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Two-Year-Old Children's Sensitivity to a Parent's Knowledge State When Making Requests

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O'NEILL, DANIELA K. *Two-Year-Old Children's Sensitivity to a Parent's Knowledge State When Making Requests*. CHILD DEVELOPMENT, 1996, 67, 659-677. These studies examined whether toddlers take their communicative partners' knowledge states into account when communicating with them. In Study 1, 16 2-year-old children (mean age 2;7) had to ask a parent for help in retrieving a toy. On each trial, a child was first introduced to a new toy that was then placed in 1 of 2 containers on a high shelf. The parent either witnessed these events along with the child or did not because she or he had left the room or had covered her or his eyes and ears. As predicted, when asking for help in retrieving the toy, children significantly more often named the toy, named its location, and gestured to its location when a parent had not witnessed these events than when she or he had. In Study 2, 16 2-year-old children (mean age 2;3) had to ask a parent for help in retrieving a sticker dropped into 1 of 2 identical containers placed out of reach in the far corners of a table. The parent either witnessed, along with the child, which container the sticker was dropped into or did not because her or his eyes were closed. In their requests for help, young 2-year-old children gestured to the sticker's location significantly more often when the parent did not know its location than when she or he did. The implications of these findings for current characterizations of 2-year-old children's ability to assess the knowledge of others is discussed.

When we communicate with other people we assess what is old and new information for them (Clark & Marshall, 1981; Grice, 1975; Keenan & Schieffelin, 1976). Our ability to assess another person's knowledge is integral to successful communication. Piaget (1926) proposed that before 7 or 8 years of age children tend to communicate egocentrically, without tailoring their message to what a listener knows or doesn't know. Although early empirical work supported Piaget's claim (e.g., Flavell, Botkin, Fry, Wright, & Jarvis, 1968), these methodologies were not specifically geared to younger preschool children.

Recent research focusing on preschoolers' developing understanding of mental states (or *theory of mind*) (e.g., Astington,

Harris, & Olson, 1988; Butterworth, Harris, Leslie, & Frith, 1991; Perner, 1991; Wellman, 1990) has shown, however, that children as young as age 3 can accurately assess the knowledge of others and tailor their communication accordingly. This ability has also been investigated in very young children by researchers studying children's early communication development. This work is generally not cited by researchers of children's conceptual perspective-taking skills, despite its relevance. It suggests that, when more sensitive dependent measures and more natural experimental settings are used, children younger than age 3 can show an ability to tailor their communication to the knowledge states of communicative partners. The relevant major approaches and findings of both these research areas are now reviewed.

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Conceptual Perspective-Taking Research

The ability to assess another person's knowledge based on their perceptual experience.—One experimental approach has been to ask children to assess directly what another person knows based on that person's perceptual experience. For example, they have been asked to infer whether a person or puppet who has (or has not) had perceptual access to the contents of a box knows what is in the box (O'Neill, Astington, & Flavell, 1992; Pillow, 1989; Pratt & Bryant, 1990; Wimmer, Hogrefe, & Perner, 1988). Three-year-old children's performance has varied across studies but has generally been good when the experimental procedures highlight informational access as the salient criterion (Pillow, 1989; Pratt & Bryant, 1990) and poor when they themselves are ignorant of the box's contents (Wimmer et al., 1988), or when they are asked about the knowledge of puppets or people obtained in ways other than by looking (e.g., by tactile perception in O'Neill et al., 1992). Two-year-old children have shown only below chance performance when asked, for example, to assess their mother's knowledge of a secret that she had not been allowed to hear (Marvin, Greenberg, & Mossler, 1976; Mossler, Marvin, & Greenberg, 1976).

The ability to choose a potentially knowledgeable helper.—Another approach has eliminated the need for children to answer explicitly a verbal question about another person's knowledge by asking children to choose between a knowledgeable and nonknowledgeable adult as a source of information. Povinelli and deBlois (1992) found that 3-year-old children could not reliably find a hidden toy when confronted by one adult who always saw the hiding of the toy and pointed correctly to where it was hidden and another adult who never saw the hiding and always pointed to an incorrect location.

The ability to adjust the level of informativeness to a communicative partner's knowledge.—Three-year-old children have shown the greatest ability to assess another person's knowledge in communicatively oriented tasks. Menig-Peterson (1975) found that, when conversing with an adult partner, 3-year-old children talked more and needed less prompting to talk about events that their partner had not experienced, than those which had been jointly experienced by the child and the adult partner. Perner and Lee-kam (1986) examined how 3-year-old children adapted the information they gave to a

communicative partner regarding two possible actions that a toy could produce. The child's partner had either observed one or neither of the actions. Older 3-year-old children mentioned the action(s) that the partner did not know about in both cases. Younger 3-year-old children tended to be underinformative, mentioning only one new action in both cases. Children's nonverbal communication was not taken into account in either of these two studies, raising the possibility that children's abilities had been underestimated.

The focus of this conceptual perspective-taking research has been to clarify whether 3-year-old children can accurately assess the knowledge of other people. With respect to 2-year-old children, this question has not arisen because there has been debate as to whether 2-year-old children even conceive of other people as having beliefs (e.g., Wellman, 1993; Wellman & Bartsch, 1994). For example, Wellman (1993) has stated that "two-year-old children fail to conceive of people as even having beliefs, let alone that beliefs guide action" (p. 16). Wellman's view is based on findings (Wellman & Woolley, 1990) that 2-year-old children find it much easier to predict another person's actions and reactions when told that person's desire (e.g., he wants to go swimming) than when told that person's belief (e.g., he thinks his dog is in the garden). Showing that 2-year-old children adapt their communication to the knowledge states of others would challenge this assumption.

Communicative Development Research

Contrasting given and new information.—Based on examinations of children's naturally occurring speech at the one-word stage, it has been argued that children are choosing the word that encodes the most informative aspect of the situation (Greenfield, 1979; Greenfield & Smith, 1976) or that provides new information about the topic (Bates, 1976). At the two-word stage, Wieman (1976) found that children placed heavier focal stress on the word in an utterance that conveyed new (as opposed to given) information. Talking about what is new to the situation at hand, however, does not imply that a child is taking a listener's knowledge state into account or even that a child realizes that the information is new for a listener.

Reference and the establishment of discourse topics.—Successfully initiating a new topic of conversation requires that a

communicator take the knowledge state of a communicative partner into account (see Foster, 1986, 1990; Garvey, 1984; Keenan & Schieffelin, 1976; McTear, 1985). Anecdotal examples suggest that 1- and 2-year-old children specifically try to communicate about things their communicative partners do not know about (e.g., Shatz, 1994a). However, despite the scrupulous and intensive collection and recording of many children's early naturalistic conversations (e.g., Bloom, 1991; Dunn, 1988; Garvey, 1984; McTear, 1985; Scollon, 1976), the factors influencing children's communications often remain difficult to determine. In addition, nonverbal communication is often not included in such observations, especially once children begin to use words. As a result, these data are of limited use as evidence that such young children tailor their communication to their communicative partners' knowledge states.

