Learning by looking: Infants' social looking behavior across the transition from crawling to walking

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Abstract

This study investigated how infants gather information about their environment through looking and how that changes with increases in motor skills. In Experiment 1, 9.5- and 14-month-olds participated in a 10-min free play session with both a stranger and ambiguous toys present. There was a significant developmental progression from passive to active social engagement, as evidenced by younger infants watching others communicate more and older infants making more bids for social interaction. Experiment 2 examined longitudinally the impact of age and walking onset on this progression. The transition to independent walking marked significant changes in how often infants watched others communicate and made active bids for social interaction. Results suggest that infants transition from passive observers as crawlers to active participants in their social environment with the onset of walking.

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Introduction

In this article, we explore the intersection of developmental changes in social cognition and motor skills. More specifically, we seek to understand how infants gather information about their environment through looking and how that changes with increases in motor skills. We focus on infant looking because infants begin learning through vision from the moment they are born. Humans rely more heavily on vision than do most species (e.g., Kellman & Arterberry, 1998). It is well known that newborns begin visually scanning the environment and pausing for objects and people just minutes after they are born (Haith, 1980). As infants develop, they use their sense of vision to detect perceptual and physical regularities in the environment (e.g., Gibson, 1988), to make predictions about future events based on past events (e.g., Canfield & Haith, 1991), and to observe the behaviors of others.
Toward the end of the first year, infants’ looking behavior becomes increasingly social in nature. Most researchers have focused on two related aspects of infants’ social looking: joint attention and social referencing. Joint attention generally begins between 9 and 15 months of age and is characterized by infants looking toward the same objects as their partners and even adjusting their looking to match changes in their partners’ looks (e.g., Adamson & Bakeman, 1991). Also around this time, infants begin to engage in social referencing. Although precise definitions of social referencing have varied across studies, most agree on a few core components, namely that infants are exposed to a novel item or situation and appraise the situation, in part, by glancing immediately to the mother, seeking more information about the situation (e.g., Hornik & Gunnar, 1988; Tamis-LeMonda & Adolph, 2005). Infants then usually respond to the stimulus in a manner similar to their mothers (e.g., Ainsworth, 1992; Hornik, Risenhoover, & Gunnar, 1987). An infant’s request for information about a particular object, the comprehension of the mother’s response about the referent, and the application of information from the mother to later behaviors define the social referencing process.

Social referencing can also be thought of as a means toward affective or emotional communication (Ainsworth, 1992; Baldwin & Moses, 1996; Bowlby, 1969). According to this theory, when an infant turns to the mother after looking at an object, the infant is asking a trusted adult how to feel and react emotionally to the stimuli. Thus, social referencing is not only a type of look but also a critical component of early childhood attachment and interaction between the infant and mother.

Indeed, social referencing behavior has been the focus of dozens of studies on emotional and social development that detail who infants will social reference and under what circumstances (e.g., Blackford & Walden, 1998; Feinman, 1992; Hirshberg & Svejda, 1990; Hornik & Gunnar, 1988; Klinnert, Emde, Butterfield, & Campos, 1986; Walden & Baxter, 1989; Walden & Ogan, 1988; Zarbatany & Lamb, 1985). Despite the data that have been amassed on social referencing, there are still some important remaining questions about the role of social referencing in the larger context of social looking and social development. Social referencing is not the only kind of look, and experimentally it is very narrowly defined. Despite minor differences in emphases, most researchers agree that a social reference look must include the following four components: an observation of an event or object, a feeling of uncertainty, followed by a look, and an intention to seek information. This narrow definition of social referencing as the only social look neglects many of the other looks infants give not only in uncertain situations but also when simply appraising their environment. For example, infants can look to an adult before performing an uncertain activity (i.e., social referencing or pre-action) or after already performing the action (post-action look). In both cases, the infant has looked to an adult for information about an uncertain activity, but only one of those looks would count as social referencing (depending on the particular definition chosen by the researcher). Infants can also look at a parent to initiate a social interaction, seek comfort, or share affect.

To investigate how social referencing looks fit in to the larger context of other social looks, Clyman, Emde, Kempe, and Harmon (1986) developed a typology of information-seeking social looks composed of eight categories (see below for categories and details). These new classifications of social looks were then tested with 12-month-olds in Ainsworth’s strange situation. Clyman and colleagues (1986) found bids for interaction to be the most common look and social references to be, in fact, the least frequent in 12-month-olds. This was quite surprising because the testing situation was novel and this is the age group for which most social referencing research is conducted. Still, infants demonstrated fewer social referencing looks than any other look. Furthermore, other than those few social reference looks, the experimenter—not the mother—was the most frequent target of social looks.

