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## Toddlers' Understanding of Peers' Emotions

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### Abstract

The second year of life sees dramatic developments in infants' ability to understand emotions in adults alongside their growing interest in peers. In this study, a social referencing paradigm was employed to examine whether 12-, 18-, and 24-month-old children can use a peer's positive or negative emotion messages about toys to regulate their own behavior with the toys. Twelve-month-olds decreased their play with toys toward which a peer had expressed either positive or negative emotion compared to play following a peer's neutral attention toward a toy. Eighteen-month-olds did not respond systematically, but 24-month-old children increased their toy play after watching a peer display negative affect toward the toy. Regardless of their age, children with siblings decreased their play with toys toward which they had seen a peer display fear, the typical social referencing response. Results are discussed in the context of developmental changes in social understanding and peer interaction over the second year of life.

### Keywords

Emotion understanding; infancy; siblings; social referencing

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The second year of life sees dramatic developments in children's ability to understand the goals, desires, and emotions of others alongside their growing interest in peers. By preschool age most typically developing children have become quite sophisticated social partners with their peers, engaging in elaborate pretend play, complex games, and joint problem-solving (see Rubin, Bukowski, & Parker, 2006, for a review). The roots of these skills lie in understanding the internal lives of others generally, and of peers in particular. Thus, the marked growth in peer interaction by the third and fourth years of life has its seeds in early developments in social understanding. Although important developments in social understanding during the first two years of life have been widely investigated in terms of young children's interactions with adults, the development of these skills in the peer context has been comparatively ignored. Thus, in the current study we sought to examine growth in children's understanding of peers' emotions over the second year of life.

Research has highlighted regular developments over the first and second year in understanding adults' emotions. In the first year infants begin to understand positive and negative emotion expressions as referring to objects in the world (Phillips, Wellman, & Spelke, 2002), and by the end of their first year, they will sometimes look to adults' emotional responses for information about ambiguous or potentially dangerous situations and then adjust their behavior accordingly (Campos & Stenberg, 1981; Feinman, 1982; Walden & Ogan, 1988). By 18 months of age they may understand an adult's expressions of

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desire and disgust as distinct from their own feelings and modify their behavior accordingly (Repacholi & Gopnik, 1997). Similarly, toddlers begin to respond prosocially to adults' emotional distress by the middle of the second year, although these responses are still sporadic and may be governed in part by emotional contagion (Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992). By the end of the second year of life, children are using emotion words and have become good readers of adults' emotion expressions, with a burgeoning awareness of others' mental states (Bartsch & Wellman, 1995; Bretherton, McNew, & Beeghly-Smith, 1981; Phillips et al., 2002). However, there is no empirical reason to believe that children's competencies in their interactions with parents and other adults necessarily extend to their interactions with peers. Indeed, very young children's social competence with peers appears to lag behind that with adults by several months to a year (Brownell, Ramani, & Zerwas, 2006).

Infants are interested in their same-age peers, but prior to 18 months of age children's peer interactions are comparatively rare, uncoordinated, and relatively limited in complexity (Brownell & Brown, 1992; Eckerman & Peterman, 2001). Over the second and third years of life, children's social awareness rapidly expands as they develop both the skills and the social understanding that enable them to generate cooperative interactions with peers (Brownell et al., 2006; Eckerman, Davis, & Didow, 1989; Smiley, 2001). So, it should be expected that children's understanding of other children's emotions would also be developing rapidly in this period.

Many of the affectively laden social interactions of young peers revolve around one another's toys. Possession struggles over toys are a hallmark of toddler interactions. Hay, Caplan, Castle, and Stimson (1991) found that 2-year-olds were less likely than 1-year-olds to share a toy in which their peer had expressed interest. This suggests that young children may be attuned to other children's interest in, intentions toward, or affective relationships with objects in the environment. Moreover, Caplan, Vespo, Pederson, and Hay (1991) found that 1- and 2-year-olds had frequent conflicts over toys even when duplicate toys were available. In fact, fully one quarter of these conflicts occurred when the aggrieved child was holding a matching toy! So, there is suggestive evidence that very young children may be attentive to the foci of their peers' positive attention and interest, at least when toys are involved, and that they may link their peers' emotional responses to toys with the peer's desire, interest, or intention.

Very young children also attend to one another's negative emotions. By the end of the second year of life, they sometimes respond to a peer's distress with tentative comforting gestures or by seeking help for the peer (Dunn, 1987, 1988; Eisenberg, 1982; Hoffman, 1982; Lamb, 1993; Radke-Yarrow, Zahn-Waxler, & Chapman, 1983). However, naturalistic observations have found extremely low base rates of responding to peers' distress (Lamb & Zakhireh, 1997). Others have found that young children may be aware of, but are not usually responsive to, the distress of other children (Caplan & Hay, 1989; Howes & Farver, 1987; Phinney, Feshbach, & Farver, 1986; Zahn-Waxler et al., 1992). Still other research points to the importance of contextual factors, such as familiarity with the peer and whether the peers' distress occurs in child care or at home (Demetriou & Hay, 2004; Howes & Farver, 1987; Lamb & Zakhireh, 1997). Thus, the picture that emerges of toddlers' responses to peers' negative affect is complex: they may notice their peers' negative affect but do not systematically respond, and a variety of contextual and individual difference characteristics may explain their differential responsiveness.

