

## Early Reasoning About Desires: Evidence From 14- and 18-Month-Olds

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Although there is substantial evidence that 30-month-old children can reason about other people's desires, little is known about the developmental antecedents of this ability. A food-request procedure was devised to explore this understanding in 14- and 18-month-olds. Children observed an experimenter expressing disgust as she tasted 1 type of food and happiness as she tasted another type of food. They were then required to predict which food the experimenter would subsequently desire. The 14-month-olds responded egocentrically, offering whichever food they themselves preferred. However, 18-month-olds correctly inferred that the experimenter wanted the food associated with her prior positive affect. They were able to make this inference even when the experimenter's desires differed from their own. These data constitute the first empirical evidence that 18-month-olds are able to engage in some form of desire reasoning. Children not only inferred that another person held a desire, but also recognized how desires are related to emotions and understood something about the subjectivity of these desires.

Over the past 10 years, a great deal of research effort has been directed toward exploring young children's understanding of their own and other people's minds (i.e., the child's theory of mind). As a consequence, there is now abundant evidence that by 4 years of age, children can explain and predict people's behaviors by reference to subjective mental states, including beliefs and desires (see, e.g., Astington, Harris, & Olson, 1988; Perner, 1991). Younger children, however, have often been characterized as "desire psychologists" because they appear to rely heavily on the construct of desire and rarely (if ever) recognize the role of beliefs when reasoning about human action (Wellman, 1993).

Wellman and Woolley (1990) have investigated this desire psychology by giving older 2-year-olds ( $M = 2$  years 10 months) information about the desires of various story characters and then asking them to make predictions about each person's actions and emotions. Children appeared to understand that when people want something, they behave in a manner consistent with the fulfillment of that desire (e.g., if Bill wants X, he will look for X). They also appreciated that different emotions would be experienced depending on whether one's desires were fulfilled (e.g., if Bill does not get what he wants, he will be unhappy). Furthermore, these children recognized that desires could be

distinguished from actions. Yuill (1984), Astington and Gopnik (1991), and Hadwin and Perner (1991) found a similar understanding in 3-year-old children.

In addition to theory-of-mind experiments, researchers have examined children's spontaneous talk about people's mental lives. Wellman and Bartsch (1994), for example, recently reported that children begin to use desire terms such as *want* to explicitly refer to internal states as early as 18 months of age. By their second birthday, children were talking about the different desires of different people (e.g., Jane wants X and Bill wants Y). It was not until around 30 months, however, that they demonstrated an appreciation of the subjectivity of desires—that different people can have different attitudes toward the same object (e.g., Jane wants X, but Bill does not want X).

Do even younger children have a similar, but implicit, understanding of desires? To date, this question has not been directly addressed, due primarily to the lack of appropriate research methodologies. In particular, all the standard tasks have relied heavily on verbal competence. However, children presumably begin learning about the minds of others well before language is acquired. Even in infancy there is some evidence of the underlying foundations on which a theory of mind will later emerge (see Baron-Cohen, 1995; Bretherton, 1991; Hobson, 1994; Poulin-Dubois & Schultz, 1988; and Wellman, 1993, for overviews). Very young infants, for example, show some primitive understanding of the internal states of others in behaviors such as imitation (Gopnik & Meltzoff, 1994) and primary intersubjectivity (Trevarthen, 1979). Gopnik and Meltzoff have argued that these types of behavior reflect an ability to map the visible actions of others onto the infant's own internal bodily sensations. For example, for neonates to respond to the visual sight of another person's facial gesture with a matching gesture, they must appreciate the similarities between the visible face of another and the kinesthetic experience of their own unseen faces. Such a capacity enables infants to understand that they share not only similar behaviors with other people but also similar internal sensations. This may be an important precursor to attributing internal mental states to others.

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By 9–12 months, infants begin to interact with others in distinctive ways. Some have suggested that infants now understand that people have experiences that are directed toward objects and that these experiences can be shared. Scaife and Bruner (1975), for example, have discussed infants' ability to establish joint attention with their mothers when the mothers' gaze is directed toward an object or event. Infants also begin to understand the referent of another person's pointing gesture and become increasingly adept at "following the point" rather than simply fixating on the other person's hand (Leung & Rheingold, 1981). Infant pointing also becomes apparent at this age and is often accompanied by gaze alternation, as if trying to confirm that the other person is indeed attending to the target object (Bates, Camaioni, & Volterra, 1975). During this same period of time, infants begin to examine their mothers' facial expressions in ambiguous or novel situations. This referencing behavior implies that infants understand that another person's emotional expression is a response to, and conveys information about, some object or event (Hornik, Risenhoover, & Gunnar, 1987). Most relevant to the present discussion, however, is evidence that 12-month-olds know that people seek to obtain objects. For instance, infants become capable of giving objects in response to another person's request gesture and can communicate their own desires by alternating their gaze between person and object, while simultaneously producing grasping motions (Masur, 1983).