Resolving miscommunication episodes.—Children's repairs in miscommunication episodes have been argued to reveal the ability, even of prelinguistic infants, to recognize "a partner's capacity to *understand* a message" and attribute "an internal state of *knowing* and *comprehending*" to a communicative partner (Bretherton, McNew, & Beeghly-Smith, 1981, p. 339; see also Bates, 1976; Bates, Camaioni, & Volterra, 1979; Bretherton & Bates, 1979).

Researchers adopting this view point to findings that, when faced with adults' clarification requests (e.g., Hmm? You want the milk?), 17-month-old children repair their original messages by using different strategies such as repetition, augmentation through gestural or verbal means, and substitution of old requests with new ones (Golinkoff, 1986; see also Marcos, 1991; Marcos & Kornhaber-le Chanu, 1992; Wilcox & Howse, 1982). Seventeen-month-old children have also been shown to adapt differentially the amount of verbal material they repeat when an adult responds to their initial verbal request with a general query (e.g., What?), a specific query (e.g., You want what?), or treats the original request as a declarative statement (e.g., Yes, I see) (Anselmi, Tomasello, & Acunzo, 1986; Wilcox & Webster, 1980).

Golinkoff (1983, 1986, 1993) has argued that these findings suggest that preverbal infants have considerable communicative skill and treat their mothers, not as omniscient, but rather as communicative partners who need more information of a specific nature.

Other researchers have hesitated in attributing to children such a sophisticated understanding of a communicative partner in explaining these repair behaviors. Instead, they have attributed children's repairs to "an awareness of appropriate speaker options" (Wilcox & Webster, 1980) or children's adherence to the Gricean (1975) conversational postulate that a speaker should not provide information of which the listener is already aware, that children may have learned through observing the responses of adults to such queries (Anselmi et al., 1986; Shatz & O'Reilly, 1990). The key problem with this research remains, however, that the factors influencing children's communications have not been adequately controlled. For example, in Golinkoff's (1986) study it is difficult to determine how children's repairs varied specifically with the type of miscomprehension signal provided by the mother. To draw firm conclusions regarding the ability of children to take into account the mental state of a communicative partner, the partner's knowledge must be manipulated directly. The studies presented here are an attempt to do so.

What this communication research does reveal, importantly, is that until about the age of 3 children's use of nonverbal communicative means is crucial in accurately assessing the amount of information children are attempting to convey to a communicative partner. For example, the information supplied through gesture in children's requests after 20 months of age is often supplementary to, rather than redundant with, the accompanying verbal information (Butcher & Goldin-Meadow, 1993; Greenfield & Smith, 1976; Iverson, Volterra, Pizzuto, & Capirci, 1993; Masur, 1983; Morford & Goldin-Meadow, 1992; Zinobar & Martlew, 1985). Children's use of gesture may also reveal a sensitivity to the informational needs of communicative partners that their verbal behavior does not: 20- to 44-month-old children have been observed to use gestures more often with pronouns than with nouns when responding to an adult's miscomprehension (Tomasello, Anselmi, & Farrar, 1984/1985).

Overall, there are several reasons to suspect that 2-year-old children may have an ability to assess the knowledge of other people that has been unrevealed to date. First, previous tasks have all required fairly sophisticated judgments on the part of children such as keeping in mind and comparing the knowledge states of two puppets or peo-

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ple. Second, these tasks have usually required children to process and remember considerable verbal information, rendering them unsuitable to the limited attention spans and linguistic skills of 2-year-old children. Third, the verbal dependent measures of most previous studies have imposed task demands that could mask any understanding 2-year-old children might possess. Fourth, many tasks have used mental terms in the questions posed to children making children's responding contingent on an understanding, not just of the concept, but of the term itself. Fifth, many conceptual perspective-taking tasks have strayed far from the kinds of naturalistic, supportive environments in which toddlers may be able to exhibit their burgeoning skills. Researchers who have examined the kinds of joking and deceitful behavior that toddlers engage in at home with their family members often suggest that we are underestimating their ability to take the perspective of another person (Bartsch & Wellman, 1995; Dunn, 1988, 1991; Reddy, 1991; Shatz, 1994b).

The goal of the current studies was therefore to examine, with as naturalistic a procedure as possible, whether 2-year-old children take a parent's knowledge state into account and tailor their communication accordingly. In keeping with naturalistic communicative research strategies, a task was used that would be familiar and natural for 2-year-old children, namely, asking the parent to get an out-of-reach toy. The appropriate response could be carried out nonverbally, ensuring that if children understood that they had to supply information (e.g., the toy's location) it was well within their ability to do so. Unlike the methodologies of the communication studies presented, however, experimental control over the crucial variable (i.e., the parent's knowledge state) was maintained.

Study 1

In Study 1, children had to request a parent's help in retrieving a toy placed in one of two containers on a high shelf. The parent sometimes witnessed the introduction and placement of the toy in a container and sometimes did not. It was predicted that, when requesting the toy, children would more often name the toy, name its location, and gesture to its location when the parent had not witnessed the toy's introduction and placement.

METHOD

Subjects

Sixteen children (eight boys and eight girls; mean age 2-7, range 2-6 to 2-10) participated in the study. Thirteen mothers and three fathers took part. Fifteen children were Caucasian and one was African-American. Children were largely from middle-class families and were recruited through infant care centers, advertisements in parent magazines, and sign-up sheets in pediatricians' offices. Data from an additional 10 children were omitted either due to excessive fussiness, experimenter error, or because the parents gave feedback.

Materials

Equipment.—The experimenter sat to the right of the child at a small table. In front of the children, at a distance of 2 m, stood a shelf spanning 1.6 m in total length (see Fig. 1). The shelf stood at a height at which adults could not see the contents of the containers placed on the shelf. The parent was seated next to the door, to the left of the child, at a distance of 2 m. A video camera recorded children's behavior face-on. Attached to the table near the child was a microphone. A videocassette recorder equipped with frame-by-frame viewing capability was used to view and code the videotapes.

Stimuli.—A "bell box" was constructed by cutting an opening into the front of a cardboard box. Behind this opening (inside the box) were some bells that rang if an object was thrown through the opening. The toys used included a toy shoe, plane, dog, and teddy bear on the introductory trials; a frog and a Big Bird doll on practice trials; and, a ball, car, pig, and duck on experimental trials. Two small, blue, opaque containers—a file card box and a cup—were also used on experimental trials. All of the toys that were used on experimental trials could easily be hidden in either container.

