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Talking About the Near and Dear: Infants' Comprehension of Displaced Speech

Patricia A. Ganea
University of Toronto

Megan M. Saylor
Vanderbilt University

The present research investigated the role of familiarity and proximity in infants' comprehension of displaced speech. When 13- and 16-month-old infants heard a researcher talk about a familiar person immediately after she left the room, they showed comprehension of the name by looking, pointing, or searching for the person in question. The majority of 16-month-olds were also able to reveal comprehension of the reference to the absent person after a 16-min delay, and they were able to respond to the name of an unfamiliar person as well. The 13-month-olds had more difficulty responding after the delay and to the name of a less familiar person. Thus, in the early phases of absent reference comprehension, infants' ability to respond to displaced speech can vary as a function of the temporal gap between the verbal reference and the last appearance of the referent, and of how strong their representation of the referent is.

Keywords: mental representation, language, memory

When infants first begin to talk, their communication is limited to their immediate needs and current events that surround them. For example, they talk about food items, visible toys and present people (Sachs, 1983). With development, infants' language becomes "displaced" from the perceived situation, including references to events that took place in the past, people who are not present and faraway places. The ability to communicate about topics that are absent is a core property of human language that enables transmission of knowledge across space and time (Deacon, 1997; Hockett, 1960; Werner & Kaplan, 1964).

Several studies have clarified that infants' ability to *talk* about absent entities emerges late in their second year (Sachs, 1983; Scollon, 1979; Veneziano & Sinclair, 1995). In the beginning infants' remarks are limited to the most proximal referents, things that are near, events that happened in the immediate past, or things that they might do in the near future. Recent studies of infants' *comprehension* of topics of speech that are displaced from the present context have suggested a similar developmental path, with infants' understanding initially being restricted to the most proximal referents (Ganea, 2005; Saylor, 2004; Saylor & Baldwin, 2004).

The ability to bring to mind an absent referent is a function of both representational and contextual factors (Ganea, 2005). First, infants' comprehension of references to absent objects is dependent on their *general representational capacity*. With development, there is a dramatic increase in their ability to represent information about the spatial location and properties of objects (Huttenlocher, 1974; Spelke, Breinlinger, Macomber, & Jacobson, 1992), as well as information about word sounds and their relation to objects (Huttenlocher, 1974; Jusczyk & Hohne, 1997; Tincoff & Jusczyk, 1999). Other representational factors include (a) the strength of the *word-object relation*—the relation between the name of the object referred to and the infant's memory representation of the object—and (b) the strength of the specific memory *representation of the object* itself. For example, the more exposure the infant has to the name-object link, the more likely it is that hearing the name will trigger a representation of the object when not in sight. Similarly, the stronger the representation of the object, the more likely it is that this representation will instigate an action toward the object when it is hidden (Munakata, 2001; Munakata, McClelland, Johnson, & Siegler, 1997). Thus, in the case of absent references, the more experience an infant has had with an object, the more likely it is that he or she will activate a representation of the object when mentioned in its absence. Another important factor in infants' comprehension of references to absent objects is the degree of *contextual support*. Research on memory development suggests that children's memory in the first 2 years of life has a high degree of specificity, so that differences between contexts can drastically affect the extent to which a child can bring a memory representation to mind (Butler & Rovee-Collier, 1989; Hartshorn et al., 1998; Hayne, MacDonald, & Barr, 1997). In general, children are more likely to retrieve a memory representation when there is an exact match between the initial context of stimulus encoding and the test context. Thus, in the case of absent references, infants should more often respond to references to absent objects and entities when they are mentioned in a context with which both the child and the referent have been associated rather than in a novel context.

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Patricia A. Ganea, Institute of Child Study, Ontario Institute for Studies in Education, University of Toronto, Toronto, Ontario, Canada; Megan M. Saylor, Department of Psychology and Human Development, Vanderbilt University.

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Correspondence concerning this article should be addressed to Patricia A. Ganea, Institute of Child Study, University of Toronto, 45 Walmer Road, Toronto, ON, Canada M5R 2X2. E-mail: patricia.ganea@utoronto.ca

According to this model, in the early stages of development, absent reference comprehension is constrained by limited representational capacity and infants may fail to show evidence of understanding references to absent people or events unless they are in a supportive environment. Whether an infant responds to a reference to an absent object or person will be determined by the complex interaction of representational and contextual factors.

Previous research offers some support for this claim. In one recent study, 12-month-old infants only responded to the name of an absent toy if it had been introduced in the same room it was hidden in (rather than an adjacent room or at the child's home, Osina, Saylor, & Ganea, 2012). Even more striking is a result from Saylor and Baldwin (2004) in which 12-month-old infants failed to show reliable comprehension of references to an absent familiar person—the infant's own father. When hearing the experimenter talk about "Daddy" infants from 15-months on responded in some way (e.g., looking toward the door of the laboratory room or even searching for the absent parent). The 12-month-olds, however, showed no discernible response (see also, J. F. Miller, Chapman, Branston, & Reichle, 1980). Nevertheless, two additional studies that probed infants' understanding of talk about absent *objects* found that 12- to 13-month-olds respond to the name of an absent object if the object is mentioned only after a short delay and is accessible (Ganea, 2005) or if they are provided with reminders of the referent (Saylor, 2004).

