze of a conventional looker (Tummeltshammer, Wu, Sobel, & Kirkham, 2014). Research examining selective trust during the second year of life has shown that 14-month-olds prefer to imitate an irrational action from a model who properly uses a familiar object (Zmyj, Buttelmann, Carpenter, & Daum, 2010), 16-month-olds look longer at a person who mislabels objects (Koenig & Echols, 2003), and by 18 months, infants are more likely to imitate an irrational action and learn new words from an accurate rather than an inaccurate speaker (Brooker & Poulin-Dubois, 2013).

While these studies used object labeling, gaze, and object use as a source of reliability for infants, previous work has shown that it is also possible to examine children's sensitivity to people's behaviors in the emotional domain, by manipulating the appropriateness of emotional expressions. Infants are sensitive to emotional expressions in the first few months of life, and they rely on others' emotional cues to regulate their behavior by the end of the first year (Feinman, Roberts, Hsieh, Sawyer, & Swanson, 1992; Hornik, Risenhoover, & Gunnar, 1987; Walden & Ogan, 1988). In a recent study, 18-month-old infants, but not 15-month-olds, showed more checking behaviors when they observed an actor exhibiting an emotional reaction (happiness or sadness) that was unexpected after a positive or negative experience (Chiarella & Poulin-Dubois, 2013). More specifically, infants detected the incongruencies of an individual displaying Pollyanna-type behaviors (i.e., positive emotional expression to an object loss or pain event) or crybaby-type behaviors (i.e., negative emotional expression after receiving an object). Interestingly, another recent study reported that infants as young as 14 months show increased pupil dilation when they witness an actor expressing emotions that are incongruent with the valence of their ongoing actions (e.g., patting a toy tiger with an angry expression), suggesting some lower level processing of emotion–context associations that may be leading to sympathetic arousal (Hepach & Westermann, 2013). Similarly, 10-month-olds have been shown to be sensitive to a cartoon's facial expressions after either successfully or unsuccessfully achieving a desired goal (e.g., sadness after successfully jumping over a barrier; Skerry & Spelke, 2014). Interestingly, an absence of emotional display following a negative event (object loss) is not considered anomalous, even by 18-month-olds (Chiarella & Poulin-Dubois, 2015). Together, these studies show a developmental progression in the ability to detect action–emotion mismatches.

The selectivity of infants' responses toward individuals who demonstrate conventional or unconventional emotional cues has just started to be examined (Poulin-Dubois & Brosseau-Liard, 2016). In the first investigation on infants' behavior as a function of emotional reliability, Chow, Poulin-Dubois, and Lewis (2008) exposed 14-month-olds to either a conventional emoter, who expressed positive affect while looking inside a box that held a toy, or an unconventional emoter, who expressed positive affect while looking inside an empty box. Then, infants watched the same adult gaze behind a barrier. Infants were more likely to follow the gaze of the conventional looker behind the barrier (Chow et al., 2008). In a task using similar emotional reliability conditions, infants watched the same adult turn on a push-on light in an unconventional manner, using her forehead to illuminate the light (Poulin-Dubois, Brooker, & Polonia, 2011). In this case, infants were more likely to imitate the unconventional action if the adult had previously exhibited conventional emotional behavior while looking inside the container. These findings suggest that by 14 months, infants are selective in whom they choose to imitate and whose gaze they choose to follow. However, the conventionality of the emotional expressions had a direct impact on the child,

as he or she was repeatedly deceived about the content of the box, which was empty. Thus, one might argue that infants' reluctance to follow the gaze or imitate the model was result of this deception. To address this confound, this study examined infants' selective trust toward an emotional emoter who did not interact with the child but expressed sad emotions that did or did not match their current experience.

A well-established finding in the literature is that infants begin to engage in prosocial behaviors during the second year of life (Dunfield, Kuhlmeier, O'Connell, & Kelley, 2011; Warneken & Tomasello, 2007). For example, infants as young as 14 months demonstrate instrumental prosocial behaviors (Warneken & Tomasello, 2007), and by 18 months, they add empathic helping to their prosocial repertoire (Svetlova, Nichols, & Brownell, 2010). In a more recent study, Hepach, Vaish, and Tomasello (2012) had 3-year-olds watch an adult consistently express sadness in either an appropriate (harm), neutral (no visible harm), or inappropriate (minor harm) context. Although the original goal of their study was to document the conditions required for children to exhibit empathic responses, they also found that children were more likely to show checking behavior (i.e., to decipher what occurred) when the sad reaction mismatched the context, or what they refer as crybaby behaviors (minor harm), or when the children were unaware of what had occurred (no visible harm), compared to when they saw appropriate distress following harm (harm condition). They were also faster to help the conventional emoter than the unconventional emoter in a subsequent prosocial task. Although these studies have provided a starting point for this line of research, there is no research regarding the effect of a model's emotional displays on infants' prosociality, similar to the one demonstrated with preschoolers (Hepach et al., 2012). Given that it has been shown that infants detect emotionally unconventional individuals (Chiarella & Poulin-Dubois, 2013; Hepach & Westermann, 2013; Skerry & Spelke, 2014), it remains unknown whether watching an individual display mismatching or matching sad reactions to a positive event will decrease infants' spontaneous willingness to help that person. Thus, one of the main objectives of the current study was to examine infants' selective helping behaviors toward emotionally unconventional individuals across different helping contexts, including both nonemotional, goal-oriented instrumental helping (Warneken & Tomasello, 2007), and emotional, empathic helping (Svetlova et al., 2010). Based on previous research (Chiarella & Poulin-Dubois, 2013), it was expected that 18-month-old infants would be able to identify the object required to complete a simple action (e.g., spoon for eating) and correctly infer whether an actor's sad emotional expression is appropriate if she receives the target object (e.g., a spoon) or a distracter (e.g., a block). It was hypothesized that if infants detect a mismatch between an event and the emotional reactions, this detection will lead infants to show less concern toward the sad individual and more visual search behaviors while looking at the scene. Nonverbal behaviors such as visual search patterns while looking at an event are observed in infants as young as 12 months and interpreted as an attempt to comprehend distress (Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992). If this detection occurs, we predicted that infants' subsequent willingness to help the emotionally unconventional individual would be specific to a context where requests for help are expressed through emotional expressions of distress. In contrast, emotional unreliability was not expected to affect instrumental helping, a form of prosocial behavior known to be very robust in very young children (Warneken & Tomasello, 2007).