Procedure

Introductory trials.—Children were first shown the bell box, told that in this game they would be able to get some toys to throw in the box, and allowed to try throwing some toys into the box to make the bells ring.

Practice trials.—These two fixed-order trials familiarized children with asking the parent to get a toy for them from the shelf. On Practice Trial 1, children were shown a

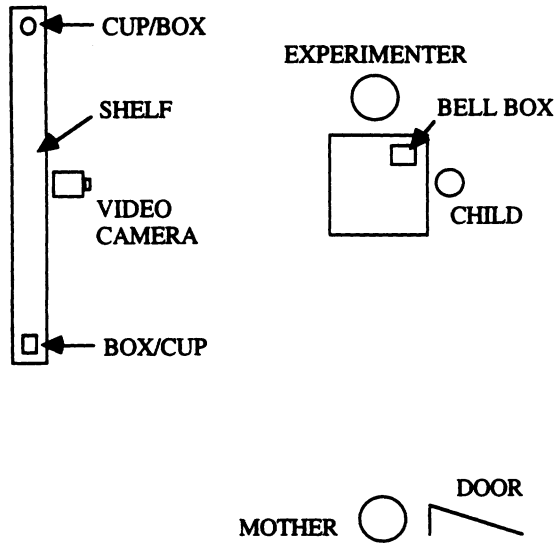


FIG. 1.—Room configuration for Study 1

toy frog and named it. Then, the experimenter placed the frog on the middle of the shelf, saying “Look where the frog is going. I’m putting the frog way up high on this shelf.” The children were told that the parent would be their helper in the game. Following this, if they did not request the parent’s help spontaneously (within about 1–2 sec), children were given the prompt, “Tell mommy (daddy) what you want her (him) to do.” After children made a first response, the parent retrieved the toy from the shelf. If children made no response at all, the parent was prompted to retrieve the toy from the shelf, and it was pointed out to children that this was how the parent could help them in the game. This procedure was then repeated with a second toy.

Experimental trials.—Four fixed-order experimental trials followed in which the toy was placed in one of two containers (a cup or box). The children first named the containers, and then one container was placed on either end of the shelf. Each trial began with the experimenter showing the child a new toy, asking the child to name it (all the children did so without difficulty for all the toys), and then placing the toy in one of the containers saying “Look where the (toy name) is going. I’m putting the (toy name) in the box (cup).” On Trials 1 and 3,

the parent was present in the room and witnessed the introduction of the toy and its placement in one of the containers. On Trial 2, the parent left the room during these two events. On Trial 4, the parent closed her or his eyes and covered her or his ears during both of these events.¹ On this trial, children were told, “Mommy’s (Daddy’s) going to close her (his) eyes and cover her (his) ears. Mommy (Daddy) can’t see anything and mommy (daddy) can’t hear anything.” So, the parent knew the toy’s identity and its location on the shelf on Experimental Trials 1 and 3 (the *parent knowledgeable* trials) but did not on Trials 2 and 4 (the *parent ignorant* trials).

Following the toy’s placement in one of the containers, children were asked a memory control question, namely, “Where’s the (toy name)?” They could respond verbally or by pointing. Following this, the experimenter retrieved the parent from outside the room on Trial 2 or, on Trial 4, the parent was told to open his or her eyes and ears. If children did not request the parent’s help spontaneously, the experimenter used the prompt, “Tell mommy (daddy) what you want her (him) to do.” If, on Trials 1 and 3, children spontaneously made a request immediately after the toy’s placement, the memory control question was not asked.

¹ The parent was initially supposed to leave the room on this trial, but during piloting children expressed resistance to her or him leaving for a second time. Thus this trial was added instead.

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On Trials 1 and 2, the use of the toy car or ball was counterbalanced. The pig and duck were presented in fixed order on Trials 3 and 4, respectively, because piloting suggested that children's attention might wane on later trials. Fixing the order of the last two trials preserved a fully counterbalanced design for the earlier two trials. The location (cup/box) of the four toys on the shelf was counterbalanced in such a way that over the four experimental trials each container was used twice. This yielded eight orders which were counterbalanced with the container's location on the shelf (right/left) to produce 16 final orders.

The parent was seated by the door because children often made a request spontaneously as the parent reentered the room on Trial 2. Seating the parent next to the door for the entire session thus ensured that the parent was equally distant from the child and the shelf on all trials at the time the child made his or her request.

Instructions to parents.—When the children were first brought to the lab room, they were given a chance to play with some toys in order to familiarize themselves with the room and the experimenter. During this time, the parents were given detailed verbal and written instructions that specifically asked them to do several things: (a) to say as little as possible during the task, (b) to look at their child with a neutral, attentive, expression while waiting for their child's request, (c) not to look at the shelf when they reentered the room or uncovered their eyes, and (d) to retrieve the toy on all trials regardless of whether their child adequately told them where it was. The parents were instructed not to wait for more information, ask "Where?" or "What?" or use any nonverbal cues to signal that they needed more information.

The goal was for the parent to simply retrieve the toy on all six trials following the child's first request, regardless of its adequacy. To enable the parents to act in this manner, the experimenter surreptitiously told them the toy's location while retrieving them from outside the room on Trial 2 and asked them to peek while covering their eyes on Trial 4.² Had parental feedback been allowed, it would have been impossible to determine whether children's re-

sponses on subsequent trials were the result of the feedback or the manipulation of the parent's knowledge. Similar reasoning for not using feedback can be found in other studies (e.g., Maratsos, 1975). Children whose mothers violated these feedback instructions, either verbally or nonverbally, on either of the first two experimental trials were replaced. If feedback occurred only on the third or final trial, these children were included in the main analyses as this feedback resulted in the loss of data for only the final trial at maximum.

RESULTS

The hypothesis of this study was that children would communicate more information on the parent ignorant trials than on the parent knowledgeable trials. Of particular interest were three types of new information that children might include more often in their requests on parent ignorant trials: (1) a point or other gesture to the toy's location in the cup or box, (2) the name of the container (box/cup) in which the toy was placed, and (3) the name of the toy (e.g., duck, pig, car). Either of the first two means was sufficient to specify the toy's location to the parent. The third type of information, naming the toy, did not help the parent locate the toy but was included as a dependent measure because it did constitute *new* information that the parent was not privy to on parent ignorant trials.

Coding of Videotapes

All the videotapes were coded independently by the primary investigator and an undergraduate research assistant who was blind to the hypothesis of the study. On each trial, the child's first spontaneous or prompted request to the parent was coded. The verbal and nonverbal components of children's requests were coded as follows.