One factor that has been shown to influence the development of children's social and emotional understanding of other children is their interactions with older children. For example, both preschool and toddler-aged children with older siblings have been shown to

perform better on standard tasks of social understanding, such as theory of mind tasks, than children without older siblings (Dunn, 1999, 2002; Howe, Petrakos, & Rinaldi, 1998; Hughes & Ensor, 2005; Hughes, Fujisawa, Ensor, Lecce, & Marfleet, 2006; Perner, Ruffman, & Leekham, 1994). Likewise, a small empirical literature on interactions between unfamiliar mixed-age groups of children suggests that preschool-aged children may have more frequent interactions and enhanced communicative performance with older children than with same-aged peers (Fishbein & Osborne, 1971; Lougee, Gruenich, & Hartup, 1977). One study of 18- and 24-month-old children's mixed-age interactions found that even 18-month-olds used more imitation and vocalized more in their interaction with older children than with same-age children (Brownell, 1990). Thus, there is some evidence that toddler-aged children might display enhanced social understanding when interacting with older children than they do with same-age peers.

The current study explored young children's understanding of an older peer's emotions using a social referencing paradigm. In the standard social referencing paradigm, children are exposed to an adult's positive or negative affect toward an unfamiliar object and then their approach toward or avoidance of the object is assessed. The current study's procedures were adapted from an infant social referencing study that employed unique controls (Mumme & Fernald, 2003). In particular, a neutral-attention condition was included to ascertain whether children's reactions to an object following an adult's positive or negative emotion expressions differed from their reactions when the adult paid attention to the object with neutral interest. Finding differences between the attention condition and the affect conditions allowed the authors to conclude that it was the affective information, and not just an adult's attention to or interest in a given object, that drove infants' preference for or avoidance of the object. The study also used prerecorded, televised adult emotional expressions to control for variations in stimulus presentation and potential contextual influences on children's responding.

Using these procedures the current study was conducted with 12-, 18-, and 24-month-old children who were exposed to the positive or negative affect of an older peer. The aim was to identify age-related changes in toddlers' ability to use negative and positive emotion information from a peer about novel toys during the age period when peer interaction skills are emerging. The use of televised stimuli not only provided important controls, but also emphasized the infant's role as onlooker, which is particularly relevant during the second year of life when peer interactions may be marked as much by watching as by engaging socially with one another.

## Method

### Participants

Twenty-three 12-month-old infants (8 males), twenty-four 18-month-old infants (11 males) and twenty-one 24-month-old children (9 males) were tested. All children were tested within three weeks of their birthday or half-birthday and all were healthy and typically developing. Families were recruited from a medium-sized city and surrounding suburbs and were predominantly white and middleclass (78% Caucasian; 7% African-American; 6% Asian; 1% Latino; 7% biracial). All children who began the task completed it. However, the analyzed data excluded one 12-month-old girl who did not touch any of the toys.

### General Procedure

Infants first participated in a brief warm-up free play period to acclimate them to the laboratory setting, after which they were escorted with the mother to another room where testing occurred. The testing procedures were modeled closely on those used by Mumme

and Fernald (2003). Stimuli were prerecorded video clips of a child displaying emotions toward toys, which infants viewed on a 44 cm color television monitor. During testing, infants were seated in a high chair positioned at the end of a table approximately 1.5 m away from the monitor. The mother sat 15 cm to the child's left, facing the child diagonally and with her back to the video display. Mothers filled out questionnaires and were instructed not to interact with the child. The experimenter sat to the right of the table obscured from the child's view by a curtain. The child's and parent's behavior were recorded with separate cameras.

The testing session consisted of three 50-s trials. Before each trial, the experimenter placed a pair of toys on a tray directly beneath the monitor, aligned with the video display and out of infants' reach. Each trial began with a 5-s video segment of an engaging abstract design to center the child's attention on the monitor. A trial consisted of a 20-s peer emotion display presented on the monitor followed by a 30-s play period with the pair of toys while the monitor displayed a blank screen. During the play period the experimenter, obscured behind the curtain, moved the tray of toys into the child's reach (using rods attached to the tray as in Mumme & Fernald, 2003) so that the toys were equidistant from the center of the child's body; the child was free to play with either or both of the toys. If the child dropped a toy out of reach, the parent immediately returned it to the tray without saying anything to the child. After 30-s of play, the experimenter signaled the parent to remove the toys from the infant and place them in a basket beneath the table. The first trial presented a neutral emotion that was the same for all children. The second trial presented either a positive or a negative emotion, manipulated between subjects. The third trial presented a positive emotion that was the same for all children and was included to ensure that the session always ended on a positive note; no data were collected from this trial.

### Stimuli and Materials

Four novel toys were presented in pairs: a 14 cm red and blue spiral letter holder; a 14 cm blue rubber jack; a 12 cm green and black Y-shaped hose adaptor; a 12 cm plastic white tube with a red wing nut (adapted from Mumme & Fernald, 2003; see Figure 1). To create a standard set of peer emotion expressions, separate video presentations were constructed in which a young-looking 6-year-old girl gazed at and directed facial expressions and vocalizations toward one of the two novel toys in each pair using prototypical facial expressions and acoustic properties (Ekman & Friesen, 1975; Scherer, 1986). The two toys were positioned directly in front of her, approximately 30 cm apart on a white surface.

The same girl was used in all of the stimuli. She was young enough to appear visibly child-like but old enough to meet the demands of expressing neutral, positive, and fearful facial and vocal expressions toward a series of neutral objects. A female child was chosen to be consistent with previous social referencing studies that have employed female emotion informants to minimize stranger anxiety among infant participants. She was coached to display highly expressive positive and negative facial expressions (happy and fearful) while gazing at each of the neutral toys in turn. For the neutral stimulus she simply looked at the toy with interest while displaying a neutral facial expression. Investigators judged the emotion stimuli to be approximately equivalent in intensity. Facial expressions were accompanied by verbal descriptions of the toys (e.g., "It's red and white; it is made out of plastic") delivered with the matching vocal emotion; vocalizations were recorded separately and edited onto the video of the child's facial expressions.