Bretherton, McNew, and Beeghly-Smith (1981) have viewed these various behaviors as indicative of an implicit theory of mind, such that the infant attributes mental states to self and others. Although these abilities undoubtedly have an important role in the later emergence of a theory of mind, in their earliest form they need not involve any attribution of internal mental states independent of action. A more conservative interpretation, discussed by Wellman (1993), is that by 12 months of age, infants simply recognize that they are sharing a behavioral state with the other person. As they become increasingly adept at gaze alternation, infants will come to recognize that some overt behaviors refer to objects and that these behaviors can be shared with others. People looking at, pointing to, smiling about, and reaching for objects are all directly observable experiences and, as such, there would initially be no need for the infant to impute any underlying mental state. Thus, even in the example of infants giving objects in response to requests, one cannot conclude that they conceive of the other person as having an underlying psychological desire, because the person's request gesture or gaze is visibly directed toward the desired object.

Wellman (1993) has proposed that, in contrast, by 18–24 months of age, children understand that people are psychologically connected to objects. Thus, toddlers recognize that people have internal, psychological experiences about, or in response to, objects and events in the external world. The teasing and comforting behaviors observed in children at this time have frequently been cited as examples of an emerging understanding of internal states. However, in the absence of more direct empirical evidence, these actions must also remain open to interpretation. Although 18-month-olds may identify that a negative emotion is being displayed by a distressed person, it is not entirely clear whether they are aware that comforting actions will alter the person's internal feeling state as opposed to just decreasing

overt signs of distress. At this stage in empathic development, children tend to comfort others in ways that they themselves would find comforting, as in the offer of their favorite toy (Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992). This egocentric comforting suggests that children are reflecting on their own experiences of distress rather than inferring a desire in the other person or understanding that different people may desire different forms of comforting. Over the second year, many children also display some form of teasing behavior directed toward siblings or parents. Dunn (1988), for example, described children removing a sibling's comfort object or destroying their prized possessions. Although such actions could be viewed as an awareness of the sibling's desires and an understanding that a negative reaction occurs when "you don't get what you want," competing explanations cannot be dismissed. On the basis of past experience and observation, a toddler may easily learn what actions will upset another person rather than know that distress can be produced by opposing people's desires. Reddy (1991) has also described teasing in which children as young as 12 months begin to offer, and then withdraw, an object. Children presumably have expectations as to how a giving sequence will unfold and may violate this script either to see how another person will respond or because this behavior unintentionally produced a desirable response (e.g., laughter) on a previous occasion. As with the other examples, then, performance of this action does not necessarily depend on inferences about people having desires or any other internal state. Moreover, the behaviors do not necessarily indicate an understanding of the diversity and subjectivity of desires.

Toddlers' early communicative behaviors have also been viewed as evidence of an implicit theory of mind (see Golinkoff, 1993, for a comprehensive discussion). For example, late in the second year when children's verbal (or nonverbal) messages are misunderstood by another person, they will repair these miscommunications by repeating the original message, adding gestures, or producing substitute messages (Bates, 1979; Golinkoff, 1986). It has been argued (e.g., Bretherton et al., 1981) that children produce these repairs because they understand that the mental states of self and other are distinct and that language is a means by which to share the contents of one's mind. However, many of the child's early communications are aimed at obtaining objects or accomplishing other overt goals; repairs in these contexts can therefore be explained in nonmentalistic terms (Shatz & O'Reilly, 1990). For example, the child knows from experience that language and gestures influence the behavior of others and so the child simply uses a succession of signals that have worked in the past, until the goal is achieved. At around 18 months, children also begin to have conversations about absent topics, for example, objects that are currently out of sight (Goodwin, 1985; Sachs, 1983). It could therefore be argued that the child is attempting to share information, rather than simply intending to influence the behavior of the other person. However, when these utterances involve object labels, it is difficult to interpret children's intentions. Are they attempting to influence another's mental state or are they merely requesting objects? The most compelling evidence for an early understanding of mental states come from those instances when the child communicates about personal experiences and events that have happened in the past (e.g., Bloom & Beckwith, 1989;

Golinkoff & Gordon, 1988; McShane, 1980). These apparent attempts to share information are relatively rare until around 24 months (McShane, 1980). Moreover, as with the various other behaviors cited here, leaner interpretations can be proposed. Researchers cannot be sure that the child thinks the other person lacks certain knowledge and that he or she is aware of the need to directly communicate these mental contents. Indeed, young children often talk and behave as if other people have access to their mental states and past experiences. Toddlers may be talking about these personal topics because they have learned that such behavior will produce positive outcomes, for example, maintaining engagement with the other person, eliciting empathic (e.g., a hug) or other expressive responses, or reinstating an activity and involving the other person.

These earlier studies largely relied on naturalistic observation of the infant's behavior. Although the findings are suggestive, it is difficult to rule out alternative nonmentalistic interpretations of this sort of data. In this study, we extended the work on theory of mind to younger children by using a more controlled experimental paradigm. We explored children's understanding of desires as mental states underlying behavior and action and their understanding that different people may have different desires directed toward the same object. We designed a nonverbal task with highly salient stimuli and an ecologically valid response appropriate to these very young children. Children were presented with two familiar and distinctive foods. After tasting each food, the experimenter produced an affective response (positive or negative) to indicate her preferences and subsequently requested that the child give her some more food. Because the referent of the request was ambiguous, a correct response was dependent on children inferring the experimenter's desires from her previous emotional reactions to each food. If children assume that everyone's desires are the same, they could respond to the request by offering the food that they themselves prefer or by giving away the food that they dislike to avoid sharing the desirable food. We controlled for these alternative responses by manipulating whether the experimenter's food preferences were the same as, or different from, those of the child.