Gestural responses.—The occurrence of any gesture (e.g., coded simply as present or absent) was noted and recorded as spontaneous or prompted. In addition, if a gesture was produced, two specific aspects of the gesture were coded: (a) the *direction* of the gesture (e.g., shelf center, shelf right, bell box) and (b) *gesture type*. The majority of gestures were points (88%). The other gestures included reaches, indicates (whole hand point with all fingers extended), and

² Note that in a few instances children would specifically ask the parent to retrieve the object from an incorrect location. In such cases, the mothers first retrieved the incorrect container that was empty and then subsequently retrieved the toy from the correct location. Such instances were rare and did not appear to affect subsequent behavior.

"lazy gestures" that very sloppily and hastily motioned in a given direction. As the use of these different gesture types did not vary significantly across the four experimental trials, they are all subsumed under the one dependent measure of gesture. Only gestures in the direction of the shelf were included as gestures to the toy's location. Gestures to the bell box or to mother, for example, were not included. Infrequently, a gesture appeared to be directed more to the center of the shelf than to one side in particular. These gestures were included in the main analysis as gestures to location because they were clearly directed to the shelf and thereby served at minimum to specify the containers on the shelf as the toy's location. In addition, it is impossible in such cases to know whether children intended but failed to point to the box or cup, thereby making the exclusion of such points questionable. Two gestures produced on experimental trials toward the incorrect container on the shelf (i.e., the child forgot where the toy was) were also included as gestures to the toy's location.

Verbal responses.—Children's verbal requests (e.g., "Mommy, you help?") were independently transcribed by the experimenter and the undergraduate research assistant and recorded as spontaneous or prompted. In order to resolve minor differences in wording, a graduate research assistant was employed to review the tapes and transcripts and provide the final transcript used. The full transcripts of children's verbal responses in Study 1 are available from the author.

Agreement between coders.—Percent agreement between coders ranged between

91% and 100% for all dependent measures. (It was 100% for the occurrence of all the three main dependent measures.) In all cases of disagreement the coding of the research assistant was used.

Frequency of Naming the Toy, Naming the Location, and Gesturing to the Location

Table 1 shows the percentage and number of children naming the toy, naming the location, and gesturing to location on both practice trials and all four experimental trials.

Practice Trial Results

The percentage of children not responding decreased from 25% to 0% over these two trials, suggesting that children caught on quickly to the structure of the game. The number of children responding spontaneously increased from 1 (6%) to 10 (63%). On Practice Trials 1 and 2, seven (44%) and four (25%) children, respectively, made requests that did not contain any of the dependent measures and generally took the form "Help me," "Play the game," or "Get it." Such nonspecific request types were to be expected on trials in which it was not necessary to point out the location or identity of the toy to the parent—that is, when children only needed to indicate that the parent should retrieve the toy.

Experimental Trial Results

Analysis of these trials focused on the three dependent measures of main interest as tabulated in Table 1. In addition to naming the box or cup, three instances of the verbal response "up/in there" and one instance of "in here" were also included as verbally specifying the location. (All four instances occurred in conjunction with a point

TABLE 1
PERCENTAGE (and Number) OF CHILDREN NAMING THE TOY,
NAMING THE LOCATION, AND GESTURING TO
LOCATION IN STUDY 1

	Name Toy	Name Location	Gesture to Location
<i>Practice:</i>			
Trial 1	25 (4)	0 (0)	31 (5)
Trial 2	44 (7)	6 (1)	50 (8)
<i>Experimental:</i>			
1. Parent present	56 (9)	13 (2)	56 (9)
2. Parent left room	75 (12)	44 (7)	94 (15)
3. Parent present	50 (8)	13 (2)	44 (7)
4. Parent shut eyes and ears ^a	73 (11)	33 (5)	80 (12)

^a N = 15.

to location.) All children correctly named the box and cup containers before the start of these trials. For the purposes of the analyses to follow, prompted and spontaneous responses were collapsed, as they bore no systematic relation to the experimental manipulation, nor did they differ in terms of informativeness. Over the four trials, the number of children responding spontaneously (without prompting) was eight (50%), six (37%), 12 (75%), and 12 (75%) respectively. (The drop on Trial 2 is most likely due to the fact that the parent's reentry into the room was somewhat disruptive, which caused children to hesitate in making a request. To ensure that the children's attention did not wander, the experimenter often needed to prompt a request.)

Cochran-Mantel-Haenzel test.—The pattern of responding for all three dependent measures followed the pattern predicted (see Table 1). More information was conveyed by the children in their requests on parent ignorant trials than on parent knowledgeable trials. Statistical analysis of these results was performed separately for each dependent variable using the Cochran-Mantel-Haenzel test (Cochran, 1954; Mantel & Haenzel, 1959). The Cochran-Mantel-Haenzel test is essentially a chi-square test that, instead of producing expected values for the aggregate data, produces expected values for each child on each trial. These expected values are then used when the chi-square test is performed on the data as a whole. It is necessary to take these individual expected values into account because of the repeated-measures design of the study and the fact that each particular child's response tendencies may vary in general, and their performance on one trial is not independent of their performance on another trial. Note that the results of Trial 4 are based only on the data of 15 children because one mother violated the feedback instructions on Trial 3.

Toy naming.—Although there was a nonsignificant difference in the amount of toy naming over the four trials ($Q_{cmh} = 4.93$, $df = 3$, $p = .177$), children did name the toy significantly more often on parent ignorant trials than on parent knowledgeable trials (contrast $Q_{cmh} = 4.74$, $df = 1$, $p = .029$).

Location naming.—Children differed significantly across trials in how often they named the location of the toy (i.e., cup/box) ($Q_{cmh} = 8.05$, $df = 3$, $p = .045$), doing so

significantly more often on parent ignorant trials than on parent knowledgeable trials (contrast $Q_{cmh} = 7.86$, $df = 1$, $p = .005$).

Gesture to location.—Children differed significantly across trials in how often they gestured to the location ($Q_{cmh} = 12.73$, $df = 3$, $p = .005$), doing so significantly more often on parent ignorant trials than on parent knowledgeable trials (contrast $Q_{cmh} = 11.45$, $df = 1$, $p = .001$).

These results argue strongly against the possibility that, as children became more experienced, they simply learned to give more information, regardless of the parent's knowledge state. This explanation cannot account for the fact that children provided less information on Trial 3 than on either Trial 2 or Trial 4.

Individual Analysis of Information Provided on Parent Knowledgeable and Parent Ignorant Trials

An examination of children's individual response patterns bolsters the finding that on parent ignorant trials children provided more information than on parent knowledgeable trials. Children's individual patterns of responding were first examined for each of the three dependent measures separately (for the 15 children completing all four trials). On each trial, children were given a 0/1 score for each dependent measure on each trial. Then, for each child separately, the total score (maximum = 2) for each dependent variable on parent ignorant trials was compared to the total on parent knowledgeable trials. The first three columns of Table 2 show the percentage of children displaying one the four possible response patterns, namely, providing some information, the total of which was (1) greater, (2) equal, or (3) lesser on parent ignorant trials than on parent knowledgeable trials; or (4) providing none of a given type of information on any trial. The results clearly indicate that, of those children who showed a difference in responding across the two types of trials, the great majority showed a difference in the predicted direction.