Findings in other studies support those of Clyman and colleagues (1986) that infants use a variety of social looks to appraise their environment. Hornik and Gunnar (1988), for example, found that affective sharing, similar to bids for social interaction, occurred more frequently than did social referencing. They argued that the infant uses these looks as a means of interacting with his or her mother and, in so doing, of gaining information about the environment. The ability to gain information through means other than social referencing, as in affective sharing, suggests that infants may use many types of social looks in interactions with others and in appraisals of their environment.

Here we seek to understand the full range of social looks that infants use and how their looking changes over time. To do this, we present data from both a cross-sectional study and a longitudinal study where we explore the connection between changes in social looking behavior and changes in mo-
tor development, specifically the onset of independent walking. The onset of walking is associated with significant changes in an infant’s social and nonsocial worlds. Walking presents a new set of opportunities for an infant who is now able to interact with his or her environment in a different way. Upright locomotion brings with it the ability to see where one is going while moving and to hold up toys of interest while moving. Indeed, many studies have shown that the transition from crawling to independent walking changes how infants experience their environment to the point where infants must learn skills as walkers that they had already mastered as crawlers. For example, Adolph (1997) found that crawling infants were quite accurate at judging the steepest slope they could descend, but with the onset of walking, the same infants would plunge headfirst down the slope. Similarly, Clearfield (2004) found that experienced crawlers were more successful on a spatial memory task that required locomotion than were older but newly walking infants. Clearfield argued that perception, memory, and movement contribute to infants’ cognition such that what infants learn about the world is related, at least in part, to how they move in it. Thus, the onset of walking results in a reorganization of infants’ cognition.

Not only does walking onset change how infants perceive and explore their world, it also affects their social interactions, particularly with their caregivers. Biringen, Emde, Campos, and Applebaum (1995) examined the emotional expression between infants and their mothers by maternal perceptions of infants’ emotions, infants’ testing of wills, and infants’ overall responsiveness to their mothers’ interactions. Although Biringen and colleagues compared early and late walkers, some characteristics were true of pre-walkers and walkers regardless of when this transition occurred. Walkers showed an increased testing of wills, meaning that they were more likely to continue a behavior even after repeatedly being told to stop. Furthermore, although infants became more affectively positive with the onset of walking, mothers perceived their infants’ emotions more negatively, perhaps as a reflection of the increased testing of wills.

Given that walking onset affects perceptual judgments, spatial memory, and social interactions, we asked whether walking may also serve as a catalyst for changes in social looking behavior. To do this, we present data from two experiments. In Experiment 1, we tested 9.5- and 14-month-olds in an ambiguous situation designed to elicit many looks. In Experiment 2, we examined the developmental changes in social looking longitudinally.

**Experiment 1**

In this experiment, we tested infants at 9.5 months of age (when social referencing reliably appears) and 14 months of age in an ambiguous situation and measured eight categories of looking behaviors. We had two specific goals: (a) to examine the frequency of social referencing in the context of all social looking behavior and (b) to explore whether and how social looking behavior changes with age.

**Method**

**Participants**

Participants were 15 infants (7 boys and 8 girls) with a mean age of 9.6 months (range = 8.7–10.5) and 15 infants (7 boys and 8 girls) with a mean age of 13.8 months (range = 12.7–14.2). These age groups were chosen because 8 to 10 months is when social referencing can first be observed reliably in infants and by 14 months infants are adept at social referencing (e.g., Hornik & Gunnar, 1988). All 9-month-olds were crawling ($M = 7.2$ weeks crawling experience and not yet walking), and all 14-month-olds could walk independently ($M = 6.4$ weeks walking experience). In terms of race/ethnicity, 1 infant was Indian American, 1 was Hispanic, and the rest were non-Hispanic Caucasian. Infants were recruited via letters to parents based on published birth announcements. All infants received a small prize for participation.