In the first trial all children saw the peer display attention and simple interest toward one of the two toys. In the second trial, half the children saw the peer display positive emotion (happiness) toward one of the two toys, and the other half saw the peer display negative affect (fear). The peer directed attention and emotion to only one of the two toys on each

trial (the “target” toy), with sides counterbalanced over the neutral and emotion trials. The other toy was unattended (the “distracter” toy). Each toy in a pair was the target toy for half of the infants, and the distracter toy for the other half. A different pair of toys was presented in each trial: the rubber jack was paired with the letter holder, accompanied by neutral affect; the hose adapter was paired with the plastic tube, accompanied by either positive or negative affect. For half of the infants the peer’s positive or negative emotion was directed to the toy on the child’s right, and for the other half the peer’s emotion was directed to the toy on the child’s left.

## Measures

The first author and two research assistants coded the video data with sound muted. The camera displayed only the face of the infant and not the stimulus display, so all coders were blind to condition. The two relevant behaviors were total duration of looking at the video display during each presentation and total duration of touching each object during each play period. The first behavior ascertained that infants were attentive to the peer’s emotions. The second behavior was the variable of interest. Coding was completed with the Noldus™ Observer 5.0 computer-based observation software.

**Looking time**—Looking was coded continuously as all time spent looking straight ahead toward the video display. Coding ended when the toy tray was pushed into view of the camera. Seventeen percent of tapes were coded for reliability by all three coders (average intraclass correlation = .85).

**Touch time**—Touching was coded continuously as any touch to the toys, including passive holding as well as active play and exploration, and both brief and prolonged touching of the toys. Touch to each toy separately and to both toys simultaneously were coded as mutually exclusive. Thus, if a girl began holding the tube and then picked up the hose adaptor with the other hand while retaining the tube, she would first be coded as touching only the tube, then be coded as touching both toys. Coding continued until the parent removed the first toy. Seventeen percent of tapes were coded for reliability by all three coders (average intraclass correlation = .96).

Although all children were given 30-s of play time with the toys, parents differed slightly in the amount of time they took to remove the first toy. Thus, in order to insure that coding was equated for amount of exposure to the toys, only the first 30-s of available play time were coded for each play period.

## Results

### Preliminary Analyses

All children watched the 20-s positive or negative emotion presentation for at least 10-s (range = 11–20 s). A mixed-effects ANOVA with trial as the within-subjects factor (neutral–attention; emotion) and affect valence (positive; negative) as the between-subjects factor was conducted on looking time and showed that children were slightly but significantly more attentive during the emotion trial ( $M = 18.18$  s,  $SD = 2.96$  s) than during the neutral–attention trial ( $M = 15.5$  s,  $SD = 5.09$  s),  $F(1, 65) = 12.22$ ,  $p < .001$ . However this tendency did not differ for positive or negative emotion displays.

Means and standard deviations for the touch to the toys, the dependent measure, are presented in Table 1. Preliminary analyses revealed no significant sex differences and no toy preferences or side preferences; thus, substantive analyses were collapsed over these variables.

## Toy Play in Response to a Peer's Emotions

We asked whether watching a peer's emotion altered children's toy play by contrasting the amount of time they touched the toy toward which the peer had directed neutral attention with the amount of time they touched the toy toward which the peer had directed either positive or negative emotion. To this end, a mixed-effects ANOVA, with trial (neutral-attention; emotion) as the within-subjects factor and affect valence (positive; negative) during the emotion trial as the between-subjects factor, was conducted separately for children at 12 months, 18 months, and 24 months. The dependent measure was target toy touch time. Results are shown in Figure 2.

For 12-month-olds a significant main effect was found for trial,  $F(1, 21) = 6.93, p = .02$ , reflecting a tendency to touch the target toy less during the emotion trial ( $M = 5.32$  s,  $SE = 1.20$  s) than during the neutral-attention trial ( $M = 11.02$  s,  $SE = 1.63$  s), regardless of whether the peer displayed positive or negative affect toward the toy. In other words, among 12-month-olds both positive and negative emotions displayed by a peer toward a toy tended to reduce children's play with that toy. A main effect was also found for affect valence  $F(1, 21) = 5.35, p = .03$  such that children in the negative valence condition touched the target toy less ( $M = 6.0$  s,  $SE = 1.30$  s) than those in the positive valence condition ( $M = 10.34$  s,  $SE = 1.36$  s), averaged across the neutral and emotion trials. However, the interaction between trial and affect valence was not significant, so 12-month-olds did not reduce their touching from neutral to negative affect trials any more than from neutral to positive affect trials, as might be expected.

No significant effects were found for 18-month-olds although the pattern of responding was similar to that for 12-month-olds. For 24-month-olds, a marginally significant interaction between trial and affect valence was in evidence,  $F(1, 19) = 3.07, p = .10$ . Post-hoc tests revealed that 24-month-olds who saw the peer display negative affect toward a toy exhibited a marginally significant  $t(10) = 1.79, p = .10$ , increase in play time with that toy ( $M = 11.14$  s,  $SD = 8.11$  s) compared to the toy toward which the peer had displayed neutral attention ( $M = 5.68$  s,  $SD = 6.90$  s); in contrast, children who watched the peer display positive affect toward a toy did not show a significant change in their play ( $M = 6.50$  s,  $SD = 5.65$  s) compared to the neutral-attention toy ( $M = 7.40$  s,  $SD = 6.86$  s).

## Target versus Distracter Touch

We also asked whether, within each trial, the peer's attention or emotion toward one of the two toys altered children's interest in playing with that toy. To address this question a mixed-effects ANOVA with trial (neutral-attention; emotion) and toy (target; distracter) as within-subjects factors and affect valence (positive; negative) during the emotion trial as the between-subjects factor, was conducted separately for children at 12 months, 18 months, and 24 months.