One possibility is that infants in these follow-up studies were able to reveal comprehension because the referents were accessible and mentioned after a very short delay. Hence, the spatial and temporal proximity of the object interacted with the child's representation of the object and thus facilitated his or her ability to respond to its name when not in view. Similarly, although infants in Saylor and Baldwin's (2004) study presumably had a strong representation of their absent father, two contextual factors may have interfered with their ability to respond to his or her name. Not seeing their father for some time and hearing his name in a novel environment, with which he was not previously associated, may have interfered with infants' ability to respond.

Based on this previous research suggesting that representational factors may constrain absent reference comprehension, our prediction is that infants will be more likely to respond to the name of an absent parent in a novel laboratory environment, if the person has been associated with that location and if infants hear mention of the person soon after they have last seen him or her. According to the model described above, we also predict that the pattern of results will be different for a less familiar person—an experimenter the child recently met and, thus, for which the child has a weaker representation. We expect that infants will respond less to the name of an unfamiliar person, even when the person is mentioned in a context with which she has been associated and soon after she has left the room. These findings would further indicate that infants' capacity to respond to references to nonvisible things and people is a function of their ability to bring to mind and act upon a representation of the referent at the time of communication.

We included infants at 13 and 16 months of age so that we would have one group we were fairly certain would respond to the name of an absent familiar person (as they responded in a more challenging situation in Saylor & Baldwin, 2004, study) and one group that we predicted would be helped by the supportive environment we offered in the current study. The infants were tested in a variant of Saylor and Baldwin's (2004) procedure in which a researcher talked about a familiar person when they were absent. However, in this study, the familiar other accompanied infants on their visit to the lab and were thus nearby spatially. During the study the infants and the familiar other (who was either a sibling or caregiver) played together in the lab room for 10 min. The familiar other then left the room, saying "goodbye!" The researcher then talked about the familiar other either immediately (Study 1) or after a 16-min delay (Study 2). This manipulation enabled us to investigate the role of proximity. The hypothesis was that moving the referent closer in time and space in Study 1 would facilitate children's ability to respond to the name of an absent person. In addition, we predicted that responses to the name would decrease in Study 2 when the strength of infants' representation of the person would be diminished by inserting a temporal lag between the verbal reference to the person and the time when she was present. In Study 3, the child heard the name of an unfamiliar person immediately after she had left the room (as in Study 1). The prediction was that, given children's weaker representation of the person, children would be less likely to respond to the person's name even when mentioned immediately after she had left the room.

Study 1

The goal of Study 1 was to assess whether 13- and 16-month-old infants would respond to the name of an absent familiar person in a novel lab environment, if the person has been associated with the lab and if infants hear the person's name immediately after they have last seen her. We expected that under these optimal conditions, both the 13- and 16-month-olds would be able to engage in communicative behaviors to indicate comprehension of displaced speech. Children's ability to indicate the location of the absent referent (via looking and pointing) or to actively search for the person upon hearing his or her name would indicate that hearing the name activated a representation of the referent.

Method

Participants. The participants were 32 infants, sixteen 13-month-olds (seven girls, range = 12.7 to 14.1 months, $M = 13.3$) and sixteen 16-month-olds (10 girls, range = 15.0 to 17.0 months, $M = 16.1$). An additional 12 infants were excluded due to fussiness or distraction during test (10) or parental interference (two). All infants were English speaking and were recruited from a database of volunteers and birth records published in the local newspaper. The majority of them were from White, middle class families.

Materials. Parents were asked to bring a sibling or another familiar person to the lab along with the infant (e.g., another parent, sibling, or close relative). Parents were asked what label or nickname the infant is most familiar with for that person. The primary experimenter (E1) used that name when making references to the absent person. The referent that the experimenter talked about in Study 1 was the infant's older sibling ($n = 25$), parent ($n = 5$), or adult relative ($n = 2$). E1 used a short picture book to occupy the infant's attention during the brief delay period. A camera was set up in the corner of the room to record the test session.

Procedure. Upon arrival, the family was brought directly into the testing room and engaged in a brief play session. While E1 explained the procedure of the study to the parent, another experimenter (E2) encouraged the infant and the additional person to interact with each other. After approximately 10 min, E2 and the additional person went into another room in the lab and the delay phase began. As E2 and the additional person left the room, the infant was seated on the parent's lap and E1 called the infant's attention to their exit (e.g., "Say goodbye to Daddy! Bye Daddy!"). Infants remained seated on their parent's lap during the delay and test phases. During the delay phase, E1 showed the infant a small animal picture book for approximately 2 min. Parents were asked to refrain from making references to the absent person during the delay phase, until asked to do so by E1 during test. When the book interaction phase was over, E1 put it away, sat on the floor across from the infant and began the test phase of the procedure. The test phase began with the experimenter gaining the infant's attention by calling his or her name. When eye contact was achieved, the experimenter mentioned the absent person with a general type of reference ("What about Daddy? Have you seen Daddy today? What do you think Daddy is doing? Yeah, Daddy!"), followed by a more direct reference if the infant did not respond ("Where is Daddy? Can you show me where Daddy is?"). During the absent reference phase the experimenter focused her gaze on the infant's face and used infant-directed speech to offer the test utterances. If the infant did not respond to any of the two types of references, E1 asked the present parent to ask the infant about the absent person.