**Apparatus**

Infants were tested in a large brightly lit room (20 × 20 feet) with novel toys (e.g., an abacus and a stuffed octopus with hard plastic shapes on the end of the tentacles that made noise when the shapes...
were inserted into the octopus head) in opposite corners of the square testing area (which was 12 × 12 feet). The parent and experimenter occupied the other two corners of the area. Note that ambiguous toys and a stranger are the two stimuli most frequently cited as eliciting social referencing (e.g., Feinman, 1992). Two video cameras located on opposite sides of the room were set up to record infants’ behaviors during the study. One camera was at floor level in one corner of the play space, and the other camera was mounted 5 feet above the floor looking down across the play space in the opposite corner. The camera at floor level allowed coders to note actual eye position, which was synchronized with the higher camera to note head position.

**Procedure**

The session began when the parent—the mother in all but one case—placed the infant in the middle of the designated play space. After the parent put the child down, the parent sat down in the designated corner of the play space and the experimenter sat in the opposite corner. The parent, experimenter, and toys were within the sight and crawling or walking distance of the infant at all times. The parent was instructed not to verbally direct the child’s play (i.e., not pointing out specific toys for the child to look at or play with, not verbally instructing the child). The parent was also instructed to look positive and happy when the infant approached or played with any of the toys and to look negative and concerned when the infants moved out of the play space, tried to play with toys that were outside of the play space, or tried to play with the cameras. The experimenter sat in the corner opposite of the parent and occasionally talked with the parent, but the experimenter remained blank-faced. The infant was recorded for 10 min.

**Data coding**

Look frequencies were coded for the 10-min session for each participant, and percentages of each type of look are reported. A social look occurred whenever an infant looked at an adult’s face for at least a half-second (0.5 s) and was classified based on Clyman and colleagues’ (1986) categories:

1. **Orient to a voice**: An infant looks at an adult who has just started speaking, defined as turning the head, and possibly the torso, toward the person who has just begun speaking, fixating on that adult.
2. **Orient to an action**: An infant looks in reaction to a person's sudden or noisy movement.
3. **Pre-action (i.e., social referencing) to the mother**: An infant looks at an uncertain event or object and then looks to an adult before acting in response to that event or object. This was coded as a look at the referent with an immediate and consecutive look to the mother.
4. **Pre-action (i.e., social referencing) to the experimenter**: Same as above but directed toward the experimenter.
5. **Post-action reference**: An infant is engaged in some form of movement or activity and suddenly stops the behavior and physically turns the head, and perhaps the body, to look at an adult. Post-action references are analogous to social references except that the infant looks after, not prior to, acting.
6. **Bid for social interaction**: An infant appeals to an adult to share an emotional reaction to an object or event or appeals for interaction with the adult, as in offering a toy or raising the arms, frequently accompanied by gestures, vocalizations, or facial cues to the adult. These bids were distinguished from post-action looks by the accompanying gestures and actions with the toys (e.g., holding out the toy or pointing at it). Note that Clyman and colleagues (1986) further separated bids into short bids (less than 2 s) and long bids (more than 2 s). Although we did code for both separately and analyzed them, we found no differences between the short and long bids, so we collapsed them into one category.
7. **Watching others communicate**: An infant fixates on the experimenter and then transfers attention to the mother and fixates on her face or vice versa while the adults are communicating. Thus, a triadic relationship is established in which the infant may be observing a social relationship and learning from it or perhaps processing information about an interaction between two other people.
8. **Gaze aversion**: An infant fixates on an adult’s face and then looks away, but not to another adult or to a toy. These looks tended to occur at the end of a session when the infant was losing interest in the toys and the task.
In addition to the looking categories, we also coded the distance traveled around the play space. This measure was designed to address whether crawling infants might give different kinds of looks because they did not move as far away from the parents as did walking infants. The floor surface was a 1-foot-square checkerboard pattern, so a rough measure of distance was calculated by counting the number of squares crossed during the 10-min session.

Reliability
A second coder blind to the study coded 20% of the test sessions, an equal number from each of the age groups. Interrater reliability was 84.8% exact agreement across categories of looks (range = 80–88%). Reliability for social referencing the parent was 87.5% exact agreement, and reliability for social referencing the experimenter was 85.7% exact agreement. Note that these numbers are significantly higher than those originally reported by Clyman and colleagues (1986).

Results and discussion
To test whether infants engaged in some kinds of looks more frequently than in others, the number of looks in each category, collapsed across age, were submitted to a Friedman test, which revealed significant differences, $\chi^2(7) = 84.68, p < .0001$ (see Fig. 1). Bids for social interaction occurred more frequently than any other look, and orienting to an action occurred less frequently than any other look. All other looks, including post-action looks, pre-action looks to parent and experimenter (i.e., social referencing), watching others communicate, and gaze aversion, were ranked comparably.