On the one hand, if the children have only a behavioral conception of desire, they will be unable to determine the object of the experimenter's desire because no specific behavioral cues (e.g., direction of gaze, gesture, or both) accompany her request. Furthermore, if they do not understand that people can have different desires toward the same objects, they will tend to respond egocentrically. Thus, they will simply assume that the experimenter is asking for the food that they themselves find desirable. On the other hand, if children have developed a psychological conception of desire, they should give the experimenter whichever food is the target of her positive affect. This behavior would indicate that the child inferred the experimenter's desire from her previous emotion, even though no current behavioral cues to the desire are present. Moreover, it would also indicate an understanding of the diversity and subjectivity of desires.

We also examined individual differences in task performance to gain some insight into the social and linguistic variables that might be involved in the acquisition of such knowledge. A number of researchers (e.g., Gopnik & Meltzoff, 1986; Toma-

sello & Farrar, 1984) have demonstrated a close temporal relationship between the acquisition of certain words and the appearance of related cognitive abilities. The acquisition of a word for desire may likewise be related to the child's early understanding of this internal state. Furthermore, there is some evidence of an association between the frequency of preschoolers' conversations about internal states and their performance on emotion-understanding and false-belief tasks (Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991). Children who are already talking about internal states, in particular, desires, may therefore be more likely to succeed in the present task.

## Method

### *Participants*

A total of one hundred eighty 14- and 18-month-old children were recruited, with equal numbers of boys and girls in each age group. Parents had responded to a general call for volunteers to participate in studies being conducted at the Institute of Human Development, University of California, Berkeley. Children and parents were then recruited from this participant pool. Twenty-one children were excluded due to fussiness or crying ( $n = 14$ ), failure to taste either food ( $n = 6$ ), or parent interference ( $n = 1$ ). The final sample consisted of eighty-one 14-month-olds (41 boys and 40 girls) and seventy-eight 18-month-olds (37 boys and 41 girls). The mean age for each group was 14.4 months ( $SD = 0.27$ , range = 13.8–14.9) and 18.3 months ( $SD = 0.27$ , range = 17.7–18.9). Children were typically from middle-class, intact families; maternal education ranged from high school to doctorate, and 72% of the children were Caucasian.

### *Design and Procedure*

Children, accompanied by a parent, participated in a testing session that included free play and several other tasks unrelated to those reported here. The session was divided into three blocks, each containing two tasks and separated by periods of free play. Participants were randomly assigned to one of eight testing orders. The food-request procedure was administered first, last, or in the middle of the testing session.

Equal numbers of male and female participants from each age group were randomly assigned to one of two preference conditions: matched or mismatched. These groups differed in terms of which food the experimenter desired, with the underlying assumption that participants would exhibit a strong preference for one food and that they would all prefer the same food. To ensure that this would be the case, we presented an attractive snack typically consumed by young children (Pepperidge Farm Goldfish crackers) and a relatively unappetizing raw vegetable (broccoli flowerets). Thus, in the matched condition, the experimenter expressed pleasure in response to tasting the cracker and disgust with the broccoli. In the mismatched group, these emotion-food pairings were reversed. Stimulus presentation side was counterbalanced across participants in each preference group. It was expected that participants' food preferences would not change as a function of the experimenter's affect. Social referencing studies (e.g., Gunnar & Stone, 1984) have indicated that when children are confronted with familiar, unambiguous stimuli, their interaction with these objects is typically not influenced by another person's emotional message. Participants' food preferences were therefore examined before and after observing the emotional displays as a post hoc test of this assumption.

For ease of administration, the first emotion expressed was always associated with the food on the experimenter's left. The experimenter facially expressed the emotions of happiness and disgust in accordance with the descriptions of Ekman and Friesen (1975). These facial expressions were accompanied by verbal scripts that differed primarily in their

intonational structure. Words such as *yucky* or *yummy* were avoided, to control for individual differences in children's verbal comprehension. However, exclamations (i.e., "Eww!" and "Mmm!") were used to draw attention to the experimenter's face and to maintain ecological validity. An example of a disgust script is "Eww! Crackers! Eww! I tasted the crackers! Eww!"

**Setting.** Participants were tested individually in a medium-sized laboratory room, with the majority seated in a high chair at a table. The experimenter was seated on the opposite side of the table, and the parent sat slightly behind the child. Parents were instructed to remain neutral and to limit interaction with the child during the task. A magazine was provided so that the parent could pretend to be unavailable should the child attempt to elicit feedback. Some children (6%) refused to use the high chair and were therefore tested at the table while sitting on the parent's lap. A brief free-play period, in which the child became acquainted with the experimenter, preceded task administration. Participants' behavior was videotaped throughout the testing session. A second camera recorded the experimenter's facial expressions, and these videotapes were subsequently examined to check that the affective displays were recognizable to adult coders.