Coding. For all studies reported here films of test sessions were coded by two independent coders to identify whether infants responded to the references, what type of response they made (e.g., pointing to the door where the absent person left, looking toward the door, and getting up and approaching it), and what type of reference they responded to (general, direct, or parental). A behavior during the test was considered as a "response" only if that behavior was contingent upon the experimenter's reference. In other words, if the child just happened to look to the door or point to it during the test that behavior was not counted as a "response." "Looking" was counted as a response if the infant turned his or head to look in the direction of the door when the name of the absent person was mentioned. "Pointing" was counted as a response if the infant pointed to the door when the name was mentioned. If looking and pointing occurred together, only "pointing" was counted. "Approaching" was counted if the infant stood up and approached the door in response to the experimenter's reference. The level of agreement between the coders was 94% in Study 1 (Kappa = .87), 100% in Study 2 (Kappa = 1.00), and 93% in Study 3 (Kappa = .85). Disagreements were resolved by a third person.

For all studies we also coded for possible experimenter bias. First, for all videos in which there was a clear view of the experimenter's and parent's body (93 video clips), one naïve coder was asked to observe the experimenter/parent's behavior during the test (body movement if visible, head movement, voice quality) to judge *when* the person left the room based on how the experimenter/parent behaved. If the differences across studies are due to experimenter bias or parental cuing, then an objective coder should be able to reliably identify whether the person left the room recently or after a delay (16-min). Chi-square analyses of this data revealed that based on the experimenter or the parent's behavior during the test a naïve person could not reliably determine when the mentioned person left the room. Thus, the differences observed across studies, in which we varied the length of departure period, were not due to experimenter bias (p ranged from .84 to .99).

In the second type of experimenter bias coding, we asked another naïve coder to judge whether the experimenter/parent cued the child to respond indirectly. The coder was instructed to note *any* behavior (body movement, head movement, or voice quality) prior to the child's response that may have cued the child. This coder identified eight cases out of 93 clips (8.6%) where the experimenter may have cued the child. A second naïve coder watched these eight clips to determine whether the child's response behavior was contingent upon the behavioral cue identified by the first coder. Only one child was identified as cued by the experimenter in Study 2 (this case was removed from the data set). For the remaining seven clips, the experimenter's behavior occurred either much earlier than when the child responded, the child did not respond at all during the test, or the experimenter/parent's behavior was not identified as a cue by the second experimenter. Based on these additional analyses, we conclude that the differences observed in this research are not due to experimenter bias.

Results and Discussion

The main question of the study was whether infants comprehended references to an absent familiar person whose name they knew and whom they had recently seen. The results showed that all (100%) of the 16-month-olds and almost all (87%) of the 13-month-olds responded to hearing the name of an absent familiar person. There was no age group difference in children's responses (Fisher's exact test, $p = .48$). All of the 16-month-olds responded to the experimenter's reference to the absent person: Twelve responded when they heard the general reference, and four responded to the direct reference. Of the fourteen 13-month-olds who responded, 79% responded to the experimenter's reference (eight to the general reference and three to the direct reference) and 21% (three of 14) responded to the reference made by their present parent. Thus, at both age levels, the majority of children responded to the reference made by the experimenter and in particular to the general type of reference.

We also considered the type of behaviors that infants initiated during the absent reference phase, by examining the first behavior that they responded with. Tables 1 and 2 show the number of children at 13- and 16-months, respectively, who initiated each type of response (looking, pointing, going) as a function of request type across the three studies reported here. The 16-month-olds in Study 1 initiated three types of behaviors in response to hearing the name of the absent person: Three approached the door, seven pointed at the door, and six looked toward it (see Table 2). The 13-month-olds in Study 1 responded by going to the door (four) and looking toward it (10). None of the 13-month-olds pointed at the door. There was a significant age-group difference with respect to pointing only: The 16-month-olds initiated more pointing behaviors than the 13-month-olds did (Fischer's exact test, $p = .006$).