The two age groups (9.5 and 14 months) were compared on each category in a series of Mann–Whitney U tests. There were significant differences in three categories (see Fig. 1). The younger participants looked a significantly greater percentage of the time at others communicating ($M = 9.43\%, SE = 2.32$) than did the older participants ($M = 3.04\%, SE = 1.51$), $U = 57.5, p < .05$, and the younger infants engaged in more gaze aversion ($M = 11.36\%, SE = 3.20$) than did the older infants ($M = 4.6\%, SE = 2.19$), $U = 64.0, p < .05$. In contrast, the older group engaged in a significantly higher percentage
of bids for social interaction \((M = 58.65\%, SE = 5.10)\) than did the younger infants \((M = 39.07\%, SE = 0.56)\), \(U = 56, p < .05\).

To separate out the effect of age from locomotor experience, a series of analyses of covariance (ANCOVAs) were conducted, with each type of look as a dependent variable, age as a regressor and locomotor experience as a covariate.\(^1\) None of the categories of looks showed an effect for age with locomotor experience partialed out. However, one category, watching others communicate, did reveal a significant effect for locomotor experience above age, \(F(1, 26) = 6.66, p < .01, \eta^2 = .70\).

To test whether these results could be attributed to the crawling infants not being able to move as far away as the walking infants (which could affect the kinds of looks they gave), we compared the distance traveled in the play space. A t test confirmed no significant differences, \(t(28) = 1.32, ns\). Thus, the differences between the crawling and walking infants was not due to locomotor limitations.

The current study was designed to explore social referencing in the context of all social looks and how social looking behavior changes with age. One striking finding was the frequency of social referencing looks in comparison with other classifications of looks. Only approximately 15% of all looks were pre-action looks, compared with between 38 and 60% of the looks being bids for social interaction, replicating the trend reported by Clyman and colleagues (1986) and Hornik and Gunnar (1988). This finding is critical because it suggests that infants may be more interested in participating in interactions with their parents than in appraising their environment via their parents.

We also found that younger infants looked significantly more at others communicating than did older infants and that older infants engaged in significantly more short bids than did younger infants. Although the younger infants did watch the adults significantly more than did the older infants, this was not their dominant form of looking (only 38% of their looks were bids for interaction). The 9-month-olds’ pattern of looking is best characterized by variety, with several categories being equally represented, including orienting to a voice, pre-action looks to the mother, watching adults communicate, and gaze aversion. Interestingly, all but one of these categories involves some kind of voice interaction with an adult, whether it be looking toward adults who are already speaking or looking to an adult to initiate an interaction (the bids). Although one may argue that the bids for interaction were more challenging for crawlers, recall that bids could be pointing at or vocalizing about a toy, not just holding it up (which might be more challenging while in a crawling posture). Moreover, all of the crawlers engaged in the majority of their looks while sitting near the toys, thereby leaving their hands free. The 14-month-olds’ pattern was somewhat more consistent, with the majority of their looks (58%) being bids for social interaction. This suggests a potential developmental progression, where infants begin learning about social interactions by watching others and then initiate participation in their own social interactions.

To investigate this developmental progression, we expanded on Experiment 1 in a longitudinal study, testing infants monthly from 9 to 14 months of age. Furthermore, we tested one possible contribution to this change by considering the transition from crawling to walking as a potential impetus for infants becoming more active participants in their social environments.

**Experiment 2**

**Method**

**Participants**

Participants were 14 infants (9 boys and 5 girls), all Caucasian except for 1 Hispanic. All participants were observed once a month for 6 months, beginning at 9 months (± 2 weeks) of age and ending at 14 months (± 2 weeks) of age. One infant missed one data collection session due to illness, and there was no other attrition.

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\(^1\) Although the data are nonparametric, there are no nonparametric tests of this kind. And because the data were already converted to percentages for ease of interpretation, those percentages lend themselves to this kind of parametric test. However, note that we acknowledge the limitations of this particular analysis.
Longitudinal design

Infants were tested six times in total, beginning at 9 months of age. All infants were crawling at this visit. Each infant then returned to the laboratory once a month on his or her monthly birthday until the infant was 14 months of age (when infants are typically walking independently). This design allowed us to track the transition from crawling to walking while holding age constant, enabling us to tease apart the influences of age versus locomotor experience. Walking onset was determined in two ways: maternal reports and the experimenter observing several consecutive steps made by the infant independent of any external supports such as furniture. For infants’ ages at walking onset, see Table 1.