**Food-request procedure.** A game of "give and take" was played with participants before the experimental task, to facilitate later giving and to check their motivation to share objects with another person. Two bowls of food were subsequently presented on a tray, and participants were given 45 s in which to taste them. This baseline period allowed participants an opportunity to demonstrate their initial food preferences. At the end of the baseline, the food was removed from the child's immediate reach. The experimenter then tasted each food and produced the designated expressions, each lasting approximately 10 s. The experimenter placed one hand, palm facing up, exactly midway between the two bowls and requested some food (i.e., "Can you give me some?") as she moved the tray toward the child. Thus, the request was made before the child reached toward a bowl. If the child did not immediately offer any food, the experimenter withdrew her hand. All participants were given 45 s to further taste the food, to determine whether their preferences had changed as a function of the experimenter's affective display. Additional requests were made during this time to participants who had not complied with the initial request, but these only occurred when participants had no food in their hands or mouths and were not in the process of reaching toward a bowl. Such precautions were necessary to avoid biasing participants' responses (e.g., they might assume that the referent of a request is the food in their hands).

### Questionnaire Measures

Two questionnaires were mailed to parents and completed in the week before the testing session. The Internal State Language Questionnaire (ISLQ) was adapted from Bretherton and Beeghly (1982) and consisted of 37 internal-state words that typically appear over the 18- to 24-month-old period. These words were divided into eight categories: positive emotions, negative emotions, physiological states, perceptual states, affective expressions, volition, cognition, and moral judgment. For those words that parents had heard their children produce, parents were asked to provide an example and to describe the situation in which this occurred. This contextual information was then used to determine whether the child was using the word appropriately. We included in this questionnaire two items about whether parents thought their children understood verbal requests to give objects and the nonverbal give gesture (i.e., extended, upturned hand). These questions were used to verify that participants had understood the task requirements. Parents also completed a modified version (Buss & Plomin, 1984) of the Colorado Childhood Temperament Inventory (CCTI; Rowe & Plomin, 1977), which consists of 5 scales: Shyness, Sociability, Emotionality, Activity Level, and Persistence. We included this measure to explore whether children's

personalities, in particular, their level of sociability, might be related to their ability to understand other people's minds.

### Behavioral Coding

Although only the participants were visible in the behavioral videotapes, the experimenter's vocal expressions of pleasure and disgust were audible. Therefore, the tapes were examined without sound to ensure that coders were blind to participants' preference group assignment. Participants' food preferences were coded from these tapes during the baseline and after the experimenter's affective display. Six food preference categories were used: (a) likes crackers, (b) likes broccoli, (c) likes both foods, (d) dislikes both foods, (e) neither food tasted, and (f) can't tell. Preference judgments were based on a combination of behaviors such as whether the participant tasted, played with, or rejected a food (e.g., threw it on the floor, removed food from the mouth) and the facial expression accompanying such actions. The same coder also recorded which food was offered in response to the experimenter's request(s) and noted any teasing gestures (i.e., child offers and then takes food away from the experimenter's hand). Two additional coders, one for each age group, scored approximately 35% of the data set. Inter-coder agreement (agreements/agreements + disagreements) for 18-month-olds was, for food offered, 100%; for baseline food preference, 96%; and for final food preference, 93%. Inter-coder agreement for 14-month-olds was, for food offered, 96%; for baseline food preference, 88%; and for final food preference, 96%.

### Reliability of Experimenter Expressions

We conducted a manipulation check to ensure that the experimenter had in fact produced the appropriate affective expression (i.e., disgust or happiness). Two naive adult coders (one for each age group of children) examined videotapes of the experimenter's expressions without sound, so that only the experimenter's face was used in making the emotion judgments. Each expression was categorized in terms of its overall hedonic tone (positive, negative, or neutral) and the presence of any discrete emotions (happiness, interest, neutral, surprise, anger, disgust, fear, sadness, or "other"). Coders were required to indicate which of the discrete emotions was predominant if more than one emotion was detected. These same coders also rated the intensity of each expression on a 5-point scale (1 = *very mild* to 5 = *very intense*). Two additional coders examined 35% of the data set for each age group. Interobserver agreement for hedonic tone and discrete emotion was 100%. The intensity ratings were not reliable and were therefore not included in any further analyses.

The appropriate emotions (i.e., disgust or happiness) were predominant in all of the experimenter's displays. Because of equipment failure, no expression information was available for 2 participants. Because of the successful manipulation check with the remainder of the sample, we assumed that these 2 participants had also received the appropriate affective information.

## Results

### Participants' Food Preferences

As anticipated, the majority of participants preferred the crackers during the baseline (93%) and after the experimenter's affective display (92%). Participants' food preferences typically did not change over this period of time, with the exception of 6 participants (4%). Of these, 3 had enjoyed both foods during the baseline but then appeared to prefer the broccoli after the experimenter indicated that she liked this food. The remaining

3 participants, all 14-month-olds, initially preferred the crackers but later appeared to dislike both foods.

As noted earlier, the experimental groups were designed with the underlying assumption that participants would prefer the crackers. Rather than exclude those participants who did not meet this criterion, we used the preference data to reassign participants across the two experimental conditions. For example, if a participant's final preference was broccoli and they had observed the experimenter expressing pleasure toward broccoli, they could be reassigned to the matched preference group. In total, only five 14- and four 18-month-olds required reassignment. The results of analyses with these new groups did not differ, in any respect, from those of the original groups formed by random assignment. To avoid confusion and repetition, we present only data based on the original preference groups.