We have also analyzed the time it took children to respond as soon as the experimenter mentioned the absent person's name. We did not have latency time for three children because of technical error with the tape. Thirteen-month-old infants took longer to respond to the mention of an absent person's name ($M = 37.83$ s,

Table 1
Number of 13-Month-Olds in Each Study Who Initiated Each Type of Response Behavior (Look, Point, Go) as a Function of Reference Type

	Study 1			Study 2			Study 3		
Reference	Look	Point	Go	Look	Point	Go	Look	Point	Go
General	8	0	0	4	2	0	2	1	1
Direct	1	0	2	1	0	0	0	1	1
Parent	1	0	2	3	0	1	0	0	1
Total	10	0	4	8	2	1	2	2	3

SD = 37.10) than the 16-month-olds did (*M* = 15.4 s, *SD* = 25.4), $t(25) = 1.86$, $p = .07$.

In summary, the results of this study provide evidence that 13- and 16-month-olds can respond to references to a familiar person when the person is not in view but had recently been seen. Consistent with previous findings from Ganea (2005), infants in this research showed robust comprehension of references to an absent person when the person was easily accessible in the environment and they had interacted with her recently. The level of responding to the name of an absent familiar person in this study (14/16 children) is different from the level of responding in Saylor & Baldwin's (2004) study in which only one (1/12 children) of the 13-month-olds responded to hearing the name of their absent parent. These results suggest that one reason the 12-month-olds in Saylor and Baldwin's (2004) study gave no indication of understanding the reference to their absent parent was because of the more demanding nature of the test. The person mentioned in that study did not accompany infants to the research lab, and thus, children had not seen him or her for a longer period of time. There were two factors that might have contributed to the better performance here than was seen in Saylor and Baldwin's (2004) study. First, the absent individual had previously been in the room in which the reference to him or her occurred; thus, the person was associated with the current context in the infant's mind. Second, there was a relatively short delay (only 2 min) between when the infant had last seen the person and when the reference to him or her was heard. Thus, having the representation of the person and the person-name relation recently active made it easier for those representations to be reactivated when the person was named in its absence.

Given the current evidence that infants at 13- and 16-months engaged in communication about an absent familiar person under optimal test conditions, we can now examine factors that affect the extent to which a child can activate an object's representation when not in view. Studies with nonhuman primates (E. K. Miller & Desimone, 1994) and artificial networks models (Munakata et al., 1997) show that repeated exposure to a stimulus changes the pattern of neural activity representing that stimulus. These neural changes are presumed to strengthen the representations of objects, making it more likely that those representations could be activated and maintained when the objects are not visible (Munakata, 2001; Munakata et al., 1997). If infants are better at maintaining object representations when familiar objects are hidden (Shinskey & Munakata, 2005), we should expect them to be more likely to also activate those representations when they hear the name of a familiar person but not when they hear the name of a relatively novel person. Children will also be more likely to activate a representation of a referent when that representation has been recently activated then when the memory representation has decayed in time. Studies 2 and 3 examine the effect of two factors on absent reference comprehension: (a) the period of time since the person was last seen, and (b) the familiarity of the referent. We expect that the gradual increase with age in infants' representational capacity will moderate the effect of these factors, which should be most important early on.

Study 2

In Study 2 we examined the role of temporal proximity in infants' ability to respond to the name of an absent familiar person, by inserting a longer delay (approximately 16 min) between the time when the infants had last seen the person and the time that they heard his or her name again. In Ganea (2005), 13-month-olds were less likely to respond to the name of a novel absent object, for which they had recently learned a name, when the reference was made 15 min after the infant interacted with the object. Thus, when

Table 2
Number of 16-Month-Olds in Each Study Who Initiated Each Type of Response Behavior (Look, Point, Go) as a Function of Reference Type

	Study 1			Study 2			Study 3		
Reference	Look	Point	Go	Look	Point	Go	Look	Point	Go
General	6	5	1	5	0	2	3	2	1
Direct	0	1	1	1	2	2	1	3	0
Parent	0	1	1	2	0	0	1	0	0
Total	6	7	3	8	2	4	5	5	1

Note. One child in Study 3 made a verbal comment ("bye-bye") and is not included in the table.

the strength of the infants' representation was diminished by a delay between seeing the object and hearing its name again, responses to the name decreased. The goal of this study was to examine whether delay has a similar effect on infants' responses when the reference is to a highly familiar referent (a parent, sibling, or grandparent) and, thus, whose representation is likely to be much stronger compared to a recently encountered referent (see Ganea, 2005). As we have seen in Study 1 children can activate and respond to the name of an absent familiar person under optimal conditions, when their representation of the person has been recently activated in the current environment. Would children still be able to do so in a context in which their representation of the person has presumably decayed as a function of delay? It is unlikely that delay would affect their acoustic representation of the name, given evidence that much younger infants (8-month-olds) have good memory of words from stories after 2 weeks (Jusczyk & Hohne, 1997). Rather than a problem of phonological identification, it is more likely that after the delay period the strength of the person's representation in infants' memory degrades over time and as a result children have difficulty activating and maintaining that representation in the absence of the referent. As a result, children would be less likely to indicate absent referent comprehension by looking, pointing or even searching at the referent's location. This is consistent with evidence that when children have weak representations of objects they do not search for them when not in view (Shinskey & Munakata, 2005).