The second major focus of this study was to examine the extent to which infants' imitation and social referencing are selective toward an individual who has previously

expressed sadness in an inappropriate context. While a number of recent studies have shown that infants' learning is influenced by an individual's past expertise and competence, we have yet to understand whether emotionally unconventional individuals influence infants' willingness to learn. Thus, we examined whether 18-month-olds' exposure to an emotionally unconventional individual impacts their responses toward that person during a social referencing task. Infants have been shown to use others' emotions to guide their behavior in ambiguous situations as early as 12 months of age (Campos & Stenberg, 1981). Moreover, in an emotional referencing paradigm, Repacholi (1998) showed that when presented with two containers, 14- and 18-month-olds are more likely to initially search the container previously associated with a "happy" expression, compared to a container associated with a "disgust" emotional expression. This suggests that infants as young as 14 months are able to use both the experimenter's attentional cues and their emotional expressions, in order to predict the nature of the referent that is the focus of their attention. However, it remains unknown whether infants' experience with an emotionally unconventional individual would impact their powerful tendency to first look inside the box associated with a positive emotion.

Given that a major objective of this study was to examine the extent of 18-month-olds' selective behaviors, infants' willingness to gain information from the emoter was also investigated using a classic imitation task for assessing episodic memory in infants (Bauer & Mandler, 1989). Examining imitation was deemed important to rule out a simple halo effect, that is, a negative bias toward the unconventional model or a positive bias toward the conventional model (who always received the nontarget object in the reliability exposure phase). In contrast to the rational imitation task used in previous research on selective trust (Poulin-Dubois et al., 2011; Zmyj et al., 2010), the imitation task does not require infants to choose between the models' novel action and a conventional action. Rather, the Bauer and Mandler (1989) task simply requires the infant to replicate a three-step action produced by the actor. The inclusion of this task (as well as the instrumental helping task) allowed for an investigation of whether emotional unreliability might influence infants' selective behavior in a nonemotional context, providing a strict test of the impact of the model's emotional conventionality.

METHOD

Participants

Eighty-six 18-month-old infants ($M = 18.2$ months, $SD = .68$ months, range = 17.1–19.6 months) participated in this study. In order to be included in the final sample, infants were required to watch three of the four reliability exposure trials. Thirteen infants did not meet the inclusion criterion (0/4 trials $n = 2$, 1/4 $n = 3$, 2/4 $n = 8$; conventional: $n = 7$, unconventional: $n = 6$), leaving a final sample of 73 infants (conventional: $n = 37$, unconventional: $n = 36$; 46 males, 27 females). The two groups were equivalent in age: $M = 17.1$ months, $SD = .74$ months, and $M = 17.1$ months, $SD = .61$ months for the conventional and unconventional groups, respectively. This study was conducted according to guidelines laid down in the Declaration of Helsinki, with written informed consent obtained from a parent or guardian for each child before any assessment or data collection. All procedures involving human subjects in this study were approved by the University Human Research Ethics Committee at Concordia University.

Materials and procedure

Infants and their parents first spent a brief period of time in a waiting room to familiarize themselves with the two experimenters, who were warm without excessive positive affect. Parents were asked to sign a consent form and complete a short demographic questionnaire. Infants' expressive vocabulary was measured using the Level II short form of the MacArthur-Bates Communicative Development Inventory: Words and Sentences (MCDI: WS), a parent report checklist of language comprehension and production developed by Fenson et al. (2000). They were then invited to the testing room. Infants were seated in a high chair, and parents were asked to sit behind and to the left of the infants. They were instructed to remain neutral and keep their eyes on the stage so as to maintain the infants' attention to the events. A screen (controlled by E2) was lowered between trials, and a small bell was rung at the onset of each trial to attract infants' attention back toward the stage.

Reliability task

During the reliability task, an apparatus resembling a puppet theater was used to display a female experimenter acting out four live events. The four events were expected to be familiar to infants of that age, so that they could identify which object would be appropriate to complete the actions (e.g., spoon to eat). Infants observed the scene from a child seat placed 90 cm from the display. A video camera placed underneath the stage was focused on infants' faces to record looking times and behaviors. All infants were administered four trials, during which the experimenter tried to complete an action without the required object: Play-Drums, Play-Pegs, Eat-Spoon, and Play-Ball (all trials were counterbalanced across participants). Each trial lasted 20s and included two phases, a familiarization (10s) and a test phase (10s). During the familiarization phase, infants watched as the experimenter pretended to complete an action without a target object, then received either an appropriate or an inappropriate object. During the test phase, the experimenter always expressed sadness (based on Ekman, Friesen, & Ellsworth, 1972) once she received the object.