For 12-month-olds a significant main effect was again found for trial  $F(1, 21) = 5.94, p = .02$ , reflecting a tendency for 12-month-olds to touch both target and distracter toys less during the emotion trial ( $M = 6.23$  s,  $SE = .70$  s) than during the neutral-attention trial ( $M = 8.35$  s,  $SE = .72$  s), regardless of whether the peer's affect toward one of the toys had been positive or negative. A main effect was also found for affect valence,  $F(1, 21) = 6.45, p = .02$ , such that 12-month-olds in the negative affect valence condition touched both target and distracter toys less overall ( $M = 5.86$  s,  $SE = .77$  s) than those in the positive affect valence condition ( $M = 8.71$  s,  $SE = .81$  s). However, the interaction between trial and affect valence was not significant, meaning that 12-month-olds did not play with the toys less in the negative affect trial only.



Once again, no significant effects were found for 18-month-olds. For 24-month-olds a significant main effect was found for trial  $F(1, 19) = 6.79, p = .02$ , reflecting a tendency to touch both target and distracter toys more in the emotion trial ( $M = 9.29$  s,  $SE = .79$  s), than in the neutral-attention trial ( $M = 6.96$  s,  $SE = .87$  s) regardless of whether the peer's emotion toward the target toy was positive or negative. In addition, a marginally significant trial by affect valence interaction was evident,  $F(1, 19) = 4.08, p = .06$ . Post-hoc tests revealed that 24-month-olds who saw a peer display negative affect toward a toy showed a significant *increase* in play with both toys ( $M = 10.14$  s,  $SE = 2.62$  s) compared to the neutral-attention trial ( $M = 6.00$  s,  $SD = 3.75$  s),  $t(10) = 4.85, p = .001$ , whereas children who watched the peer display positive affect toward the toy did not show a significant change in play between the neutral-attention trial ( $M = 7.93$  s,  $SD = 4.18$  s) and the positive affect valence trial ( $M = 8.45$  s,  $SD = 4.44$  s).

### Sibling Influences

Many of the children had a sibling ( $n = 26$ ), most of whom were older than the study child. To assess the possibility that having a sibling affected young children's responses to a peer's emotion displays, a mixed-effects ANOVA, with sibling status (sibs; no sibs) and affect valence (positive; negative) during the emotion trial as between-subjects factors, and trial (neutral-attention; emotion) as the within-subjects factor was conducted on target touch time. A significant 3-way interaction among sibling status, affect valence, and trial emerged,  $F(1, 61) = 6.18, p = .02$ . (Children's age and sibling status were not confounded and analyses covarying age produced nearly identical results.) Follow-up two-way ANOVAs with sibling status (sibs; no sibs) as the between subjects factor and trial (neutral-attention; emotion) as the within-subjects factor were conducted separately for each affect valence condition (positive; negative). Sibling status did not affect children's toy play following a peer's positive emotion toward the toy. However, for the negative affect valence condition, a significant two-way interaction between trial and sibling status emerged,  $F(1, 32) = 7.99, p = .008$  (see Figure 3). Post hoc tests showed that after they watched a peer react fearfully to a toy, children with siblings reduced their toy play ( $M = 5.33$  s,  $SE = 2.10$  s) relative to watching the peer display neutral attention to a toy ( $M = 10.54$  s,  $SE = 1.85$  s),  $t(11) = 2.52, p < .03$ . In contrast, children without siblings exhibited the opposite pattern of results, increasing their play with toys after watching the peer respond to them with fear ( $M = 10.73$  s,  $SE = 1.55$  s) relative to watching the peer display neutral affect to toys ( $M = 6.61$  s,  $SE = 1.37$  s),  $t(21) = -1.91, p < .07$ .

### Supplemental Data Collection

To increase the robustness of these results, and because both we and Mumme & Fernald (2003) found stronger effects in the negative emotion condition than in the positive condition, we collected data for 24 additional infants in the negative condition only (five 12-month-olds; twelve 18-month-olds; seven 24-month-olds). We particularly wished to increase the sample size for the 18-month-old children to enhance our confidence in the null results for that age group. Demographic characteristics for the additional participants were similar to those of the original sample. Thus, total sample size for all children who were administered the negative condition was seventeen 12-month-olds (8 males); twenty four 18-month-olds (12 males); eighteen 24-month-olds (6 males).

To evaluate differences between target toy touch in the neutral attention and negative emotion trials, a repeated measures ANOVA with trial (neutral-attention; negative emotion) as the within-subjects factor was conducted separately for children at 12 months, 18 months, and 24 months. On the whole, these supplemental data confirmed and strengthened the findings reported above. Twelve-month-olds displayed a trend for a trial effect,  $F(1, 16) = 3.0, p = .10$ , where touching the target toy in the neutral-attention trial ( $M = 8.47$  s,  $SD =$

7.32 s) exceeded touch to the target toy in the negative emotion trial ( $M = 4.62$  s,  $SD = 5.05$  s). Again, 18-month-olds displayed no significant differences in their touching of the target toy in the negative emotion trial ( $M = 9.13$  s,  $SE = 1.60$  s) compared to the neutral-attention trial ( $M = 8.46$  s,  $SE = 1.28$  s). Twenty-four-month-olds displayed a significant trial effect,  $F(1, 17) = 5.50$ ,  $p = .03$ , such that amount of time touching the target toy in the negative emotion trial ( $M = 9.42$  s,  $SD = 7.45$  s) significantly exceeded time touching the target toy in the neutral-attention trial ( $M = 4.78$  s,  $SD = 5.80$  s).