Method

Participants. The participants were 36 infants, twenty 13-month-olds (eight girls, range = 12.6 to 14.5 months, $M = 13.5$) and sixteen 16-month-olds (seven girls, range = 15.0 to 18.3 months, $M = 16.6$). Two infants were excluded due to distraction during test, and a third infant was excluded because of experimenter bias. All participants were English-speaking, and the majority of them were from White and middle class families.

Materials. Parents were asked to bring in an additional person and were asked what label or name the infant knew for that person as in Study 1. The referent that the experimenter talked about in Study 2 was the infant's older sibling ($n = 30$) or parent ($n = 6$). A basket of simple toys and picture books was also present to occupy the infant during the longer delay period.

Procedure. The only difference from Study 1 was that there was a longer delay period between the time that the additional person left the room with E2 and the time that E1 mentioned the person' name to the infant. During the delay phase, E1 remained with the infant and the parent and continued to play for approximately 16 min. Infants were allowed to move around the room during the delay phase, but at the end of the delay, the parent was asked to take the infant on the lap for the test phase. Parents were asked to refrain from making references to the absent person during the delay phase, until asked to do so by E1 during test. Before beginning the test, E1 cleaned up all the toys from the floor and put them in a cabinet in the room. During the test, E1 used infant-directed speech to make references to the absent person and used the same type of references as in Study 1.

Results and Discussion

In Study 1, 94% (30/32) of the 13- and 16-month-old children responded to the name of an absent familiar person, indicating that children at both ages can comprehend the name of an absent familiar person in a context in which the person is no longer in view. In Study 2, we assessed the effect of delay on children's ability to respond to a familiar person's name in an absent reference context. When the person's name was mentioned after a 16-min delay since the person was no longer in view, 69% (25/36) of children in Study 2 indicated comprehension. This level of responding was significantly different than the level of responding in Study 1 (Fischer's exact test, $p = .01$).

There was also a trend for a significant age-group difference in the number of infants who responded to hearing the name of an absent familiar person (Fischer's exact test, $p = .067$) in Study 2. Almost all of the 16 month-olds (87%, 14/16) in Study 2 responded to hearing the name of an absent person after a 16-min delay since they had last seen the person. This level of responding is similar to that of 16-month-olds in Study 1, indicating that by 16-months infants' representational abilities are robust enough to sustain delays of 16-min and thus to enable them to communicate about absent people even when they have not recently seen them. With respect to the type of reference to which they initiated a response, 86% (12/14) of them responded to the experimenter's reference (seven to the general reference and five to the direct reference) and 14% (2/14) responded to the parental reference. Of the infants who responded, four infants went to the door, two pointed toward it, and eight looked at the door (see Table 2).

In contrast to the 16-month-olds, just over a half (55%, 11/20) of the 13-month-olds responded to hearing the name of an absent person when there was a relatively longer delay since they had last seen the person. This level of responding is nearing significance when compared to the level of responding of the 13-month-olds in Study 1 ($p = .067$). Of the infants who responded, 64% (7/11) responded to the experimenter's reference (six to the general reference and one to the direct reference) and 36% (4/11) responded to their parent's reference to the absent person (see Table 1). In terms of type of responses initiated, one infant went to the door, two pointed toward it, and eight looked at it. Unlike in Study 1, there was no significant difference in the type of responses initiated across the two age groups according to Fischer's exact tests.

In terms of latency of response during the test, there was no significant difference across the two age groups (13-month-olds: $M = 26.73$ s, $SD = 21.67$; 16-month-olds: $M = 23.86$ s, $SD = 18.34$), $t(23) = 0.36$, $p = .23$. Also, there was no significant difference in latency to respond across the two studies (Study 1: $M = 25.37$ s, $SD = 32.56$; Study 2: $M = 25.12$ s, $SD = 19.49$), $t(50) = 0.03$, $p = .97$.

To summarize, infants as young as 13-months have the ability to respond to names of familiar people—at least in a context with which the person had recently been associated and when she is mentioned soon after leaving the room (as in Study 1). If the verbal reference to the absent familiar person is made after a longer delay, fewer children are capable of responding at 13 months, despite the fact that the person has still been associated with the context. By implication, the delay caused the 13-month-olds' representation of the person to decay, and thus, infants were not able to bring it to

mind and act upon it when the person was not in view. This finding is consistent with the findings of Ganea (2005) indicating that a 15-min delay since children had last seen an object affects 13-month-olds' ability to respond to the name of the object when absent. However, it seems that the level of performance dropped less in the current study. In Ganea's research, the level of responding dropped significantly from 86% (12/14) in the no-delay condition to 31% (5/16) in the delay condition, whereas in the current study the decrease in performance was from 81% (13/16) in the no-delay condition to 55% (11/20) in the delay condition. One explanation for this difference across studies may be explained by the fact that children's representations were of different strength to begin with. In this research children presumably had a strong representation of the familiar person, and this may have moderated the effect of delay on their memory representation to some extent. In the research by Ganea, the absent reference task involved a relatively novel object for which children had recently learned a name for, and thus, presumably their object representation was much weaker to begin with.