The same analysis was carried out with all three types of information combined (i.e., each child received a 0–3 score on each trial). This analysis revealed three patterns of responding among the 15 children completing all four trials. Eleven children (73%) provided more information on parent ignorant trials than on parent knowledgeable tri-

TABLE 2

PERCENTAGE (and Number) OF CHILDREN DISPLAYING VARIOUS RESPONSE PATTERNS FOR THE THREE DEPENDENT MEASURES OF STUDY 1 ($N = 15$)

Response Pattern	Name Toy	Name Location	Gesture Location	Name/Gesture Location
Parent ignorant > parent knowledgeable	53 (8)	47 (7)	47 (7)	47 (7)
Parent ignorant = parent knowledgeable	27 (4)	0	53 (8)	53 (8)
Parent ignorant < parent knowledgeable	13 (2)	7 (1)	0	0
Do not provide this information on any trial	7 (1)	47 (7)	0	0

als. Two children (20%) provided equal amounts of information on parent ignorant and parent knowledgeable trials. Only one child (7%) provided less information on parent ignorant trials than on parent knowledgeable trials. Clearly, a small subset of children was not accounting for the significant difference found in the aggregate data. Children also augmented their requests in many different ways, adding one, two, or even all three pieces of new information. In addition, seven (88%) of the eight cases in which a child's response included none of the three pieces of information occurred on parent knowledgeable trials.

On parent ignorant trials, information about the toy's location determined the adequacy of children's responses. Without this information it would not normally have been possible for the parent to find the toy and fulfill the child's request. The results were therefore reexamined with respect to location information only. Children were credited with providing location information if they named the cup or box or if they gestured to the cup or box (not to the center of the shelf). Of the 15 children completing all four trials, none was observed to provide less location information on parent ignorant trials than parent knowledgeable trials (see Table 2, last column). Seven children (47%) provided more location information on parent ignorant trials, and eight children (53%) provided some location information, the amount of which was equal on parent ignorant and parent knowledgeable trials.

Eye Gaze

To ensure that children who provided no verbal or gestural location information were not trying to signal location by using eye gaze, all the trials were recoded independently by the experimenter and the graduate research assistant for instances of alternating gaze behavior. Alternating gaze was defined as a sequence of looks produced by the child specifically in the sequence: *look at mother* → *look at container* → *look back to mother*. Coder agreement for instances of alternating gaze was 100%. This analysis of gaze revealed that, of the 16 parent knowledgeable trials and four parent ignorant trials in which location information was not provided, alternating gaze accompanied a child's request in only two instances (one in each condition). Thus, older 2-year-old children were not relying on this means of specifying location.

Memory Control Question

On each trial, once the toy had been placed in one of the containers, children were asked the memory control question, "Where's the (toy name)?" This control question proved to be unnecessary, as children's memory for the location of the toy was almost perfect. For example, children gestured to the incorrect container only twice. In addition, there were no behavioral indications observed (e.g., scanning the shelf or saying "I forgot") to suggest that children had forgotten where the toy was. Any confounding effects of the posing of this question were ruled out by subsequent analyses.³ This question was omitted in Study 2.

³ This question could have represented a confound because it was more likely to be posed on parent ignorant trials than on parent knowledgeable trials, in which children made their requests spontaneously. To rule out the possibility of this confounding effect, the results were analyzed with respect to whether the question was asked of a child and what information was contained in the child's subsequent request to mother. Because the majority of children were asked this question on parent ignorant trials, and the majority of these children also supplied location information in their requests, an analysis of these trials is not informative. An analysis

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Summary

In Study 1, 2.7-year-old children showed an impressive ability to tailor their verbal and nonverbal communication to the knowledge state of a parent. They were significantly more likely to include in their requests a gesture to the location of the toy, a verbal reference to the toy's location, or the name of the toy, when a parent was ignorant than when a parent was knowledgeable. The decision to use gesture as nonverbal dependent measure was amply validated in these results: of the 46 cases in which location information was somehow conveyed, gestures alone conveyed this information 74% of the time. Only 6% of the time was this information conveyed just verbally. Thus, although all the children could name the containers, the majority preferred to indicate the toy's location gesturally.

Study 2

Given the impressive performance of the older 2.7-year-old children in Study 1, it was of interest whether even younger 2-year-old children would show an ability to tailor their communication to the knowledge state of a communicative partner. Piloting revealed that many young 2-year-old children would not talk during the task and that those who did were often incomprehensible, not only to the experimenter, but to their parents as well. A procedure was therefore adopted that would avoid situations in which the quantity of verbal information supplied by the child could be over- or underdetermined by the experimenter but that retained the same predictions and basic task demands of the first study.

In Study 2, children had to ask for their parents' help in retrieving a sticker placed in one of two containers located, out of reach, in the far corners of the table at which the children sat. Because the younger 2-year-old children did not want the parents to leave the room, or sit far away, the parents' knowledge of the location of the sticker was manipulated by having them either open or close their eyes while they sat at the table with their children. Unlike in Study 1, the two containers used were identical. The

containers were both opaque, red, plastic containers fitted with an opaque yellow screwtop that had a small slit in it through which a sticker could be dropped. The use of two identical containers removed any obvious means by which children could verbally specify the sticker's location, ensuring that children could only use gestures to inform their parents of its location. The sticker's identity (e.g., duck, plane) was also not revealed to the child before it was placed in one of the two containers. This ensured that children could not ask for the sticker by naming its identity, again reducing the possibility of under- or overdetermining the information contained in a child's verbal utterance.

The prediction for this second study was that, when requesting the parent's help in retrieving the sticker, young 2-year-old children would gesture to the sticker's location more often when the parent had not witnessed its placement than when the parent had.

METHOD

Subjects

Sixteen 2-year-old children (eight boys and eight girls; mean age 2-3, range 2-3 to 2-4) participated in this study. Fifteen mothers and one father took part. Fourteen children were Caucasian, one was African-American, and one was Native American. Children were largely from middle-class families and were recruited as in Study 1. Data from an additional seven children were omitted either due to excessive fussiness, experimenter error, or because the parents gave feedback.