### Control Tasks and Experimental Task Compliance

Among the 14-month-olds, only 4 participants (5%) were reported by their parents as not yet understanding verbal requests to give, and only 1 of these also did not understand request gestures. All of the 18-month-olds were reported to understand these communications. The proportion of 14-month-olds who gave the experimenter a toy on both trials in the initial game of give and take was significantly lower than that of the older age group, 44% versus 72%,  $\chi^2(1, N = 159) = 11.64, p < .001$ . In addition, about one quarter of these younger participants failed to offer toys on either trial, whereas the majority of the 18-month-olds (91%) offered a toy at least once during the game. Performance on the warm-up task was not related to experimental task compliance, nor to correct performance, for either age group.

Overall, 68% ( $n = 55$ ) of the 14-month-olds failed to respond to the experimenter's initial or subsequent request(s) for food. Furthermore, participants in the mismatched group were less likely to comply with the request than those in the matched condition, 81% versus 54% noncompliance,  $\chi^2(1, N = 81) = 6.81, p < .01$ . The level of noncompliance (30%,  $n = 23$ ) was significantly lower amongst the 18-month-olds,  $\chi^2(1, N = 159) = 23.46, p < .001$ , and there was no significant difference as a function of preference group at this age.

### Order Effects

The order in which participants received the food-request procedure in the testing session (i.e., first, fourth, or sixth) was not related to compliance. Likewise, task order did not influence which food was offered to the experimenter. The 18-month-olds were somewhat more likely to comply with the experimenter's request when positive affect was displayed first in the expression sequence,  $\chi^2(1, N = 78) = 3.55, p = .06$ . There was no significant difference, however, in participants' ability to pass the task as a function of which emotion they received first. Food presentation side (i.e., which food was on the left vs. right) was unrelated to compliance and task performance.

### Food Offered as a Function of Age and Experimenter Preference

Of the 14-month-olds who responded to the experimenter's request, only 54% ( $n = 14$ ) offered the food associated with

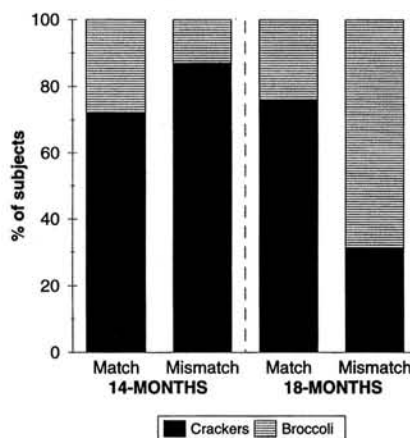


Figure 1. Type of food given as a function of age and preference group.

the experimenter's previous display of positive affect,  $\chi^2(1, N = 26) = .15 ns$ . These participants typically offered crackers in response to the request,  $\chi^2(1, N = 26) = 7.54, p < .01$ , and consequently more errors occurred in the mismatched group, Fisher's exact test ( $n = 26$ ),  $p = .009$  (see Figure 1). In comparison, 73% ( $n = 40$ ) of the complying 18-month-olds correctly inferred the referent of the experimenter's request,  $\chi^2(1, N = 55) = 11.36, p < .001$ . As illustrated in Figure 1, a differential pattern of responding emerged across the two preference groups,  $\chi^2(1, N = 55) = 11.24, p < .001$ . Thus, participants in the matched group typically offered a cracker to the experimenter, whereas those in the mismatched group were more likely to offer the broccoli. There was no significant difference in the proportion of correct responses for the matched (76%) and mismatched (69%) groups.

A number of participants offered a piece of food and then took it away from the experimenter. Participants who produced these teasing responses were considered to have complied with the experimenter's request. This behavior was significantly more frequent among the 14- than the 18-month-olds, 35% ( $n = 9$ ) versus 11% ( $n = 6$ ), Fisher's exact test ( $n = 81$ ),  $p = .01$ . Although all teasing involved the food preferred by the participant, these episodes only occurred among the 18-month-olds when the offered food was also desired by the experimenter (i.e., a correct response). This suggests that participants were cognizant of the experimenter's desires but loathe to share this particular food with her. Of the nine 14-month-olds who engaged in teasing, two did this with the food that was not desired by the experimenter (i.e., an incorrect, egocentric response).

As indicated in Figure 1, similar proportions of 14- and 18-month-olds produced correct responses in the matched preference group (72% vs. 76%, respectively). However, in the mismatched group there were significantly fewer errors among the 18-month-olds in comparison with the 14-month-olds, 31% versus 87% incorrect responses, Fisher's exact test ( $n = 34$ ),  $p = .01$ . Thus, the 14-month-olds were more likely than the older age group to offer crackers when the experimenter had indicated, using her facial and vocal expressions, a preference for broccoli.