Further research would be needed to fully disentangle the role of memory and context in younger children's absent reference comprehension. One interesting study would be one in which the familiar person would not enter the lab (and thus have no association with the lab), but the infants would have seen the person as recently as the infants in Study 1. This manipulation would inform us about the role of context association in children's absent reference comprehension.

By 16-months, infants' representational capacity is robust enough to enable responses to the name of an absent familiar person even after longer delays since they had last seen the person. This developmental pattern is consistent with proposals that with age infants have increasing ability to represent information in the absence of contextual support (Kaufman, Csibra, & Joshnson, 2005; Munakata et al., 1997) and with such improvements, contextual factors such as delay or familiarity of the referent, are less likely to affect performance in an experimental paradigm involving absent referents.

Study 3

The combined results of Studies 1 and 2 show that although infants as young as 13 months can respond to the name of an absent familiar person in a context with which the person has been recently associated and when she is mentioned soon after they had last seen the person, they have more difficulty doing so when a period of time has passed since they had last seen the person. This finding suggests that at 13 months infants' representational ability constrains their ability to indicate absent reference comprehension when these abilities are being taxed. In Study 3, we investigate another factor that is likely to affect children's ability to activate a referent's representation in its absence—its familiarity. According to the graded representation account (Munakata et al., 1997) representations of novel objects are too weak to allow the infant to activate and maintain those representations when the objects are not in view. This view is supported by findings showing that infants are more likely to engage in searching behaviors for familiar objects than for novel objects when occluded from view (Shinskey & Munakata, 2005). Accordingly, in the absent reference paradigm used in this research, we would predict that, compared to the level of responding to a familiar person (Study 1), children would be less likely to respond to the name of a person (an experimenter) that infants recently met and learned the name for. We predicted that infants' weaker representation of the novel person would result in fewer responses to her name when she was absent, even when the reference was made after a short delay (as in Study 1).

Method

Participants. The participants were 33 infants, seventeen 13-month-olds (eight girls, range = 12.4 to 14.7 months, M = 13.4) and sixteen 16-month-olds (10 girls, range = 15.8 to 17.7 months, M = 16.8). Seventeen infants were excluded due to failure to respond to comprehension question during familiarization procedure (nine), experimenter error (seven) and fussiness (one). All participants were English speaking, and the majority were White and middle class.

Materials. A picture book was used to occupy the infant during the short interval after the person left the room.

Procedure. Upon arrival, the family was brought directly into the testing room and engaged in a brief 10-min play session with two experimenters. E1, E2, the infant, and the parent sat on the floor of the testing room. The purpose of the play phase was for the infant to become familiar with E2 and learn her name ("Kate" or "Lisa" if the child was already familiar with the name "Kate"). The name "Kate" was used for 17 infants. E2 had a bag with two toys that the infant was encouraged to play with during the familiarization phase. The first toy was a shape-sorter block activity; the second toy was a soft, small ball. For the younger infants a peek-a-boo activity was also used (this activity was not used for the 16-month-olds because they did not seem to enjoy it). During the familiarization phase, the parent was encouraged to use E2's name frequently during the play phase, as illustrated by E1 throughout the play phase (e.g., "Oh, look at Kate's toys!" and "Kate can help you!"). E1 also facilitated interaction between the infant and E2 by asking several request questions to the infant (e.g., "Can you give the block to Kate?" or "Roll the ball to Kate!"). E2 also interacted naturally with the infant during the play activities, by saying "Thank you" when the child gave her a toy and by participating in the play activities. The infant was asked request questions until he or she could respond correctly (e.g., giving the block to E2; rolling the ball to E2) on at least one comprehension request. If children did not respond correctly to at least one comprehension request, the procedure was continued, but their data were excluded from the study. After approximately 10 min, E2 said "Goo bye" to the infant and left the room, with the bag of toys.

As E2 left the room, the infant was seated on the parent's lap and E1 called the infant's attention to her exit ("Say goodbye to Kate! Bye Kate!"). Infants remained seated on their parent's lap during the delay and test phases. During the brief delay phase, E1 showed the infant a small animal picture book for approximately 2 min. Parents were asked to refrain from making references to the absent person during the delay phase, until asked to do so by E1 during test. When the book interaction phase was over, E1 put the book away, sat on the floor across from the infant and proceeded with the test phase of the procedure as in Study 1. After calling the child's name to achieve eye contact, the experimenter mentioned

the absent person with a general type of reference ("What about Kate? Have you seen Kate today? What do you think Kate is doing? Yeah, Kate!"), followed by the experimenter's direct reference and the parent's reference if the infant did not respond.