Materials and Stimuli

The configuration of the lab room was similar to that in Study 1, except that the parent was now seated at the table at a 90° angle to the left of the child. Two red, opaque containers were used that each had a slot in the screw top through which a sticker could be dropped. Children were given a picture of a farmyard scene on which to place the stickers, of which there were nine in total. A small sign was attached to the ta-

of the parent knowledgeable trials, however, reveals that children who were asked this question were no more likely to supply location information than those who were not. Of the 14 parent knowledgeable trials on which children were asked this question, location information was provided (verbally or nonverbally) 57%. Of the remaining 18 parent knowledgeable trials on which children were not asked this question, location information was provided 56%. Moreover, 56% of children were asked this question on three or more trials, and only three children were asked this question solely on parent ignorant trials.

ble on the parent's side that read "Dear Parent, please remember to say as little as possible during the study."

Procedure

Introduction to the containers.—Children were shown the farm picture and told that in this game they would be able to get some stickers to put on the picture. They were then shown the two containers and told that the parent would be their helper in the game and retrieve the out-of-reach container for them. The parents were given similar verbal and written instructions regarding their behavior and feedback as in Study 1.

Practice trials.—Three practice trials were used to familiarize children with requesting the parent to get the container with the sticker in it. One container was placed directly in front of the children at the opposite side of the table, out of reach, at a distance of about 80 cm. On Practice Trial 1, the experimenter held up a sticker (*backside* toward the children so that they could not see what the sticker was) and dropped it into the container through the slot saying, "Look where the sticker is going. I'm putting the sticker in here. Oops, there it goes." Then children were told that the parent was their helper, and if children did not respond spontaneously they were given the prompt, "Tell mommy (daddy) what you want her (him) to do" as in Study 1. If children did not respond, the parent was prompted to retrieve the container, and it was pointed out to children that this was how the parent could help them in the game. This procedure was then repeated with two other stickers.

Experimental trials.—Following the three practice trials, children were given six experimental trials. During the placement of the sticker in one of the two containers, the parent had her or his eyes open on three trials (the *open eye trials*) and her or his eyes closed on three trials (the *closed eye trials*). Open eye and closed eye trials alternated; half the children started with an open eye trial and half with a closed eye trial. Before the first experimental trial began, the two containers were placed, one each, in the left- and rightmost far corners of the table. Each trial began with the experimenter stating whether the parent's eyes would be open or closed. For example, children were told, "This time, mommy's (daddy's) gonna have her (his) eyes open (closed). Mommy (Daddy) can (can't) see where the sticker's going." The sticker was then dropped in the right or left container. If the parent's eyes

were closed, they were asked to open them. Children then either made a request spontaneously or were given the prompt, "Tell mommy (daddy) what you want her (him) to do." This procedure was then repeated with five other stickers.

The first four trials were counterbalanced with respect to sticker location—left (L) or right (R). Each of four stickers (train, kitty, plane, and cow) was presented in every trial position, and two location orders were used: RLLR and LRRL. The last two trials were considered extra trials, and two stickers were presented in fixed order to produce either a RLLRLR or LRRLRL location sequence. This yielded eight orders, that were given to eight children (four boys and four girls) with alternating open-closed trials, and to eight other children with alternating closed-open trials. As the results for all the dependent measures do not differ significantly whether the first four or all six trials are considered, the results are presented with respect to all six trials.

Nonverbal violations of the feedback instructions were discreetly noted by the experimenter as they occurred during the session. During this study, parents were asked to refrain from asking children clarification questions such as *This one?* after a child's request. However, as children responded to this feedback only with head nods or a "yes" response, and never with more information, children given this feedback were not replaced.

RESULTS

Coding of Videotapes and Agreement between Coders

Children's gestures were coded as in Study 1, and agreement for the occurrence of all gestures to the sticker's location and their direction was 100% for both practice trials and experimental trials. For gesture type, it was 71% on practice trials and 94% on experimental trials.

Frequency of Gesturing to Location on Practice and Experimental Trials

The frequency of gesturing to the sticker's location on the three practice and six experimental trials is presented in Table 3.

Practice Trial Results

The percentage of children not responding decreased from 56% to 0% by the third practice trial and the percentage of children responding spontaneously in-

TABLE 3
 STUDY 2: PERCENTAGE AND NUMBER OF CHILDREN USING A POINT, OTHER GESTURE (Reach, Indicate, Lazy), AND ALTERNATING GAZE TO SIGNAL THE LOCATION OF THE STICKER

TRIAL	TRIAL TYPE											
	Practice				Open Eye				Closed Eye			
	Gesture		Alternating Gaze	Total	Gesture		Alternating Gaze	Total	Gesture		Alternating Gaze	Total
	Point	Other			Point	Other			Point	Other		
First	6 (1)	13 (2)	19 (3)	0 (0)	44 (7)	31 (5)	75 (12)	13 (2)	75 (12)	13 (2)	88 (14)	31 (5)
Second	38 (6)	25 (4)	63 (10)	0 (0)	50 (8)	13 (2)	63 (10)	19 (3)	63 (10)	19 (3)	88 (14)	31 (5)
Third	44 (7)	31 (5)	75 (12)	0 (0)	40 ^a (6)	27 ^a (4)	67 ^a (10)	20 ^a (3)	80 ^a (12)	7 ^a (1)	87 ^a (13)	40 ^a (6)

^a N = 15.

creased from 19% to 75% over the three trials. By the third practice trial, all the children were familiar with the routine of the game. On the third practice trial, 25% of the children did not provide any gestural information as to the location of the sticker. In such cases, children's requests were usually of the form: "Out please!" "More," or "I want some more."

Experimental Trial Results

On closed eye trials, the presence of a gesture indicating the appropriate container differentiated adequate from inadequate responses. In the analysis of this measure, prompted and spontaneous responses were collapsed, as they bore no systematic relation to the child's tendency to gesture or not. On each of the six experimental trials between 10 (63%) to 14 (88%) children responded spontaneously. The data for one child on the last two extra trials was dropped due to a violation of the feedback instructions by the mother on the fifth trial.

Gestures to location observed on the experimental trials followed the predicted pattern. On every open eye trial, the tendency to gesture to location was less than that observed on every closed eye trial. The increase in the amount of gesturing on closed eye versus open eye trials was 18%. Gestures other than points were seen more frequently than in Study 1. Twenty-five percent of children's gestures to location were reaches, indicates, and "lazy locators" as shown in Table 3.

Cochran-Mantel-Haenzel test.—Although children's tendency to gesture to location over the six trials was not significantly different ($Q_{cmh} = 8.77$, $df = 5$, $p = .118$), children did gesture to location significantly more often on closed eye trials than open eye trials (contrast $Q_{cmh} = 7.64$, $df = 1$, $p = .006$). This contrast is even stronger if only children's points (and not other gesture types) are considered ($Q_{cmh} = 11.613$, $df = 1$, $p = .001$).

Individual Analysis of Gestures to Location Provided on Closed and Open Eye Trials

To examine the individual response patterns, a score of 0/1 was assigned to every trial depending on whether the child produced a gesture toward a container or not. Over the six experimental trials (except for one child with four trials), this analysis revealed that seven children (44%) gestured more on closed eye than on open eye trials, eight children (50%) gestured to location on

every trial, and one child (6%) never gestured on any trial.