In the second set of analyses, touch differences between the target toy and the distracter toy were compared in the neutral-attention and negative emotion trials. A repeated measures ANOVA with trial (neutral-attention; negative emotion) and toy (target; distracter) as within-subjects factors was conducted separately for children at 12 months, 18 months, and 24 months. No significant effects were found for 12-month-olds or 18-month-olds. In contrast, 24-month-olds demonstrated a significant trial effect,  $F(1, 16) = 6.69$ ,  $p = .02$  such that touch to both target and distracter toys during the negative emotion trial ( $M = 8.70$  s,  $SE = 0.86$  s) significantly exceeded touch to both toys during the neutral-attention trial ( $M = 5.93$  s,  $SE = 0.99$  s).

Sibling findings continued to hold for this larger sample of children. In a two-way mixed-effects ANOVA with sibling status (sibs; no sibs) as the between subjects factor and trial (neutral-attention; negative emotion) as the within-subjects factor, a significant 2-way interaction between trial and sibling status again emerged,  $F(1, 56) = 4.89$ ,  $p = .03$ . Children with siblings ( $n = 24$ ) reduced their toy play after they watched a peer react fearfully to a toy ( $M = 6.75$  s,  $SE = 1.47$  s) as compared to the neutral condition ( $M = 9.69$  s,  $SE = 1.29$  s), whereas children without siblings ( $n = 34$ ) exhibited the opposite pattern of results, increasing their play with toys after watching the peer respond to them with fear ( $M = 8.44$  s,  $SE = 1.23$  s) relative to watching the peer display neutral affect to a toy ( $M = 5.90$  s,  $SE = 1.09$  s).

## Discussion

In this study we examined toddlers' understanding and responsiveness to a peer's positive and negative emotions. In particular, we examined how they used the affect of an older peer to inform and regulate their play with novel toys. The results show that toddlers do, indeed, alter their play with toys depending on a peer's emotions toward the toys, but that responses to a peer's emotional messages about toys change over the second year of life. A peer's emotion about a toy tended to suppress subsequent play with the toy in 12-month-old infants, regardless of whether the emotion was positive or negative. In contrast, a peer's negative emotions tended to activate toy play among 24-month-old children. Eighteen-month-olds appeared to be in transition, with the peer's emotions producing only slight and non-significant changes in toy play. Regardless of age, children with siblings responded differently to a peer's emotions than children without siblings, especially when the peer exhibited negative emotion. To our knowledge, this is the first study of young children's ability to use their peers' emotions to govern their behavior toward the world, that is, peer social referencing. Interestingly, the results suggest that toddlers do not use their peers for social referencing in the same way that they do with adults.

### Age Differences in Peer Social Referencing

By 12 months of age infants appear able to discriminate, understand, and use adults' facial and vocal emotion signals as information about the world. For example, they can connect adults' emotion behavior toward novel or ambiguous objects, people, and events with adults' actions toward those things (Phillips et al., 2002; Repacholi & Gopnik, 1997). They are also able to use adults' emotion signals toward things in the world to govern their own



behavior, approaching and contacting those things toward which adults express positive affect and avoiding those things toward which adults express negative affect (Campos & Stenberg, 1981; Feinman, 1982). However, it is unknown when children begin to understand and use affective information provided by their peers about things in the world. When do peers' emotion expressions toward objects and events begin to influence children's own behavior?

In the current study we found that 12-month-olds touched a toy less when it was the target of a peer's negative *or* positive emotion than when a toy was the target of affectively neutral gaze and vocalizations. When both the target and distracter toys were examined, the pattern was similar: one-year-olds inhibited their touch to both toys as compared to the neutral-attention condition, especially in the positive condition. This result stands in contrast to studies that have employed similar methods but used a televised adult as the emotion informant instead of an older peer. For example, Mumme and Fernald (2003) found that 12-month-olds systematically decreased their touch to the target toy after they had watched an adult display fear toward it, although other labs have not always replicated this effect (Martin, Witherington, & Edwards, 2008). The current results suggest that 12-month-olds may, at the very least, discriminate between emotion informants of different ages. In studies of infant social referencing with adults it remains unresolved to what extent 12-month-old infants seek and use an adult's emotion expressions as information rather than as comfort and reassurance (Stenberg & Hagekull, 2007; Striano, Vaish, & Benigno, 2006). Although older siblings, like adults, may serve as potential attachment figures or sources of comfort for infants, unfamiliar peers clearly do not. However, it also seems that peers do not function as meaningful informants about the world for infants at the end of the first year of life prior to the emergence of systematic peer interaction, and that one-year-olds may not yet know how to react to the relatively novel experience of another child's fearful or excited affect. Instead, any affect exhibited by another child toward a toy, whether positive or negative, tends to curb young infants' subsequent toy play.

Eighteen-month-olds' response patterns mirrored those of the 12-month-olds but were weaker and more variable, hence did not reach significance. Whereas at 12 months of age, children's toy play was inhibited by a peer's affective responses to the toys, 18-month-old children were not responding systematically to a peer's emotions. Other research using similar procedures has demonstrated that children at this age *do* display appropriate responses to a televised adult's fear (Martin et al., 2008), so it appears that peer emotion informants are not helpful in 18-month-olds' decisions about playing with novel toys. We were unable to probe in the current study whether this is because 18-month-olds failed to understand the peer's affective message, or whether they did not know how to respond to the peer. With both understanding of peers and understanding of emotions developing in parallel over the second year of life, and major transitions in self- and other-understanding occurring in the middle of the second year (e.g., Moore, 2007), it could be any combination of factors that led 18-month-olds to respond unsystematically in this study. Nevertheless, the failure of 18-month olds to respond appropriately to the affect of a peer suggests that, like 12-month olds, they cannot yet employ their understanding of the informational value of others' emotions towards objects with their still-primitive understanding of peers (Brownell & Kopp, 2007; Eckerman & Peterman, 2001). Because the response pattern of 18-month olds was neither the same as that of the 12-month olds nor the same as that of the 24-month olds, 18 months may well represent a transitional age in young children's developing understanding of their peers' emotions.