On each trial, the experimenter was positioned to the left side of the "puppet theater" stage. She had one object located in front of her and two objects located on the right-hand side of the stage, blocked from her view by a small barrier located in the center of the stage. In the Play-Drums familiarization phase, the experimenter mimicked beating a toy drum with an invisible drumstick and then sighed audibly in frustration before peering over the barrier at the two objects. These objects consisted of a drumstick (appropriate object) and a brush (inappropriate object). This sequence of actions was repeated twice. A gloved hand then entered the scene through the right-hand side of the stage and handed the experimenter either the drumstick (unconventional condition) or the brush (conventional condition). As she looked at the toy, she exclaimed "Ah" (unconventional condition), with a higher pitch to mimic a pleasant tone, or "Oh" (conventional condition), with a lower pitch to mimic disappointment, before taking the object from the hand (with a neutral facial expression). The same vocalizations were included before grasping the object in all events in order to emphasize that the object received was either appropriate or inappropriate to maximize the ecological validity of the scene. In the Play-Pegs familiarization phase, the experimenter mimicked hammering a set of pegs twice, sighed, and then peered over the

barrier at the two objects, which included a hammer (appropriate) and a cup (inappropriate). Then, the arm offered either the hammer or the cup, again followed by vocalizations. In the Eat-Spoon familiarization phase, the experimenter twice mimicked eating from a bowl of rice, and again sighed and looked over at the objects available, which included a spoon (appropriate) and a wooden block (inappropriate). E2's gloved hand then handed either the spoon or the block. In the Play-Ball familiarization phase, the experimenter twice mimicked bouncing a ball up and down, sighed, and then peered over the barrier at the two objects which included a ball (appropriate) and a plastic bowl (inappropriate). The gloved hand then handed either the ball or the bowl. The test phase of each trial lasted 10s and started as the experimenter turned her head, expressed sadness while holding the object in her left hand, then looked downward with a frozen sad expression. The experimenter avoids looking at the child in order to avoid attracting the infant's attention to her face and eyes, as well as to reduce infants' arousal during the negative facial expressions. The test trials ended by lowering a screen.

The four trials of the reliability task were fully counterbalanced, and each infant was randomly assigned to either the conventional or unconventional condition. Following the reliability task, infants in both groups engaged in the same four interactive tasks with the same experimenter. They remained seated in a high chair that was placed in front of a table across her. There were four orders for the interactive tasks, whereby each of the four tasks was administered first in the set. The remaining tasks were quasi-counterbalanced into four different orders.

Coding of the reliability task. The percentage of looking time at the stage (which included the actor's face and hand) during the familiarization phase (i.e., when the event occurred) and the test phase (i.e., when the actor was expressing the target emotion) was coded for each trial using INTERACT 8.0 (Mangold, 2010). Two other variables, hypothesis testing and concern, were coded based on adaptations of the coding scheme developed by Zahn-Waxler et al. (1992). Hypothesis testing was assessed by examining infants' sequence of looking behaviors at the event. Looking behaviors are considered a primary variable for hypothesis testing as they appear to be a sign of very young children attempting to attribute a cause to a particular event (e.g., see Hepach et al., 2012; Knafo, Zahn-Waxler, Van Hulle, Robinson, & Rhee, 2008; Zahn-Waxler et al., 1992). Hypothesis testing was coded on a 4-point scale: 0 = none; 1 = looks back and forth between face and object or hands at least twice, in an attempt to decipher the distress; 2 = looks back and forth between face and object or hands more than twice in a more frequent attempt to decipher the distress than 1; 3 = looks back and forth between experimenter's face and object at least twice, in addition to a back and forth look toward the parent in the room or looks back and forth between parent and the actor at least twice, in a more frequent attempt to decipher the distress than 1 or 2. Concern included infants' observable preoccupied responses. Given the nature of the exposure phase (the sadness expression was only 10s in length) and that infants were seated in a high chair rather than standing, the concern variable coding was reduced from the original 5-point scale (which included different intensities and lengths, in seconds, of concern; Zahn-Waxler et al., 1992) to a 3-point scale: 0 = none; 1 = facial concern only (e.g., furrowed or raised eyebrows in concern, open mouth, widened eyes); and 2 = facial concern with vocalizations (e.g., same as 1, but with vocalizations such as "Oh!" or calling to the parent in the room with concern or

pointing to the actor). Hypothesis testing and concern were not mutually exclusive, and thus, children could engage in both behaviors simultaneously.

Interactive tasks

During the interactive tasks, the infants sat in a high chair at a table directly across from E1. A split-screen camera angle focused on the infant's face, while a second camera recorded the whole scene. The emotional referencing task included two colored boxes with lids, a plastic cockroach, and a toy figurine. The Book Stacking (instrumental helping) task was administered using three thin sheets of wood painted blue to resemble books. These wooden "books" were exact replicas of those used in Warneken and Tomasello's (2007) study. The Blocks (instrumental helping) task consisted of six differently colored plastic shapes, a red container, and a pair of plastic tongs. For the empathic helping tasks, a pair of red cotton gloves and a brown teddy bear were used. The Rattle trial of the imitation task included two plastic blue containers (which fit into one another) and a small rubber ball. The Teddy-to-Bed trial consisted of a purple teddy bear, a pink toy crib, a small felt pillow, and a cover.