In the 18-month-old group, there was a significant correlation between participants' age (in days) and whether they correctly

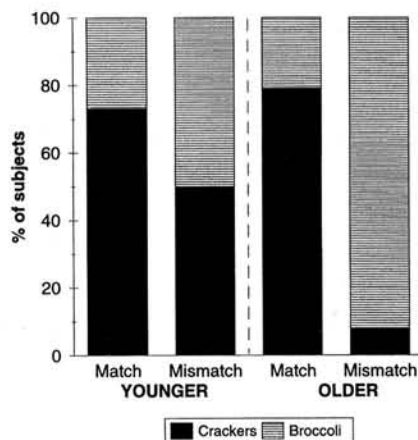


Figure 2. Type of food given as a function of median-split age group and preference group.

inferred the experimenter's desires,  $r_{pbi} = .27$ ,  $p = .05$ . To explore this effect in more detail, we divided these participants into two age groups on the basis of a median split (younger,  $<18.27$  months, and older,  $\geq 18.27$  months). Similar rates of noncompliance occurred across these groups,  $\chi^2(1, N = 78) = .55$  ns. In the matched condition, the proportion of correct responses did not differ as a function of age. However, when preferences were mismatched, incorrect responses occurred more frequently among the younger (50%) than the older (8%) 18-month-olds, one-tailed Fisher's exact test ( $n = 26$ ),  $p = .03$ . The younger 18-month-olds' performance did not exceed chance in this preference condition. Thus, unlike the 14-month-olds, these participants did not consistently offer crackers when the experimenter desired broccoli (i.e., an egocentric response). As demonstrated in Figure 2, the differential pattern of responses previously noted across preference groups was only evident in the older group of participants, corrected  $\chi^2(1, N = 26) = 10.16$ ,  $p < .01$ .

### Social and Linguistic Variables

Boys and girls did not differ in their propensity to comply with the request or in the proportion of correct responses. The number of siblings in a child's family has been positively correlated with preschoolers' theory of mind (Jenkins & Astington, 1993; Perner, Ruffman, & Leekam, 1994). Few participants had siblings in the present study; therefore analyses were limited to comparisons between participants with and without siblings rather than family size per se. Unlike the recent findings with older children, participants with siblings were no more adept at the experimental task than those without. It was possible that participants with one or more siblings would be loathe to share the food with the experimenter in comparison with participants without siblings; however, levels of noncompliance did not differ between these two groups.

We used median splits to examine whether any of the five temperament (CCTI) scales were related to compliance or correct responding. In the 18-month-old group, there was a nonsignificant trend for participants in the "sociable" half of the

sample to exhibit greater compliance with the experimenter's request than those scoring below the median on this scale,  $\chi^2(1, N = 78) = 3.02$ ,  $p < .10$ . Fourteen-month-olds who scored below the median on the Emotionality scale were somewhat less likely to comply than more emotional participants,  $\chi^2(1, N = 81) = 3.34$ ,  $p < .10$ . Correct responding on the task was not related to any of the CCTI scales in either age group.

On average, 18-month-olds had acquired significantly more internal-state words ( $M = 3.92$ ;  $SD = 4.11$ ) than had the 14-month-olds ( $M = 1.42$ ;  $SD = 2.52$ ),  $t(157) = 4.65$ ,  $p < .001$ . The total number of internal-state words acquired was not, however, related to correct performance on the task or to compliance. The 18-month-olds had acquired significantly more words than the younger age group in each of the following categories: positive emotions, negative emotions, physiological states, perceptual states, and affect expression (all  $ps < .05$ ). None of the eight categories of internal-state words were related to compliance or correct responding among the 18-month-olds. However, in the younger age group, participants who had acquired at least one positive emotion word were more likely to comply with the experimenter's request than those without such words in their internal-state vocabulary, Fisher's exact test ( $n = 81$ ),  $p = .03$ . Having a word for desire (e.g., *want*) was not related to task performance or compliance. In fact, most of the participants (86.5% of 14-month-olds and 79.5% of 18-month-olds) were not yet producing such words.

### Discussion

The data indicate that 18-month-olds did not respond egocentrically by giving the food that they themselves desired, nor did they respond selfishly by simply offering the food that they did not like. Instead, they offered whichever food had previously been the target of the experimenter's positive affect. These young children evidently used the earlier emotional cues to infer the object of the experimenter's desires. They could then use that information to later determine which food to give, even when no direct behavioral cues to the experimenter's desire were present. Moreover, children were able to make such inferences even when their own desires differed from those of the experimenter. In comparison, the 14-month-olds offered the crackers (i.e., the food they preferred), regardless of the experimenter's affective display. It is unclear, however, whether the emotional information was disregarded because these participants did not understand that it was related to desires or because it was inconsistent with their egocentric view of desires (i.e., that everyone will have the same desires as themselves).

An alternative interpretation of these data is that 18-month-olds simply remembered which food was associated with the experimenter's pleasure and offered this food in an attempt to elicit the positive expression once again. However, we then need to ask why the 14-month-olds and, more important, the younger 18-month-olds, did not do likewise when their preferences were mismatched. Furthermore, the infants appeared to be intrigued by the disgust expression; they did not react to it negatively but rather with laughter and increased attention. Therefore, one might expect participants to be more interested in eliciting the disgust response from the experimenter instead of the familiar expression of pleasure.