By the end of the second year of life toddlers are more sophisticated readers of emotion messages as well as of peers. They display empathy toward parents (Zahn Waxler et al., 1992) and occasionally, depending on the situation, toward peers as well (Demetriou & Hay,

2004; Nichols, Svetlova, & Brownell, 2009; Spinrad & Stifter, 2006). By 24 months of age children also regularly use emotion words, another index of emotion understanding (Bretherton & Beehly, 1982). Thus, the curious response of 24-month-olds in the current study introduces some interesting questions. That is, 24-month-olds did respond systematically to their peers' emotions toward toys, but they *increased* their play with the toys when they saw an older peer react fearfully toward them. Social referencing studies with adults have also documented this apparently paradoxical effect in children at the end of the second year of life, wherein they approach a toy more quickly and touch it longer after a parent expresses fear or disgust toward it (e.g., Walden & Ogan, 1988). This fits broadly with what we know about toddlers' developing relationship to the world. Two-year-olds are interested in new toys, and they are likewise interested in objects that they are not supposed to touch. As part of their growing autonomy, they begin testing and negotiating others' efforts to influence their behavior (Forman, 2007), and they may ignore or even act in contradiction to adults' emotion messages, especially if the adult's message seems counter to the child's own experience. This may often be the case in social referencing studies, including the current one, insofar as the toys toward which the other person expresses negative affect are not actually frightening, disgusting, or otherwise apparently negative.

What does this mean about 24-month-olds' understanding of peers' emotions and the regulatory effect of peers' messages on toddlers' behavior with toys? One possibility is that by age two, children understand both peers' emotions and the context they are delivered in sufficiently well to know that peers are not always reliable sources of emotion information. They may understand, for example, that peers cry about or display negative affect toward objects for reasons besides fear, like a toy moving out of reach or being taken away by another child or an adult. Alternately, they may understand only that peers' negative emotions are more interesting than their neutral interest; what, they may wonder, is so different about this toy that it deserves such a strong response? Thus, for 24-month-olds the emotions of a peer may activate exploration and play regardless of whether they truly understand the emotion that has been expressed. Moreover, the more salient development at the end of the second year may be children's increasing interest in and ability to interact with peers, rather than their understanding of the informative value of emotions. Whereas at the end of the first year of life infants may be working hard to discern the meaning of others' emotions, by the end of the second year emotions may be becoming integrated with the excitement of peer interaction. Thus, it is possible that any salient, pronounced response of a peer to an object or event in the world makes it more compelling, whether that response is motoric, gestural, or emotional.

### **Individual Differences and the Sibling Effect**

One factor that influenced children's responses to an older peer's emotions in the current study, regardless of the child's age, was experience with a sibling. Children with at least one sibling were more likely to reduce their play with the toys toward which a peer had expressed fear compared to children with no siblings. This pattern did not hold when the children watched a peer behave positively toward toys. Perhaps children with siblings perceive an older peer to be similar to their older sibling, and trust the peer's behavior to be informative, or perhaps they are more advanced in their understanding of peers' emotions. It is notable that these results converge with a growing body of work indicating that experience with siblings is associated with more complex social and emotional understanding generally (Hughes et al., 2006; Jenkins & Astington, 1996; McAlister & Peterson, 2007; Perner et al., 1994) and that children with siblings are more likely to respond to their peers' distress than children without siblings (Demetriou & Hay, 2004). The notion that sibling experience in the first two years of life may help children understand the significance of peers' emotions raises tantalizing questions about the mechanisms

underlying the very early development of social understanding, questions which the current study cannot address but which are ripe for investigation.

## Limitations

Although the results from this study are intriguing and potentially important for our knowledge about early developments in social understanding and peer social competence, we would urge caution in drawing strong inferences until the findings are replicated with a larger sample, and until the phenomenon is examined more broadly, including with familiar peers, younger peers, and siblings. It is also possible that some of the discerned age differences could be due to unique responses to these particular toys or to unique order effects because the neutral-attention trial always preceded the positive or negative emotion trials. Although we think these are relatively unlikely alternatives given that the procedures and stimuli were modeled closely on those used by Mumme & Fernald (2003), it will nevertheless be important to expand the range of stimuli, perhaps especially to the kinds of toys that toddlers are likely to play with; the results would also be more robust and convincing in a fully counterbalanced design. At a minimum, in this first study of social referencing of peers among toddler-aged children, we have identified systematic age differences over the second year of life that parallel the developmental progression of children's emerging peer interactions. How young children's developing understanding of their peers' emotions may intersect or influence their emerging peer interaction skills remains a question for future inquiry.