Instrumental helping tasks. Two instrumental helping tasks adapted from Warneken and Tomasello (2007) were administered. In the Book Stacking task, E1 demonstrated the stacking of three blue wooden "books" on top of one another. During the test phase, E1 pretended to drop the fourth book next to the pile while exclaiming "Oh," and remained neutral for 30s through a series of prompts (looking at the book, gazing back and forth from the infant to the book, and ending with, "Oh no! It fell!"). This was repeated for two more test trials. In the Blocks task, E2 quietly entered the room and sat behind the infant. E1 then demonstrated placing three blocks into a bucket using plastic tongs. After E1's demonstration, E2 placed one block in front of the infant, whereas remaining neutral E1 engaged in a series of prompts to encourage the infant to hand her the block (reaching toward the block using the tongs, gazing back and forth from the block to the infant, and ending with, "Oh no! I can't reach it!"). The Blocks task included three test trials.

Coding of the instrumental helping tasks. During the Book Stacking task, infants were given a score of 1 if they helped at any point during the 30s trial, either by placing the book on the stack or by handing the fallen book to E1 (total score of 3). During the Blocks task, infants were given a score of 1 if they handed or pushed the block toward E1 at any point during the 30s trial (total score of 3). The Book Stacking and Blocks tasks were counterbalanced across participants.

Empathic helping tasks. Two empathic helping tasks were adapted from Svetlova et al. (2010). For the Glove task, E1 showed the infant a pair of unfamiliar red gloves and displayed positive affect by saying, "Look! These are my favorite gloves! They keep me warm!" E1 then rubbed her hands together while saying "Brrrr!" before putting on the gloves. E1 then handed the infant one of her gloves and said, "Here, this one is yours!" E2, who was not wearing gloves, then entered the room, put on E1's remaining glove, rubbed her hands together, and walked out of the room, leaving E1 with no glove. In the Bear task, E1 showed the infant a teddy bear while displaying facial and vocal expressions of happiness by saying, "Look! This is my favorite bear!"

while hugging the bear. She then handed the bear to the infant and said, "Here you can play with it!" E2 then entered the room and pretended to whisper something sad to E1, by cupping E1's ear in her hand and hissing in different tones for 3–5s. E2 then left the room. For both tasks, E1 gasped loudly as E2 vacated the room, and then went through a series of 5s prompts to encourage the child to help her (see Table 1). Each cue was presented for 5s with no pause between cues. As in Svetlova et al. (2010), once the child handed the target object to the experimenter, she stopped providing cues. If the child did not bring the target object by the last cue, the experimenter got up and retrieved it herself without any emotional reaction or comment, and then proceeded to the next trial. To reduce the possibility of simple compliance or attempts to seek the adult's approval, the experimenter did not thank, praise, or reward the child when he or she brought the object, but instead neutrally described the result. The Glove and Bear tasks were counterbalanced across participants.

Coding of the empathic helping tasks. Infants were given a score from 0 (no help) to 8 (gave the bear/glove during E1's first prompt), with higher scores indicating that infants needed less overt, verbal requests for the bear/glove from E1 (i.e., needing only the emotional cues) before handing the bear/glove to E1 (see Table 1).

Emotional referencing task. The emotional referencing task was modeled after Repacholi (1998). After a brief warm-up trial, E1 placed two round, opaque containers with lids on the table, out of the infant's reach. E1 shook the containers to indicate that they were full and placed one container to her left and one to her right. E1 always began by turning to the container on her left. During the "happy" container trial, E1 opened the lid, tilted the container toward her, and exclaimed, "Wow! I found something! Wow I can see it! Wow!" (10s), accompanied by happy vocalizations and facial expressions, and then replaced the lid. E1 then turned to her right, opened the lid and said, "Ew! I found something... Ew! I can see it... Ew!" (10s), to the "disgust" container, while displaying vocal and facial expressions of disgust. She then replaced the lid and adopted a neutral facial expression, gazed at a marker on the table located in front of the infant, and slid the two containers simultaneously toward the infant, at an equal distance from the marked area on the table. E1 continued to look at this marked area until the task ended (30s). The order of presentation of the "happy" and "disgust" containers was counterbalanced. Infants were given 30s to open one of the two

TABLE 1
Communicative Cues and Helping Score

<i>Order of presentation</i>	<i>Description</i>	<i>Helping scores</i>
1	Facial/vocal cues of sadness	8
2	"I'm sad"	7
3	"I need something to make me happy/warm"	6
4	"A teddy bear/Glove!"	5
5	Alternating gaze from child to bear/glove	4
6	Reaching toward the bear/glove	3
7	"Can you help me?"	2
8	"Can you give me my bear/glove please?"	1
9	No response	0

Note. Adapted from Svetlova et al. (2010).

boxes. The first container that infants attempted to open (by touching the lid) was coded.

Imitation tasks. All infants engaged in two imitation tasks adapted from Bauer and Mandler (1989). The experimenter maintained a neutral facial expression during the administration of the task. In the Rattle task, infants were shown two plastic containers (which fit into one another) and a small rubber ball that could fit inside the containers, aligned on a tray. After a brief warm-up period, E1 said, "Watch me!" before taking the ball and putting it in the largest container. She then picked up the small container, inverted it, placed it on top of the large container (containing the ball), and then shook the items together to make a rattle while remaining neutral. This demonstration was repeated twice. During the test trial, E1 lined the items up on the tray while saying, "Can you make the ball move, just like I did?" while sliding the tray toward the infant. E1 gazed at a marker on the table located in front of the infant while remaining neutral until the test trial was over (60s). In the Teddy-to-Bed task, infants were shown a teddy bear, a toy crib, a small felt pillow, and a cover. After a brief warm-up period, E1 took the items back, said "Watch me!" and placed the pillow, teddy, and cover in the crib, respectively. This demonstration was repeated twice. Then E1 replaced all of the items on the tray and said, "Can you make the teddy go night-night, just like I did?"