Specificity of Gestures

As mentioned earlier, 25% of the children's gestures to location were deictically *less* specific than points (e.g., reaches). Assuming that these less specific gestures reflected less concern with providing precise location information, these types of gestures would be predicted to occur more often on open eye than on closed eye trials. Such a trend was evident in the data. Seven children produced different gesture types over the six trials. Among these children's responses, 8/14 (57%) gestures on open eye trials were less specific than points. In contrast, on closed eye trials, this proportion was only 3/18 (17%). For four of these seven children, this pattern held up within their own use of different gestures. These results suggest that point gestures were more likely to be produced than other gestures when a gesture was needed to serve the referential function of specifying *one* of the particular containers in addition to carrying the imperative function "get."

Gaze Behavior

Two gaze behaviors were observed among the children that prompted a recoding of the videotapes. The first of these, staring at the parent before making a request, had not been observed in Study 1 and was unanticipated. These stares, which ranged in length from about 1 to several seconds, were easily distinguishable from simple glances and occurred without any accompanying utterance or gesture. For example, on each open eye trial, one child turned to his mother after watching the placement of the sticker in the container and looked at her for a period of 2 to 3 sec. In contrast, on each closed eye trial, this child immediately turned to look at the container with the sticker after watching his mother open her eyes and made a request. The second gaze behavior observed was a gaze alternating between the parent and one of the containers either before or during the request. These two behaviors were independently coded by the experimenter and the graduate research assistant. *Stares* were defined as a look to the parent (before making a request) that endured longer than a brief glance (i.e., longer than about 1 sec). *Alternating gaze* was defined as a complete sequence of looks in the order: look at the parent → look at container → look back to the parent. Coder reliability for the occurrence of these gaze behaviors was .90.

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Stares.—These stares possibly constituted a *first* request on the part of the child. Among adults, successive turns in conversation, games, and other activities are often negotiated entirely by directing a look to the person whose turn to act or speak it is next (e.g., Sacks, Schegloff, & Jefferson, 1974). Similarly, children in this study may have been signaling to the parents that it was their turn to act by looking at them. If this were the case, this behavior would be predicted to occur more frequently on open eye trials, in which the parent already knew the sticker's location, and this look could be considered to be an adequate response. Eleven children (on 21 experimental trials) exhibited such stares to the parent *before* making a request containing verbal or gestural components. The majority of these children's stares (62%) occurred on open eye trials. That these stares were intended as an instruction to act, is also suggested by the fact that two children, following stares at the parent, accompanied five of their requests with points directed at the *parent*.

Alternating gaze behavior.—If children were using this gaze behavior to signal the location of the sticker to the parent, alternate gazes should have occurred more often on closed eye than open eye trials. Indeed, of the 24 instances in which 11 children exhibited alternating gaze behavior (before or during their request), 67% occurred on closed eye trials. Individually, six of these 11 children revealed more alternating gazes on closed eye trials than on open eye trials.

Gesture + alternating gaze.—Children's use of both gestures to location and alternating gaze was examined by giving children a score of 0–2 on each of the six experimental trials depending on whether neither, both, or one of these two behaviors were included in their request. The results were surprising using this measure: 10 of the 16 children (63%) provided more location information on closed eye trials than open eye trials, three children (19%) provided the same amount of information on closed eye and open eye trials, one child (6%) provided no information on any trial, and two children (13%) provided less information on closed eye trials than open eye trials. Thus, in comparison with the original analysis of individual patterns involving gestural responding alone, this new combined measure revealed a marginally greater effect of the experimental manipulation, i.e., 63% vs. 44%; $\chi^2(2, N = 32) = 4.452, p < .11$. As in Study 1, no behavioral indications were observed to

suggest that the children ever forgot where the sticker was.

Summary

In Study 2, younger 2.3-year-old children gestured to the location of a desired sticker significantly more often when the parent did not know this information than when she or he did. However, the difference in the amount of information supplied in cases where the parent was knowledgeable or not was smaller than that seen with older 2.7-year-old children. This was most likely due to the fact that half of the younger 2.3-year-old children pointed on every trial, resulting in a ceiling effect. The original analysis of gestures to location may have underestimated the ability of the 2.3-year-old children. An analysis that included the use of alternating gaze revealed that a majority of children (63%) provided more information about the location of the sticker on closed eye trials than on open eye trials. These results suggest that several dependent measures, such as the use of eye gaze, gesture, and speech, may need to be combined to assess accurately the abilities of younger 2-year-old children. These children's communicative abilities vary widely and even a particular child may vary, from trial to trial, the means used to provide information to a communicative partner.

General Discussion

The results of these two studies suggest that 2-year-old children can tailor their requests to a communicative partner's knowledge state. In their requests for a desired toy, 2.7-year-old children named the toy, named its location, and gestured to its location significantly more often when the parent did not know this information than when the parent did (Study 1). Similarly, 2.3-year-old children gestured to the location of a desired sticker significantly more often when the parent did not know its location than when the parent did (Study 2).

Before discussing the implications of these results, two possible methodological artifacts will be eliminated. First, it could be argued that children gestured and verbalized more on the trials in which the parent left the room or closed his or her eyes because these trials were more arousing. This argument, however, cannot explain why *specific gestures* (i.e., gestures to location) and *specific verbalizations* (i.e., toy name and location) should have been the only behaviors to increase on these trials. Arousal could

equally well have led to an increase of other gestures (e.g., pointing at the parent, pounding on the table) and other types of verbalizations (e.g., "Help me" responses). In fact, no study to date has ever found a direct relation between gestural behavior and emotional arousal (see Feyereisen & de Lannoy, 1991, for review). Second, it could be argued that the parent appears more attentive on parent ignorant trials. However, if parents did not maintain a neutral expression while waiting for their children's requests the data from these parent-child pairs were dropped. Moreover, even if the parent had appeared more attentive on parent ignorant trials, this feedback would not have indicated to children *what* additional information in particular they should have communicated.

It seems reasonable to conclude, then, that the manipulation of the parent's knowledge state was the factor influencing children's requests in the current studies. This conclusion clearly contradicts the assumption, found in the theory of mind literature, that 2-year-old children take only the desires—not the beliefs—of others into account (e.g., Wellman, 1993). An understanding of desires cannot account for these results. Instead, these results require a characterization of the type of understanding of knowledge mediating the ability of 2-year-old children to tailor their communication to a parent's knowledge state.