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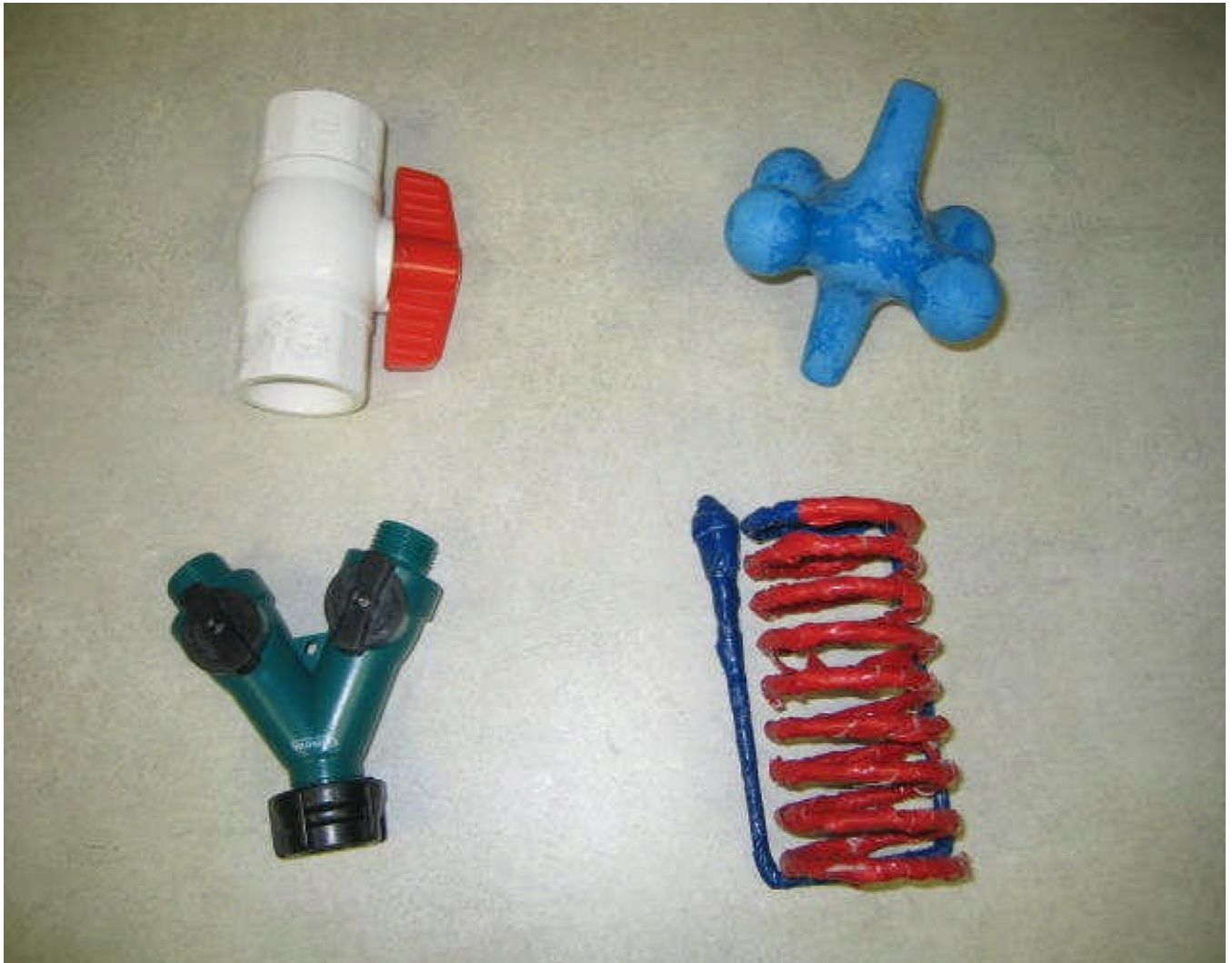
## Biographies