Coding of the imitation tasks. During the Rattle task, infants were given a score of 1 for each step they completed in the correct order (1 = ball into large container, 2 = small container inverted over large container, and 3 = shaking the containers) for a maximum score of 3. During the Teddy-to-Bed task, infants were given a score of 1 for each step they completed in order (1 = pillow into the crib, 2 = teddy on pillow, and 3 = cover on teddy) for a maximum score of 3.

Intercoder reliability

In order to keep the coder blind to the hypotheses during the reliability exposure phase, all looking times for the entire sample were coded first, which allowed each event to be divided into the familiarization and test trials. The behavioral variables were then coded (concern and hypothesis testing) during the 10s test trial, which did not include the vocalization in the familiarization phase (and thus the scene and condition remained blind to the coder). To establish intercoder reliability, 40% of the sample ($n = 30$) was coded by a second, independent observer, who was blind to the hypotheses and the condition. The kappa for the concern variable was $\kappa = .89$, while the hypothesis testing variable yielded $\kappa = .94$. Pearson's correlations were calculated to determine the inter-rater agreement for the looking time measures. The inter-rater agreement for looking time at the stage was $r(28) = .98$, $p = .001$. The four kappas for the interactive tasks ranged from $\kappa = .95$ – 1.00 .

RESULTS

There were a total of four different task orders across the interactive tasks. To control for order effects, a Condition \times Gender \times Task Order repeated measures MANOVA

was run on the dependent variables of the emotional helping, instrumental helping, emotional referencing, and imitation tasks on the subset of children who completed all trials of the interactive tasks ($n = 56$; Tabachnick & Fidell, 2007). Results revealed no significant main effect of Task Order, $F(3, 40) = .681, p = .569, \eta^2 = .049$. In addition, there were no Condition \times Task Order, $F(3, 40) = 1.67, p = .190, \eta^2 = .111$, Task Order \times Gender, $F(3, 40) = 2.604, p = .065, \eta^2 = .163$, or Condition \times Task Order \times Gender, $F(3, 40) = 1.69, p = .183, \eta^2 = .113$, interactions. As Task Order effects were not observed, this variable was removed from the remaining analyses to preserve the integrity of the data. In addition, there were no main effects of Gender, $F(1, 40) = 1.646, p = .207, \eta^2 = .040$, nor Condition \times Gender effects, $F(1, 40) = 3.46, p = .070, \eta^2 = .08$. Therefore, gender was also removed from the remaining analyses on the interactive tasks.

Although participants were randomly assigned to each condition, infants' vocabulary scores on the Level II short form of the MCDI: WG (Fenson et al., 2000) were compared across groups and correlated with the scores on each interactive task. Two families did not complete the MCDI. Results revealed no difference in the verbal abilities between the infants in the conventional ($M = 14.67, SD = 12.74$) and unconventional ($M = 12.88, SD = 12.14$) groups, $t(69) = .695, p = .489$. In addition, infants' verbal skills were unrelated to any of the scores on the individual interactive tasks (imitation (rattle): $r(59) = .133, p = .308$; imitation (teddy): $r(58) = -.034, p = .798$; instrumental helping (paper ball): $r(65) = -.046, p = .713$; instrumental helping (book): $r(65) = .067, p = .593$; empathic helping (bear): $r(63) = -.046, p = .717$; empathic helping (glove): $r(63) = -.034, p = .791$; emotional referencing: $t(50) = -.231, p = .818$).

Reliability task

Infants' looking times at the scene during the familiarization and test trials were analyzed with two Condition (Conventional/Unconventional) \times Gender repeated measures MANOVAs on the four exposure trials (Pegs/Drums/Spoon/Ball). During the familiarization phase, no significant between-subjects main effects of Condition, Trial, or Gender emerged nor any interactions among these variables. Similarly, during the test phase, no significant effects were observed. In addition, infants' looking times at the scene on the four trials were correlated, both during the familiarization phase ($r(70) = .184-.558, p = .000-.018$) and during the test phase ($r(70) = .312-.573, p = .000-.008$). Thus, infants in both conditions looked at the stage an equally high amount of time during the familiarization phase (unconventional: $M = 95.87\%, SD = 4.31\%$; conventional: $M = 94.71\%, SD = 6.91\%$), and during the test phase (unconventional: $M = 76.31\%, SD = 11.94\%$; conventional: $M = 80.41\%, SD = 9.06\%$).

To analyze the effects of Condition on the hypothesis testing and concern variables during the test phase, a Gender \times Condition MANOVA was run. There was a main effect of Gender, in that boys showed more concern overall ($M = .58, SD = .48$) than girls ($M = .36, SD = .36$), $F(2, 68) = 4.73, p = .012, \eta^2 = .122$, Wilks' $\lambda = .878$. A main effect of Condition also emerged, $F(2, 68) = 8.21, p = .001, \eta^2 = .195$, Wilks' $\lambda = .805$. Infants in the unconventional group showed more hypothesis testing than those in the conventional group, $F(1, 69) = 5.07, p = .028, \eta^2 = .068$. In contrast, the conventional group showed more concern than the unconventional group, $F(1, 69) = 7.69, p = .007, \eta^2 = .100$ (see Figure 1). No Gender \times Condition interaction emerged, $F(2, 68) = 1.24, p = .295, \eta^2 = .035$, Wilks' $\lambda = .965$.