Apparatus, procedure, and data coding

All factors were identical to those in Experiment 1 except that different experimenters participated in data collections so that the experimenter was a stranger on each visit.

Table 1
Ages at infants’ first walking sessions

<table>
<thead>
<tr>
<th>Age at first walk session</th>
<th>Number of infants</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 months</td>
<td>1</td>
</tr>
<tr>
<td>11 months</td>
<td>3</td>
</tr>
<tr>
<td>12 months</td>
<td>4</td>
</tr>
<tr>
<td>13 months</td>
<td>3</td>
</tr>
<tr>
<td>14 months</td>
<td>1</td>
</tr>
<tr>
<td>After study ended</td>
<td>2</td>
</tr>
</tbody>
</table>

Fig. 2. Mean percentages of looks by category over time. M, mother; E, experimenter. *p < .01.
Fig. 3. Mean percentages of looks by locomotor experience. M, mother; E, experimenter. *p < .01.

Fig. 4. Mean percentages of looks at 12 months of age for crawling and walking infants. *p < .01.
Results and discussion

To test whether infants engaged in some kinds of looks more frequently than in others, the data were again submitted to a Friedman test, which revealed significant differences, $\chi^2(7) = 86.53$, $p < .0001$ (see Fig. 2). Bids for social interaction occurred more frequently than any other look. Differences over time were tested with a series of Kruskal–Wallis tests, which revealed significant differences for three categories. Infants demonstrated more pre-action looks to the experimenter at 9 months than at 13 or 14 months, $H = 12.57$, $p < .001$, exhibited more gaze aversion at 9 months than at 12, 13, or 14 months, $H = 30.96$, $p < .0001$, and watched others communicate more at 9 months than at 13 or 14 months, $H = 14.36$, $p < .01$. These data generally replicate the results from the cross-sectional study in Experiment 1.

To rule out physical distance traveled as an explanation for the pattern, we again counted the number of squares crossed as a rough measure of distance. A t test comparing the total number of squares crossed in infants’ last crawling and first walking sessions revealed no significant differences, $t(11) = 1.16$, ns.

We then tested the contribution of walking onset in two ways. First, a series of Mann–Whitney U tests compared infants’ looking behaviors on each infant’s last crawl and first walk sessions. Because 12 of the 14 infants began walking during the study, only these infants were included in this analysis. Infants watched others communicate significantly more during their last crawl visit ($M = 8.26\%$, $SE = 1.48$) than during their first walk visit ($M = 1.19\%$, $SE = 1.8$), $U = 19$, $p < .001$ (see Fig. 3). Infants also engaged in significantly fewer bids for social interaction during their last crawl session ($M = 53.27\%$, $SE = 3.64$) than during their first walk session ($M = 70.78\%$, $SE = 3.56$), $U = 26$, $p < .001$. There were no other significant effects.

The second way in which we tested the influence of locomotor experience was by comparing the walking and pre-walking infants at the same age. At 12 months, 8 of the infants were walking (mean experience = 3.37 weeks) and 6 were still crawling. Again, the only two categories that revealed significant differences were watching others communicate and bids for interaction. The crawling 12-month-olds demonstrated significantly fewer bids for interaction ($M = 47.89\%$, $SE = 5.42$) than did the walking 12-month-olds ($M = 74.33\%$, $SE = 3.28$), $U = 47$, $p < .01$, and crawling 12-month-olds exhibited more looks watching others communicate ($M = 12.17\%$, $SE = 2.76$) than did walking 12-month-olds ($M = 1.44\%$, $SE = 0.78$), $U = 47$, $p < .01$ (See Fig. 4).

The current study examined the changes in the frequency of social looks longitudinally and whether the transition from crawling to walking served as a catalyst for these changes. Focusing first on the age effects, again, social referencing (or pre-action looks) to the mother were the least frequent looks, thereby replicating Clyman and colleagues (1986) and Hornik and Gunnar (1988). Furthermore, bids for social interaction were the most frequent looks. This lends further support to the idea that focusing research on social referencing misses a lot of information-seeking looking behavior by infants. In addition, we replicated the interaction from Experiment 1, where younger infants watched others communicate more than did older infants and where older infants engaged in significantly more short bids for social interaction than did younger infants. Critically, the current results replicated this age discrepancy in the same infants, lending further support to the claim that as infants mature, they progress from being passive to active participants in their social environment.