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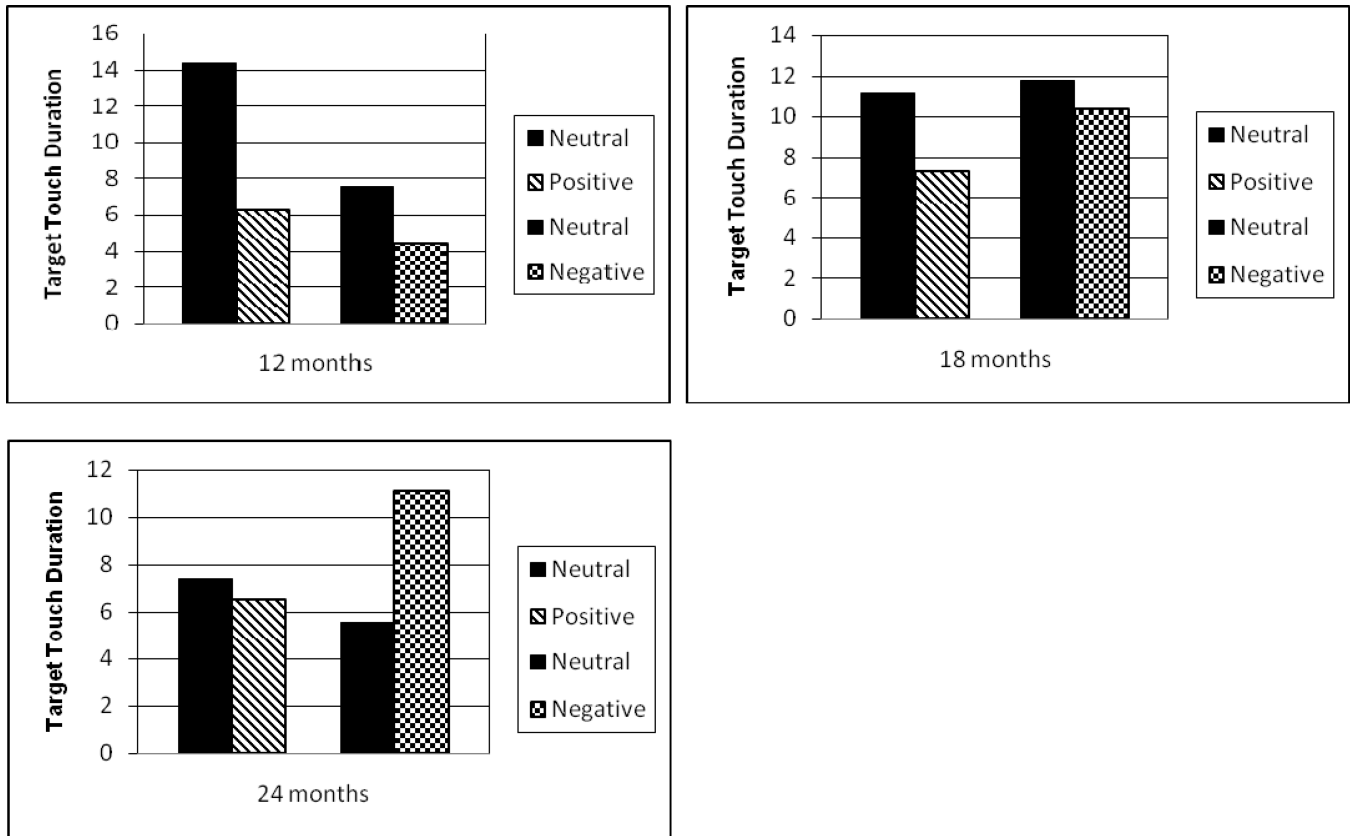
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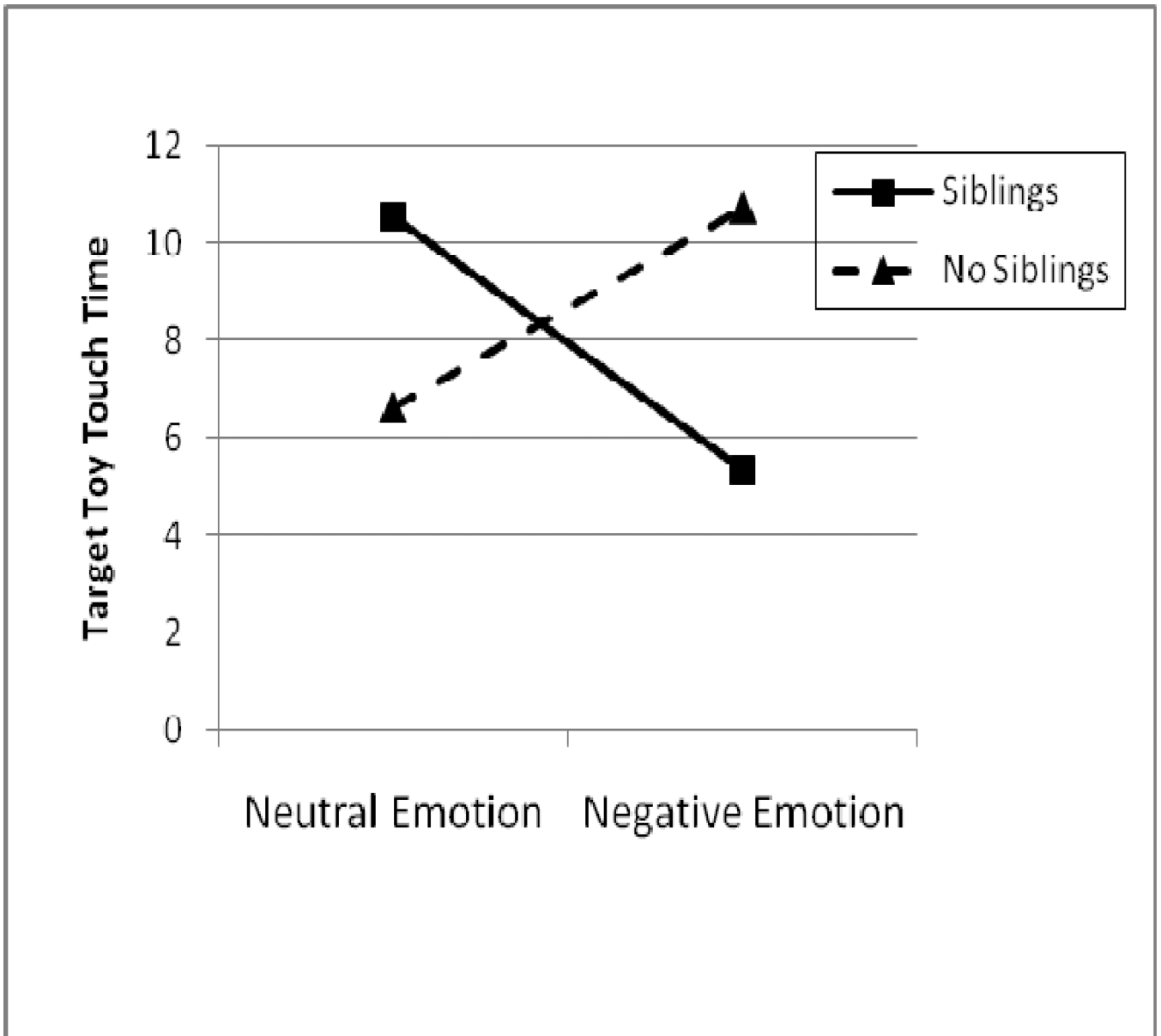




**Figure 1.**  
Novel toys used in the current study (adapted from Mumme & Fernald, 2003).



**Figure 2.**  
Amount of time children touched the target toy (seconds) as a function of age, neutral vs. emotion trial, and positive vs. negative emotion valence conditions.



**Figure 3.** Amount of time children touched the target toy (seconds) during the neutral vs. negative emotion trial as a function of sibling status.

Table 1

Descriptive Statistics for Toy Touch (in seconds)

Age (months)	N	Target				Distracter			
		Neutral		Emotion		Neutral		Emotion	
		M	SD	M	SD	M	SD	M	SD
12	23	10.87	8.38	5.28	5.72	5.7	5.93	5.28	5.72
18	24	11.48	6.27	8.83	7.17	6.48	5.1	9.5	6.52
24	21	6.5	6.76	8.93	7.27	7.33	6.37	9.74	6.02