Interactive tasks

Regarding the effects of the agent’s emotional reliability on individual interactive tasks, a significant overall Condition × Task interaction emerged, $F(2.85, 114.12) = 3.11$, $p = .031$, $\eta^2 = .072$, indicating a significant effect of condition on at least one dependent variable. Post hoc analyses from the mixed MANOVA revealed a condition effect for empathic helping as well as for emotional referencing. However, given that not all children completed all four interactive tasks, independent samples *t*-tests were conducted separately, to increase the number of children per task and, in turn, increase statistical power.

Instrumental helping

Of the 73 infants, four were excluded due to fussiness (conventional: $n = 3$, unconventional: $n = 1$), leaving a final sample of 69. The Book Stacking and Blocks tasks trended to significance ($r(67) = .22$, $p = .066$) and were thus averaged into a single score out of 3. An independent samples *t*-test revealed that infants in the conventional and unconventional conditions were equally likely to engage in instrumental helping, $t(67) = -1.46$, $p = .148$, $d = -.36$ (conventional: $M = 2.13$, $SD = .856$, unconventional: $M = 2.41$, $SD = .742$; see Figure 2).

Empathic helping

Of the 73 infants, five infants were excluded due to fussiness (conventional: $n = 3$, unconventional: $n = 2$) and one infant was excluded due to parental interference (unconventional: $n = 1$), leaving a final sample of 67. The scores on the Bear and Glove tasks were significantly correlated ($r(65) = .61$, $p = .001$) and were thus averaged into a single score on 8. An independent samples *t*-test showed that infants in the conventional condition helped more quickly (i.e., at earlier prompts) than those in the unconventional condition, $t(65) = 2.478$, $p = .016$, $d = .62$ (conventional: $M = 5.27$, $SD = 2.49$, unconventional: $M = 3.85$, $SD = 2.19$; see Figure 2). Infants’ scores were further examined by dividing each infant’s score into covert prompts

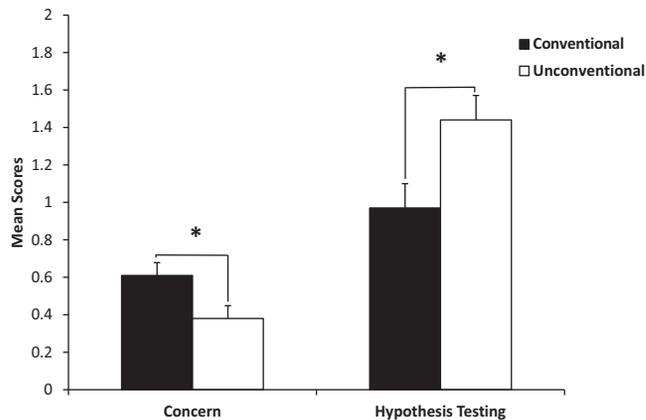


Figure 1 Concern and hypothesis testing scores for the conventional and unconventional groups.

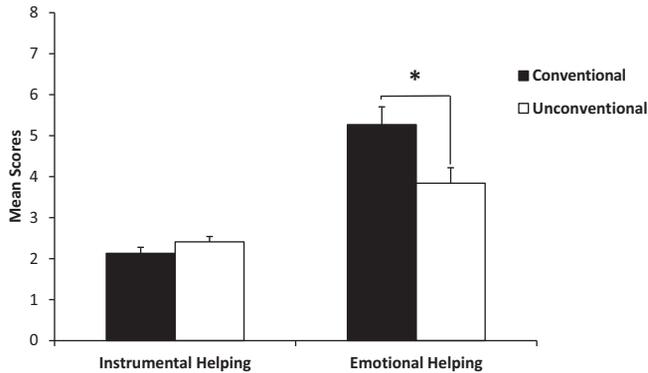


Figure 2 Instrumental and empathic helping scores for the conventional and unconventional groups. The maximum score on the instrumental helping tasks was 3, while the maximum score on the empathic helping task was 8.

(scores 4–8), in which E1 did not directly ask for help, and overt prompts (scores 0–3), in which E1 directly asked infants for help through gestures or vocalizations. Infants in the conventional group were more likely to give E1 the object based on covert ($n = 25$) rather than overt cues ($n = 8$), while infants in the unconventional group were equally likely to give after covert ($n = 16$) and overt cues ($n = 18$) ($\chi^2 = 5.808$, $p = .016$, $\phi = -.294$).

Emotional referencing

Of the 73 infants, 20 were excluded from the emotional referencing tasks because they did not try to open the containers (conventional: $n = 2$, unconventional: $n = 2$), opened both containers simultaneously (conventional: $n = 3$, unconventional: $n = 6$), or were fussy (conventional: $n = 4$, unconventional: $n = 3$), leaving a total of 53 infants (conventional: $n = 27$, unconventional: $n = 26$). A Pearson chi-square revealed that infants in the conventional condition were more likely to choose the “happy” container ($n = 17$) than the “disgust” container ($n = 10$), whereas the infants in the unconventional group tended to choose the “disgust” container ($n = 17$) more than the “happy” container ($n = 9$; $\chi^2 = 4.259$, $p = .039$, $\phi = .283$). In addition, Fisher’s exact test revealed no difference between conditions for excluded infants.