A second alternative is that 18-month-olds in the mismatched group understood that the experimenter was merely pretending to like the broccoli. These participants, like the younger age group, might still have assumed that desires are based on some objective reality (e.g., broccoli is inherently disgusting) but now appreciated that someone could pretend to like an undesirable food. Although such an interpretation cannot be completely discounted, it must be questioned for a number of reasons. First, the experimenter's behaviors were rather atypical of true pretense. If she was only pretending to like the broccoli, there would be no reason for her to actually eat this undesirable food; it would have been quite sufficient to merely pretend to taste it. When pretending that a nonfood item is food, even very young children do not try to eat it (Lillard, 1993). A second point to note is that although children do begin to produce some simple forms of pretense at around 18 months, it is unclear whether they would be familiar with and could understand the type of pretense involved in this task. The experimenter behaving as if the yucky food was yummy and vice versa is quite different from, and much more complex than, the pretend object substitutions (e.g., using a block as a car) that children are beginning to produce at this age. Finally, if the emotional displays were perceived to be pretense, children would have been faced with a dilemma when the request was made: Was the experimenter asking for the food associated with her pretend pleasure or did she want the truly desirable food? The request was not accompanied by any metacommunicative signs of pretense (e.g., exaggerated gestures or vocalizations), instead, a neutral expression (facial and vocal) was adopted during this phase of the task. The data suggest that 18-month-olds in the mismatched preference group had no more difficulty inferring the referent of the request than those in the matched group. It is most likely, then, that these participants understood the request to be with regard to the experimenter's real feelings and desires rather than any pretend states or behaviors.

A significant number of children failed to comply with the request at all. However, it is important to note that among the 18-month-olds, there were no differences in compliance as a function of preference group or age. Thus, it is likely that their noncompliance was due to motivational factors rather than to some failure to understand the request or an inability to infer its referent. This interpretation is consistent with the finding that the 18-month-olds rated as highly sociable by their parents were more likely to offer food to the experimenter. Their higher level of compliance may reflect a greater concern with pleasing other people or more interest in maintaining social interactions in comparison to less sociable children.

A significantly larger proportion of the 14-month-olds failed to comply, despite only one parent reporting that the child did not understand the gesture or verbal instruction for giving objects. Furthermore, a similar high level of noncompliance was displayed in the control task. Like the older children then, noncompliance among the 14-month-olds seems to be reflecting motivational issues and was perhaps amplified by a lack of familiarity with giving routines, hesitation to give objects to strangers, or both. The large number of participants in this age group who offered and then withdrew the cracker (i.e., teasing) is consistent with their being loathe to share food with an unfamiliar adult.

However, the finding that there was less compliance among the 14-month-olds when preferences were mismatched than when they were matched, also suggests that some portion of these noncompliers may have been perturbed by someone behaving as if they liked and wanted the broccoli. Such participants may have been in a transitional stage from an objective to a subjective view of desires. Thus, although they do notice that their own desires are not always consistent with those of other people, they have not as yet developed a new theory that would deal with such contradictions and were consequently unable to determine the referent of the experimenter's request. Rather than using the default response (i.e., "offer the food that you like"), they tended to avoid responding at all.

Given the low rate of compliance among the 14-month-olds, one might question whether the task had the same meaning for the two age groups. It is possible, for example, that 18-month-olds had some advantage because they were better able to understand the verbal request (i.e., "Can you give me some?") accompanying the experimenter's request gesture. A more successful strategy might have been to use whatever word or phrase each parent had used in the past to elicit giving in the child (e.g., *please, thank you*). It is also conceivable that when request gestures are not visibly directed toward an object and other cues are absent (e.g., an object label), as was the case in this experiment, many 14-month-olds simply do not understand that they are being asked to give an object to another person. One way of dealing with these issues is to determine whether compliance is substantially increased when mothers or a familiar adult are used as the experimenter. If compliance remains extremely low among the younger participants, then it is more likely that they are failing to understand something about the request gesture or some other fundamental aspect of the task rather than simply lacking the motivation to share food with other people.

Alternatively, those children who complied may have been able to interpret the gesture as a request precisely because they understood that it was related to an internal state of wanting. Although these compliant 14-month-olds were beginning to acquire a psychological conception of desire, it was, nonetheless, egocentric. Thus, although they understood that people request things because of some underlying desire, they mistakenly believe that everyone's desires are the same.

Overall, our findings support Wellman's (1993) proposal that by 18 months, toddlers have acquired a psychological conception of how people are connected to the world of objects. Participants construed the experimenter as having an internal experience of wanting (i.e., a desire), which in turn caused her to make a request. Furthermore, they understood that the experimenter's desire was object-specific, and consequently offered only one of the two foods that were available. Participants could not pass the task by merely noting whether the experimenter's request gesture or gaze was visibly directed toward crackers or broccoli. Instead, the object of the experimenter's desires had to be inferred from earlier knowledge of her emotional reactions to each food. In this sense, the child's conception of desire seemed to be genuinely theoretical—children took information from one context and used it to make predictions in a different context.