Results and Discussion

In Study 3, we assessed the effect of person familiarity on children's ability to respond to a person's name in an absent reference context. The results of Study 1 showed that the majority (94%) of the 13- and 16-month-old children comprehend the name of an absent familiar person in a context in which the person is no longer in view. Compared to the high level of responding in Study 1, a significantly lower number of children (58%) responded when the name was of a person that they recently encountered and learned a name for (Fischer's exact test, $p = .001$). Older infants (12/16) in Study 3 were also more likely than younger infants (7/17) to respond to the name of a nonfamiliar person ($p = .079$, Fischer's exact test).

Study 3 provides further evidence that by 16 months infants' representational abilities are robust enough for them to show comprehension of the name–person link even in the absence of the person. The majority (12 of 16) 16-month-olds responded to the name of the nonfamiliar absent person, and this number was not significantly different from the number of infants who responded to a familiar name in Study 1 ($p = .10$, Fisher's exact test). As shown in Table 2, the majority (11/12) of 16-month-olds in Study 3 responded to the experimenter's reference (six to the general reference and five to the direct reference), and one additional child responded to the parental reference. Of the infants who responded, one infant went to the door, five pointed toward it, five looked at the door, and one child made a verbal reference ("bye!").

By contrast, less than half of the 13-month-old infants (41%, seven of 17 infants) responded to the name of the recently encountered person when she was not in view. This was significantly different than the number of 13-month-old infants in Study 1 who responded to the name of a familiar absent person when she was not in view ($p = .01$, Fischer exact test). Of the 13-month-olds who responded, the majority (6/7) responded to the experimenter's request (four to the general reference and two to the direct reference), and one child responded to the parent's request. In terms of type of responses, three children went to the door, two pointed, and two looked at the door (see Table 1). According to Fischer's exact tests, there were no significant age group differences in the type of responses children initiated.

Considering the latency to respond during the test phase, there was no significant difference across the two age groups (13-month-olds: $M = 28.86$ s, $SD = 22.67$; 16-month-olds: $M = 22.33$ s, $SD = 18.29$), $t(17) = 0.68$, $p = .50$. Also, there was no significant difference in latency to respond across Study 1 ($M = 25.37$ s, $SD = 32.56$) and Study 3 ($M = 24.74$ s, $SD = 19.65$), $t(44) = 0.07$, $p = .94$. Thus, children who responded in each study took on average the same time to respond after hearing the first mention of an absent person's name. Importantly, there was no significant difference in the number of children who responded to "Kate" versus "Lisa" (13-month-olds: $p = .63$, 16-month-olds: $p = 1.00$, Fischer's exact tests). Also, the mean number of comprehension requests during familiarization phase across children who did respond during the test ($M = 2.94$, $SD = 2.53$) and those who did not respond ($M = 3.42$, $SD = 3.05$) was not significantly different, $t(30) = 0.49$, $p = .63$.

To summarize, while both groups of children in Study 1 showed high levels of responding when they heard the name of an absent familiar person, only the 16-month-olds were able to maintain that level when the name they heard was of a person that they recently encountered. One explanation for the decline in 13-month-olds' responses to hearing the name of an absent novel person compared to hearing the name of an absent familiar person is that the strength of their representation was weaker in the case of the new person. As measured during the familiarization phase, infants did respond to the person's name in her presence. There is also related evidence that 13-month-olds can remember a novel name in the *presence* of the referent even after a 24-hr delay (Woodward, Markman, & Fitzimmons, 1994). Nevertheless, as shown in this study, when infants' word-referent comprehension skills are tested with a paradigm that requires the child to respond to a novel name in the absence of the referent their more fragile representational skills can interfere with their ability to do so. Comparisons across Studies 1 and 3 indicate that familiarity of the person (and her name), and thus the strength of the infant's representation, affects the extent to which he or she can bring that representation to mind upon hearing the person's name when the person is not in view.

General Discussion

Previous research showed that 12- to 13-month-olds do not respond to the name of an absent familiar person when the reference is made in a context where the person has never appeared (Saylor & Baldwin, 2004). In the current research both 13- and 16-month-olds were able to respond to the name of a familiar absent person when the reference was made in a context with which the person was previously associated and when they have recently seen the person (Study 1). This finding is consistent with prior research (Ganea, 2005) showing that 13-month-olds are more likely to reveal comprehension of references to absent entities when the verbal reference is made in a context in which the referent has appeared and soon after the referent was out of view. It is also consistent with naturalistic observations in the home documenting comprehension of references to absent familiar objects as early as 13 months (Huttenlocher, 1974; Lewis, 1936). Similarly, Study 2 here showed that inserting a 16-min temporal gap between when the verbal reference to the absent person is made and when the referent was last seen makes it more difficult for 13-month-olds to respond to that person's name. The number of children who responded to the name of an absent familiar person dropped from 87% when the name was mentioned soon after the person left the room (Study 1) to 55% when the name was mentioned after a 16-min delay (Study 2). Also, how strong a child's memory representation of the person is can affect the extent to which infants respond to a person's name when not in view. When infants in Study 3 heard the name of a less familiar person whom they recently encountered and learned the name of, the 13-month-olds were less likely to respond to it, although the reference was made soon after the infants had seen the person. In contrast, the 16-month-olds were able to reveal comprehension of the reference to the absent person even after a 16-min delay, and they were also able to respond to the name of an unfamiliar person.