Imitation

Of the 73 infants, nine infants were excluded due to fussiness (conventional: $n = 5$, unconventional: $n = 4$) and two infants were excluded due to parental interference, leaving a total sample of 62. The Rattle and Teddy-to-Bed tasks were correlated ($r(60) = .392$, $p = .002$) and were thus averaged into a score on 3. An independent samples t -test showed that infants in both conditions recalled an equal amount of steps in order, $t(60) = 1.08$, $p = .285$, $d = .28$ (conventional: $M = 1.14$, $SD = .944$, unconventional: $M = .894$, $SD = .836$). Exploratory analyses also revealed that infants in both conditions were equally likely to imitate the steps in any order, $t(60) = -.301$,

$p = .765$, $d = -.078$ (conventional: $M = 1.79$, $SD = .978$, unconventional: $M = 1.86$, $SD = .868$).

DISCUSSION

The current findings offer two main contributions. The first is within the area of selective trust and provides evidence that, in accordance with our hypothesis, infants displayed different behaviors toward a conventional as opposed to an unconventional emoter on tasks at which infants of this age are quite competent. It was predicted that infants' observations of an unconventional emotional individual would influence their subsequent behaviors toward that individual. Furthermore, it was hypothesized that these influences would be observed specifically when the interactions between the infant and the agent involved emotional cues (i.e., emotional referencing and empathic helping) but not in tasks during which the emoter was neutral (instrumental helping and imitation). This hypothesis was supported for both tasks. First, a mismatch between an emoter's expressions and her experience (i.e., receiving or not a target object) impacts infants' selective emotional referencing. The present findings replicate and extend those of Repacholi (1998) who reported that, when uncertain about the contents of two containers, infants are influenced by the valence of an adult's emotional expression. As expected, this was replicated in our study, as most 18-month-olds in the conventional group first looked into the "happy" container. Remarkably, however, infants in the unconventional group were more likely to first choose the "disgust" container. Thus, when the actor's previous show of sadness followed a positive experience, 18-month-olds subsequently interpreted her negative emotional cues toward one container as indicative of a positive experience, overriding their robust tendency to first touch the "happy" container (Repacholi, 1998). An alternative, "leaner" interpretation would be that infants first opened the "disgust" box in order to check whether the disgust expression was also unconventional, as was the sad expression to which they were exposed during the reliability exposure phase. Nonetheless, these are striking findings, as they suggest that infants generalized an actor's past emotional unreliability to a different context (akin to social referencing) and that they generalized their experience with the actor to another emotional expression, that is, from sadness to disgust. These findings suggest that some form of "emotional monitoring" might be occurring at this young age.

Second, with regard to the helping tasks, infants in the unconventional group showed fewer helping behaviors on the basis of emotional cues than those in the conventional group. More specifically, infants required more overt, verbal prompts, and explicit reaching gestures from the emotionally unconventional adult before offering to help than the infants who were exposed to the emotionally conventional individual. In fact, the empathic helping score of the infants in the conventional condition is almost identical to the score reported in the default condition of the original study reporting this task (Svetlova et al., 2010). More importantly, the score in the unconventional condition was lower than this baseline. Thus, in the case of empathic helping, infants responded differently to requests for help in the conventional versus unconventional condition, as shown by a longer latency to help. These findings demonstrate that while infants are willing to help an actor in emotional distress (Svetlova et al., 2010), the development of this prosocial ability is emerging along with infants' capacity to

monitor the past reliability of a person's emotional reactions. Importantly, infants appear to be relying on both emotional and nonemotional cues in order to determine whether or not they should offer help to an unconventional emoter. These findings also expand upon past research showing that preschoolers are hesitant to help adults who have displayed unconventional distress (Hepach et al., 2012). We extend this literature in an important way by showing that infants detect unconventional emoters by showing more checking behaviors and less concern and that they are subsequently less likely to be guided by an unconventional emoter in situations where she displays emotion. Importantly, no differences were found in infants' willingness to help an emotionally unconventional or conventional actor when instrumental, goal-directed behavioral cues were used as requests for help, suggesting that the observed selective helping is specific to situations involving a need for emotional help. Importantly, this study provides the first evidence of the development of these specific helping preferences at such a young age. It is known that instrumental helping related to simple, shared, goal-oriented tasks emerges around 14 months of age, which is much earlier than the emergence of emotional or empathic helping (Svetlova et al., 2010; Warneken & Tomasello, 2007). Thus, it confirms that at that age, instrumental helping may be a more reflexive or automatic form of prosocial behavior, which is less rooted in context, as evidenced in a similar study which also found no differences in 18-month-old infants' instrumental helping behaviors toward accurate and inaccurate speakers (Brooker & Poulin-Dubois, 2013). Past research has mapped helping behaviors into categories of instrumental, empathic, and altruistic helping, all of which are said to develop sequentially in order of their complexity and required breadth of understanding (Svetlova et al., 2010). Thus, the absence of effect with regard to unconventional emotional responses on instrumental helping reinforces past findings that empathic and instrumental helping are qualitatively different behaviors at this point in development.

Finally, the lack of significant difference between the two conditions in the imitation task, which included no explicit emotional cues from the model, also corroborates our hypothesis that infants' selective behaviors would be exhibited uniquely within the emotional domain.