Our findings also suggest a rather early understanding of the diversity and subjectivity of desires. As early as 12 months, children appear to recognize that people's behaviors can be

directed toward different objects. For example, infants show or point to objects presumably because they realize that the other person has a different attentional experience. Therefore, 14- and 18-month-olds might be aware that people's requests and desires can likewise be directed toward different things, although this had not been demonstrated before the current study. However, the experimental task involved more than just understanding that different people have different desires. In the case of the mismatched group, the experimenter clearly disliked and did not desire the food preferred by the participant (i.e., the crackers). Thus, participants needed to appreciate that two people can have a different attitude or disposition toward exactly the same object. The older 18-month-olds appeared to have this knowledge. In addition, these children appeared to understand the relationship between certain emotions and desires, such that a desired food is associated with happiness and an undesirable food is linked to disgust. Previous studies (e.g., Wellman & Woolley, 1990) suggest that 2½-year-olds can infer another person's emotions from knowledge of their desires. This study required the opposite kind of reasoning, such that children had to infer desires from emotions.

Until now, we have only had evidence of these types of knowledge of desires in children as young as 30 months old. This study highlights the need for researchers to devise experimental paradigms that do not involve verbal responses from the child or rely heavily on verbal instructions from the experimenter. Under such circumstances, we can then be more confident that the conceptual abilities of the young language learner are not being underestimated. Indeed, whereas the majority of these 18-month-olds had yet to acquire a word for desire, they were clearly beginning to understand something about this internal state. In addition, performance on this task may have been enhanced because the negative emotion we used was contextually appropriate and intimately connected to preferences in general. Whether similar results would be obtained if just any negative affect (e.g., sadness) had been displayed is unclear. It likewise remains to be investigated whether this early desire reasoning extends beyond the food context to other types of objects and situations. From a functional and evolutionary point of view, understanding food preferences and interpreting disgust expressions are likely to be particularly fundamental "folk psychological" abilities (see Rozin & Fallon, 1987). We do not yet know, however, whether children are reasoning about tastes in particular, or about desires more generally. They may develop a "folk gastronomy" before a "folk psychology."

It is also important to point out that our study suggests that children younger than 18 months may not have the types of knowledge described above. Younger 18-month-olds performed poorly on the task in comparison with the older half of the sample, though there were no differences in performance on the control task or in their experimental task compliance. Although one must be cautious in the interpretation of the data from the 14-month-olds, due to the low rate of compliance, the results suggest that children of this age may not conceptualize desires as internal subjective states at all. Rather, "desirability" may be some inherent quality or characteristic of objects, and it is this that elicits people's desire behaviors (e.g., requests). From the 14-month-olds' perspective, crackers are a desirable food and broccoli is not; therefore the referent of the ambiguous

request would most likely be the crackers. Alternatively, some 14-month-olds may, in fact, be beginning to understand that desires are internal states but have an egocentric conception of desire. That is, these young children may assume that the desires of other people are the same as their own. Further research is needed to discriminate between these two possibilities. In either case, these age-related findings suggest that 18 months is a transition point in the development of children's desire reasoning.

Although impressive, the toddler's conception of desire is obviously less developed than that of the preschooler. For example, it is not until around 3 or 4 years that children begin to understand how beliefs mediate between desires and actions. Indeed, it is only at this point that children can understand how factors like satiation or differences in character can affect desires (Astington & Gopnik, 1991; Gopnik & Slaughter, 1991). Such complexity appears to depend on the child developing a representational understanding of the mind. The food-request task did not require participants to view themselves or the experimenter as representing a desired food in their heads. It was sufficient for them to conceptualize each person as having an internal state of wanting (i.e., a desire) for an external object (i.e., a particular food). This characterization of children's early desire reasoning is consistent with claims by others (e.g., Ferguson & Gopnik, 1988; Perner, 1991; Wellman, 1990) that during the third year, children have a nonrepresentational understanding of the mind.

The mechanisms by which the child progresses to a psychological conception of desire have yet to be documented. We can assume, however, that the infant has a wealth of evidence from which to learn about desires and that there will be a strong motivation to acquire such knowledge. A large proportion of children's social interactions are centered on communicating their own wants and needs to other people because they are so dependent on others for the fulfillment of these desires. Communicative failures, in which the toddlers' desires are not understood by others, may therefore play a vital role in their understanding that the desire itself is not visible and is separable from their actions. In addition, as the child becomes increasingly autonomous, his or her desires will more frequently conflict with, and be thwarted by, those of other people. These emotionally charged interactions may then serve to highlight the subjective nature of desires. It is interesting that at around 18 months children begin to experiment with these desire conflicts, often intentionally setting up conflicts of desires and observing the results (the typical behavior of "the terrible 2s"). This may also suggest that these children are constructing a theoretical understanding of desire as a way of explaining apparently confusing evidence about human behavior (e.g., why some people eat broccoli and others do not; Gopnik & Meltzoff, in press).

To summarize, we have argued that by 18 months, children understand that they and other people have internal psychological states. In particular, they begin to understand that desires are internal states directed toward objects and that desires cause certain actions, such as requests. They also understand the link between desires and emotions—they appear to infer that desired objects cause happiness, whereas undesired objects may cause disgust. Finally, toddlers are even beginning to understand the subjectivity of desires: that different people can have different



attitudes toward the same object. Thus, toddlers conceive of desires not only as internal or psychological states, but also as subjective states. We have by no means discovered all there is to know about the young child's early understanding of desire. It remains to be determined whether their knowledge of desire extends beyond what has been presented here and whether they have a similar understanding of other internal states. However, we can conclude that by 18 months, the toddler has a genuine though still relatively simple understanding of desire.

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