Very few researchers have speculated in detail about the 2-year-old child's understanding of knowledge. In the communication literature, when it has been argued that 2-year-old children have an ability to take the knowledge of others into account, they have simply been credited with an understanding of such concepts as "knowing" and "comprehending" without any discussion of whether this understanding might be adult-like or not (e.g., Bretherton et al., 1981). Other accounts, often from the theory of mind literature, have suggested that an understanding of visual perception may be a precursor to an understanding of belief and knowledge (e.g., Gopnik, Slaughter, & Meltzoff, 1994; Perner, 1991; Shatz, 1994a; Wellman, 1993). For example, Shatz (1994a) suggested that children's showing behavior, commonly seen around 18–24 months, is motivated by children's judgments about another person's ignorance or knowledge based on their direct, particularly visual, experience. These accounts do not, however, address in any detail how the 2-year-old child's understanding of knowledge follows

or builds on their understanding of visual perception. In fact, to date, no experimental data exist to distinguish whether 2-year-old children's apparent attributions of knowledge and ignorance are based on a sophisticated, causal understanding of knowledge and its relation to sensory experiences or on a less sophisticated understanding of knowing.

In the current studies, one might be tempted to attribute to 2-year-old children the understanding that "seeing leads to knowing," as has been attributed to 3-year-old children in the theory of mind literature (e.g., O'Neill et al., 1992; Perner, 1991). Their performance in the current tasks would therefore presumably be based on assessments of the type "Mommy has not seen where the toy was put and therefore does not know where it is." But are 2-year-old children really capable of making assessments of this type and of understanding the acquisition of knowledge in such a sophisticated fashion? As mentioned in the introduction, even 3- and 4-year-old children show only a rudimentary ability to assess the knowledge of others when asked questions such as "Who knows x?" That is, an understanding in this sense that seeing leads to knowing is fragile even in 3- and 4-year-old children. It therefore seems wiser, at present, to seek an explanation for 2-year-old children's performance in these tasks that relies on a less sophisticated understanding of knowing.

AN ALTERNATIVE EXPLANATION: DISENGAGEMENT + UPDATING

In the current studies, I suggest, 2-year-old children tailored their communication by, first, taking into account the parent's disengagement from the events taking place and, second, by wanting to update the parent about the significant and relevant events that happened while the parent was disengaged (because he or she left the room or closed her or his eyes). By presenting these notions of disengagement and updating in more detail, I will show how this *disengagement + updating* explanation differs from attributing to children the more sophisticated understanding that seeing equals knowing.

Existing research has shown that, from a very early age, children are sensitive to whether someone is engaged with them during an interaction. For example, Ross and Lollis (1987) showed that, even at 9 months of age, children increased their communica-

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tive actions during intervals in which adult partners discontinued their involvement in a game as compared to intervals in which their adult partner was fully involved in the game. That is, 9-month-old children tailored their communication to their mothers' *current*, changing, engagement states.

In the current studies, 2-year-old children revealed a more sophisticated perspective-taking ability by taking into account the parent's *past* state of engagement and adapting their communication accordingly. Recall that, at the time that children made their requests, the parent was always fully engaged in the game again. The children's adaptations of their requests must have taken into account the parents' previous disengagement from the game.

Taking into account a parent's "disengagement" need only mean, however, that a child has realized in some global sense that the parent has become disengaged from an ongoing event. That is, a child's assessment that his or her parent has become disengaged from an interaction could take into account a whole host of factors such as whether the parent is absent from the room, has her or his eyes closed, is talking about unrelated matters, or appears disinterested or distracted. Indeed, in the current studies, physical absence and visual occlusion were used because they were thought to be the two factors affecting another person's knowledge most salient to children of this age. Such a notion of disengagement does not necessarily imply that the child recognizes that one or more of the parent's specific sensory capabilities has been (negatively) affected, such as the ability to hear, see, and so forth. This type of understanding is implied, however, the seeing equals knowing explanation.

After a parent's disengagement from the game, I suggest that children were motivated to "update" her or him regarding the significant events that occurred during the period of disengagement. In the context of these studies, these "significant events" are taken to be the *change in the toy and its location*. Work on children's communicative development has shown that, even at the one word stage, children are highly attuned to the changing aspects of a situation and choose to talk about these rather than about unchanging aspects (e.g., Greenfield, 1979). In the current studies the change in toy and change in location were clearly the significant events of each new trial, as opposed to other unchanging aspects (e.g., the fact that

a toy had been hidden by the experimenter) about which children are not predicted to want to update their parents. So, the ability of 2-year-old children to tailor their requests in these studies may have rested not on a sophisticated, causal understanding of knowledge and its relation to sensory experiences but, rather, on a simpler, precursory understanding of the form "Tell other people about significant happenings they did not take part in with me."

Updating a communicative partner who has become disengaged from (or has not taken part in) an interaction is also hypothesized to be a feature of our communicative interactions with others that children are being made aware of around this age. Numerous analyses of naturally occurring conversations between parents and children have shown that, for instance, from about the age of 17 months, parents set up the linguistic grounds for the child to report past experiences shared by both of them to a naive third interlocutor and/or to the adult her or himself (e.g., de Lemos, 1981; Engel, 1986; Snow, 1990).

Further studies will be needed to clarify whether 2-year-old children's ability to tailor their communication indeed rests on a more sophisticated conception of knowing that includes specifically considering the kinds of perceptual and sensory information possessed by a communicative partner. For example, such an understanding would be hard to deny to children if they showed an ability to consider knowledge gained by a parent even if they themselves were ignorant (e.g., the parent witnesses the location of the toy but the child does not). In such a scenario, the parent has not been deprived of knowledge and therefore updating the parent is not the issue. Instead, this situation calls for the child to consider the events the parent took part in independently of the child and the particular knowledge so gained by the parent. The ability of children to adapt their communication in such a situation would certainly require a more sophisticated type of conceptual perspective taking that includes an understanding of the causal relation between sensory events and knowledge. The observation that even 3-year-old children's performance in assessing the knowledge of others is consistently better when they have experienced the event than when they are ignorant (e.g., Wimmer et al., 1988) suggests that this more sophisticated understanding of knowledge may only be

possessed by the majority of children around 4 years of age.

A shift from a "disengagement plus updating" understanding to a more sophisticated understanding of knowing might be tested by using transparent as well as opaque containers. If 2-year-old children are simply concerned with updating a parent following an instance of disengagement, they should include information about the toy's location regardless of whether the container is opaque or transparent. If, however, children are taking into account specifically what knowledge the parent possesses by virtue of visual perception, then they should only give information about the toy's location when the containers are opaque.

The possibility that 2-year-old children in the current studies were operating with a rudimentary understanding of knowing should not detract from the fact that they have an impressive, and hitherto unrevealed, ability to take into account two important factors that affect our knowledge—physical absence and lack of visual experience. Their ability to tailor their communication accordingly is clearly a remarkable pragmatic achievement that represents an important basic building block in their understanding of knowledge and of how to communicate successfully with others.

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