The second important contribution of the current paper is to the empathy literature, as the results indicated that infants exposed to an adult expressing sadness instead of happiness following a positive experience (unconventional condition) showed reduced concern while watching the "crybaby." These behaviors toward a crybaby individual (unconventional distress) are consistent with what has been demonstrated in 3-year-old children (Hepach et al., 2012) and, more recently, in 18-month-olds (Chiarella & Poulin-Dubois, 2013). These findings suggest that children and infants show selectivity in determining whether a person's distress is warranted. While it has been reported that 14- and 15-month-old infants do not appear to consider the experience of the emoter and that they react solely to emotional expressions on the basis of facial or attentional cues (Chiarella & Poulin-Dubois, 2013; Vaish & Woodward, 2010), recent evidence suggests that even younger infants may be sensitive to incongruent emotional reactions when pupil dilation is the measure of infants' reactions or when they must monitor simple goal attainment (Hepach & Westermann, 2013; Skerry & Spelke, 2014). Given that the agent made a vocalization to mark the reception of the object, it is possible that infants only detected a mismatch between the valence of the vocalization and the valence of the subsequent emotional expression (i.e., "Ah!" followed by sadness), and not between the facial expression and the fulfillment of the desire for a target toy.

Regardless of the depth of infants' processing of the event, the detection of some form of incongruence between what happened to the agent during the familiarization phase and the sad facial expression that followed altered their subsequent behaviors toward the emoter.

Taken together, these findings propose that infants' ability to detect incongruent emotional responses shows a developmental progression. First, infants appear to be able to identify and appropriately match emotional reactions that are directly related to the achievement or nonachievement of simple goals, as shown in their looking behaviors (Skerry & Spelke, 2014). Then, they appear to detect the emotional expressions that should accompany simple actions (Hepach & Westermann, 2013), followed by the ability to engage in observable empathic and looking responses, in scenarios in which emotional reactions match, or do not match, the fulfillment of object requests, as shown in the current study as well as others (Chiarella & Poulin-Dubois, 2013). Thus, as children gain more knowledge about the social world, their detection of appropriate emotions becomes more sophisticated.

No doubt, there are other possible interpretations to account for the differences between the conventional and unconventional groups during the interactive tasks. First, it is possible that infants reacted simply to the familiarity of the behaviors displayed by the conventional emoter. By definition, to be tested on the selective trust paradigm, infants must be familiar with the behaviors expected in a given context (e.g., a speaker's accuracy cannot be detected until a child knows the correct words). Thus, an unconventional model (e.g., speaker, object user, emoter) typically displays an unfamiliar behavior, and a conventional model displays a familiar behavior. However, if infants simply reacted to familiarity and preferred the individual most similar to them, then such a bias should have been observed in all of the interactive tasks. However, this is not what was observed; infants displayed specific preferences for the conventional individual, that is, only when she displayed emotional expressions.

A second possible interpretation for infants' selective behavior toward the two persons is that they were confused by the unconventional model's unexpected emotional expressions. If so, infants would have been expected to either act randomly toward that individual or refuse to respond on all of the following interactive tasks. This is not what was observed. Importantly, evidence challenging this interpretation comes from the results of the emotional referencing task. During that task, infants were guided by the model's emotions in their decision of which container to open. A striking reverse effect was observed with infants in the unconventional condition choosing the box associated with a disgust expression, and infants in the conventional condition choosing the positive box. Had infants been confused in the presence of the unconventional emoter, there would be no reason for them to choose the "disgust" container over the "happy" container, as the emotional expression would have appeared ambiguous to them. The fact that they did show a preference for the disgust container suggests that infants in the unconventional group were guided by their knowledge that this individual's negative emotions were misleading.

Finally, it is possible that the interactions that children had with the actor during the interaction tasks diminished the impact of the manipulation. Given that the model remained neutral during the imitation and the instrumental helping tasks, this potential confound is irrelevant. Regarding the emotional referencing task, there was only one trial and the appropriateness of the actor's expression was only discovered by the child when the boxes were opened. The fourth task, emotional helping, is the only task in

which the actor in the unconventional condition acted as expected, that is, expressed sadness after being deprived of a glove or toy. However, this conventional attitude did not overwrite the infants' information about this emoter and showed a longer delay and more overt cues to offer help. Taken together, while it is well known that the depth of infants' understanding of an agent's behaviors is difficult to assess, we believe that the current pattern of findings provides evidence that by 18 months of age, infants recognize the appropriateness of an individual's emotional reactions and that they take this information into account when subsequently interacting with that individual.

While the current study has many strengths, one limitation is that only negative emotional expressions were examined. In order to replicate and extend previous research, examining empathic responses to unconventional and conventional expressions of sadness was critical during the exposure phase. Although the detection of a mismatch between happy emotional expressions and negative experiences has recently been documented in infants of this age (see Chiarella & Poulin-Dubois, 2013), an important line of future research will be to investigate whether it will have a similar impact on subsequent prosocial behaviors. Similarly, as recent research shows that 8-month-old infants are sensitive to inappropriately sad reactions in response to goal achievement (see Skerry & Spelke, 2014), it would be intriguing to investigate whether they also display selective behaviors toward such unconventional emoters.

In sum, the current findings suggest that by 18 months of age, infants have begun to develop some ability to distinguish between conventional and unconventional sad expressions and that this distinction impacts infants' subsequent emotional referencing and empathic helping behaviors. This is in line with recent accounts of a precocious form of cognitive empathy (attempts to explore and comprehend others' distress) during the second year of life (Davidov, Zahn-Waxler, Roth-Hanania, & Knafo, 2013; Hoffman, 2000). More importantly, the present findings make an important contribution to the growing literature on the early development of selective trust in infancy by showing that infants' expertise in the emotional domain prepares them to detect the best informants, as well as the needs of their social partners.

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