The current research, together with related prior findings (Ganea, 2005; Saylor & Baldwin, 2004), provides evidence that in the early phases of absent reference comprehension infants' ability to respond to displaced speech can vary as a function of three factors: (a) the type of representation (strong vs. weak), (b) the location of the verbal reference (e.g., whether the reference is made in the place where the referent has previously appeared versus in a place where the referent never appeared), and (c) the temporal gap between the verbal reference and the last appearance of the referent. Also, the higher the developmental level of the child the less likely he or she will be to be affected by these factors.

With respect to the type of representation, at 13 months infants are more likely to respond to names of referents for which they have strong representations, such as of familiar people. Furthermore, 13-month-olds are more likely to respond if they hear the name of the familiar person soon after she has left (see also Ganea, 2005, for similar effect of delay on 13-month-olds' responses to references to an absent object). This research illustrates the important role that representational strength plays in infants' absent reference comprehension. If infants have a weak representation of the referent (e.g., a recently encountered person) or their representation of the person has decayed (e.g., the infant has not seen the person for a longer period of time), they are less likely to respond to the name of the person when not in view.

With increased representational capacity infants' ability to respond to speech about absent entities becomes more robust and farther removed from "here and now." By 16 months, infants respond to hearing the word "Daddy" even in a novel environment (Saylor & Baldwin, 2004), and, as shown here, they even respond to names of absent people that they have recently encountered. By the middle of their second year, infants also become more sophisticated in the type of responses that they initiate when hearing the name of an absent person. Whereas in the beginning infants' responses are limited to non-verbal reactions (such as looking, pointing, or retrieving the referent), gradually babies begin to use only verbal comments to indicate comprehension of displaced speech (comments such as, "Bye-Bye" or "Busy at work"; Saylor & Baldwin, 2004). Similarly, in production, there is a developmental progression in the types of displaced speech that infants can engage in, from reference to proximal events to reference to remote past and future, hypothetical and fantastical events (Sachs, 1983; Veneziano & Sinclair, 1995). Importantly, the developmental progression of displaced reference is the same in both hearing and homesign deaf children (who receive inadequate linguistic input), thus suggesting that it is mainly driven by conceptual factors (Morford & Goldin-Meadow, 1997).

The function of words to refer to absent objects and events is an important feature that defines their symbolic status (Deacon, 1997; Huttenlocher & Higgins, 1978). If a word is used or understood only in the presence of the referent the word could function as a spatial and temporal associate. Bates (1979) suggested that we can infer that a child has grasped the symbolic relation between a word and its referent when a process of decontextualization is evident in the child's word production. That happens when the word is used in a variety of contexts that are linked by the presence or involvement of the referent. There is a gradual "freeing-up" between the word and the context in which the word was first introduced (Bates, 1979, p. 41). For example, as Bates suggested, in the "Where is your nose?" type of game, if a child is able to respond to "Where's Mama's nose?" "Where's sister's nose?" and so on, then there is evidence that the word "nose" does not refer only touching one's nose in the original game but to a variety of noses. According to Bates, the process of decontextualization begins at around 13 months of age, in both comprehension and production, and is evidence that the idea of naming has been established. Nevertheless, as shown here, the ability to respond to a word in the absence of the referent is dependent on the complex interaction of representational and contextual factors.

Being able to engage in displaced speech with others requires infants to not only be able to represent the absent referent when it is not in view but also to appreciate the speaker's attempt to share information about an absent object or event. How do infants come to appreciate the intention of a person to talk about an absent object? One possibility is that when parents talk to their children about absent objects and events they modify their behavior and speech to communicate their intention to refer to something absent. Recent research suggests that mothers use a set of verbal and nonverbal behaviors to differentiate absent from present reference for their 11-month-old infants (Gallerani, Saylor, & Adwar, 2009). In particular, when talking about absent versus present people, mothers were more likely to use past and future syntax, requests for the location of a referent, and epistemic mental state terms. In addition, mothers worked to maintain their proximity to their infants by touching their infant more during talk about absent than present people. These differentiating behaviors may work to focus infants' attention on the speaker (and her message), rather than irrelevant present objects. Interestingly, when mothers talked about absent people—11-month-old infants showed some signs of comprehending her speech by looking to the location of the absent person. What is not clear from this previous study is whether it is the mothers' speech or the temporal and spatial proximity of the referent that may have accounted for infants' comprehension. The current study suggests that 13-month-old infants, at least, can reveal comprehension without the supportive language and nonverbal behaviors. Future research is necessary to determine the role of maternal language and proximity on younger infants' comprehension.

As shown here, at the beginning of their second year, infants are ready to communicate about things that are not perceptually present. With increased representational and conceptual development, infants' communication becomes further removed from "here and then," enabling them to eventually use language to learn about the world from what other people them.

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