More important, when the data were aligned by the transition to independent walking, the interaction held, with infants watching others communicate more as crawlers and then bidding for social interactions more as soon as they began to walk. This interpretation was strengthened by the data at 12 months, when the walking 12-month-olds were compared with the crawling 12-month-olds. These findings together indicate that the transition to independent walking affects social interactions. Although we did find age-related differences, these differences were only between 9 and 12 to 14 months of age. Critically, all of the infants were crawling at 9 months, and more than half of the infants were walking at 12 months. The significant age effects, thus, may best be explained by the transition to independent walking. The change from watching others communicate to initiating social interactions suggests that infants are maturing from passive to active participants in their social environment and that walking at least coincides with this development.
General discussion

There are two key conclusions to be drawn from the current experiments. First, these results demonstrate the importance of studying social referencing in the context of other social looks. The results of this study are highly consistent with those of several earlier studies that found bids for social interaction to be the most common type of social look (Clyman et al., 1986; Hornik & Gunnar, 1988). This suggests that infants are more interested in actively exploring their environments than in using others’ appraisals as a catalyst. It is possible that the current testing situation was not ambiguous enough to elicit many social referencing looks. Indeed, Tamis-LeMonda and Adolph (2005) recently argued that much of the social referencing literature has not presented infants with situations that were truly risky or ambiguous. However, not only did we present infants with the two situations most commonly described as eliciting referencing (ambiguous toys and a stranger), but also in the longitudinal study infants showed a significant decline in social referencing of the experimenter. The fact that they referenced the experimenter at all (and significantly more earlier on) could suggest that the situation was indeed ambiguous. Moreover, we reported rates of social referencing comparable to those in previous studies (for a review, see Tamis-LeMonda & Adolph, 2005). The fact that those rates are so low just reinforces our claim of the importance of measuring multiple types of social looks. Traditional social referencing research simply has not captured the full range of infant looking behavior. Infants are constantly looking at things and people and are constantly learning about their social world through those looks. Using social referencing as the sole type of social look excludes a vast amount of looking and learning that infants are doing.

Second, the results of Experiment 2 indicate that major changes in locomotor development may also be connected to major changes in social development. It is well known that major motor milestones, such as the onset of crawling and walking, coincide with major changes in cognitive and perceptual development (for a review, see Campos et al., 2000). We agree with Campos and colleagues (2000), who stated that “locomotion is a setting event, a control parameter, and a mobilizer that changes the intrapsychic states of the infant, the social and nonsocial world around the infant, and the interaction of the infant with that world” (p. 151).

The findings of the current study support the claim that walking has a substantial impact on infants’ social world. The upright posture of walking permits infants to see more than what is directly in front of them, thereby expanding their perceptions of the world. The direction of this impact is still unknown. Learning to walk might motivate infants to initiate more social interactions, or the desire to initiate interactions might compel infants to learn to walk. The current data do not distinguish between these possibilities, but future studies could explore this by manipulating locomotor abilities or by varying the extent to which social interactions are likely.

As infants actively construct their social and nonsocial worlds, the new form of movement lends itself not only to increased exploration of the physical environment but also to new and deeper forms of emotional connections. We saw that here, with infants passively watching others communicate as crawlers but then transitioning to actively bidding for social interactions when they began walking independently. Another way in which this new exploration and emotional connection might be expressed is through play behavior with toys. For example, Clearfield (2007) examined the changes in social interactions with toys across the transition from crawling to walking. In that study, crawlers were more likely to go to toys and play independently, whereas walkers were more likely to pick up toys and carry them to their mothers to initiate social interactions. The results of the current study lend further support to Clearfield’s conclusion that walking infants, instead of being the passive observers they were as crawlers, actively take part in their social world.

In sum, these findings express a more complicated picture of social looking behavior than was previously thought. Broadening the focus to include all categories of social looking behavior may give us a richer understanding of how infants gather information about their environment, and the ways in which information influences and regulates their behavior. Moreover, infants’ looking behavior and information-seeking behaviors are deeply rooted in other developing domains, including cognitive, social, emotional, and locomotor systems. By studying the interactions among these systems, we can gain a better understanding of the developmental process.
Acknowledgments

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References


