

12- and 18-Month-Olds Point to Provide Information for Others

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Classically, infants are thought to point for 2 main reasons: (a) They point imperatively when they want an adult to do something for them (e.g., give them something; “Juice!”), and (b) they point declaratively when they want an adult to share attention with them to some interesting event or object (“Look!”). Here we demonstrate the existence of another motive for infants’ early pointing gestures: to inform another person of the location of an object that person is searching for. This informative motive for pointing suggests that from very early in ontogeny humans conceive of others as intentional agents with informational states and they have the motivation to provide such information communicatively.

Infants begin to point communicatively at approximately 1 year. Classically, they are thought to point for two main reasons (Bates, Camaioni, & Volterra, 1975): (a) Infants point imperatively when they want an adult to do something for them (e.g., give them something; “Juice!”), and (b) they point declaratively when they want an adult to share attention with them to some interesting event or object (“Look!”).

It is unclear what infants understand of the other person when they point imperatively. One possibility is that infants’ early imperative pointing only requires them to conceive of the other person as an animate “agent of action”: they point simply to influence the other’s behavior (Camaioni, 1993; Gomez, Sarria, & Tamarit, 1993). But adults point imperatively with a full understanding of others’ intentional and mental agency: they point not to influence the other’s behavior directly, but instead to influence the other’s goals and attention. And so, without other evi-

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dence, it is at least possible that infants can request in this way as well; we simply do not know.

Declarative pointing, in contrast, has usually been taken to reflect an understanding of others' mental agency and in addition a desire on the infant's part to share psychological states with others: infants point not to influence the other's behavior, but to direct their attention and share an experience psychologically with them (e.g., Baron-Cohen, 1991; Bretherton, McNew, & Beeghly-Smith, 1981; Camaioni, 1993; Tomasello, 1995). But even here, it has been claimed that infants' early declarative pointing is not intentionally communicative until somewhat later in development (Desrochers, Morissette, & Ricard, 1995) and that it serves initially not to direct or share attention but instead to obtain attention to the self (Moore & D'Entremont, 2001). However, a recent study showed that infants at 12 months do point declaratively, to direct others' attention and with the motive of sharing attention and interest (Liszkowski, Carpenter, Henning, Striano, & Tomasello, 2004). In addition, declarative pointing has recently been shown to be developmentally associated with understanding of others' intentions (Camaioni, Perucchini, Bellagamba, & Colonnese, 2004).

Thus, infants' early declarative pointing already reveals their social-cognitive ability to direct others' attention and is motivated by *sharing attention and interest with another*, which is more purely social than the imperative motive of *obtaining something for self*. But adults also point for another reason that is extremely interesting from a social-cognitive point of view. For example, when we see another person wanting to open a lock but searching her pockets, and we see the keys for the lock, we will usually point to them. The motive here departs from the classical dichotomy of imperative and declarative pointing in infancy because it is neither to obtain an object for self nor to share interest in it. Instead, the motive is to *provide information for the other*.

Informative pointing, as we call this behavior, is interesting from both a cognitive and a motivational point of view. First, cognitively, the pointer directs the recipient's attention because of the recipient's relation to the referent, not because of an exciting new stimulus. The pointer must understand that the addressee wants to open the lock with the keys and needs to know about their location. This requires an understanding of others as persons with intentional and informational states. Recent findings suggest that this understanding is within the capability of 12-month-olds. For example, 9-month-old and older infants show an understanding of others' goals by differentiating between situations in which an adult is unwilling versus unable to give them a toy and behaving appropriately in these different situations (Behne, Carpenter, Call, & Tomasello, 2005). And 12-month-old and older infants understand something about others' knowledge states, in the specific sense of knowing which objects others have and have not experienced before and using this understanding to infer which objects others are interested in (Tomasello & Haberl, 2003; see also Moses, Baldwin, Rosicky, & Tidball, 2001,

who show that 12-month-olds appreciate that their attentional focus may differ from that of others).

Second, motivationally, the pointer helps the addressee by communicating to him the needed information. Importantly, the pointer is less concerned with her own benefits (like obtaining an object or attention to the self) than with the other person's needs. There are few direct studies of helping and other prosocial activities in infants this age. A recent looking-time study suggested that 12-month-olds are capable of differentiating helping from hindering actions and prefer a helping agent (Kuhlmeier, Wynn, & Bloom, 2003). Studies on cooperative and prosocial behavior have mostly focused on older children and their moral development (Eisenberg, 1982), or looked at infants' participation in adult activities such as cleaning up or opening things (Rheingold, 1982). Longitudinally, some joint attention behaviors in the second year of life have been shown to correlate with later social behavioral outcome at 3 years in children at risk (Sheinkopf, Mundy, Claussen, & Willoughby, 2004).

In this study, we asked whether infants point informatively. We placed infants in various situations in which an adult misplaced an object, or lost track of it in some way, and then started searching. The question was whether infants would understand the adult's intention to find the object and provide information by pointing. We documented whether infants would point in this type of situation, and also looked at other behavioral accompaniments, to determine whether infants were indeed informing the adult and not requesting or pointing to share attention. We tested both 12- and 18-month-olds to see whether 12-month-olds, who have just begun pointing, already perform at a level similar to that of 18-month-olds.

EXPERIMENT 1

The first experiment aimed at identifying whether infants would point in a context that was not set up to elicit imperative or declarative pointing. Specifically, we investigated whether infants would point at objects that did not bear interesting stimulus-inherent features but were unintentionally dropped by an adult, and whether infants would point in such situations without requesting the objects for themselves.

Method

Participants. Infants were recruited from a database of infants whose parents had been contacted through birth registries from the city hall and agreed to participate in studies of infant development. The database was made up of infants who lived in a medium-sized city in Germany. Parents were recruited by telephone and asked if their infant already pointed. Fifty-five infants who were reported by par-

ents to point were tested. Two infants were excluded because of fussiness. The final sample included 53 infants: 25 twelve-month-olds (15 girls, 10 boys; M age = 12;10; range = 11;15–13;0) and 28 eighteen-month-olds (17 girls, 11 boys; M age = 18;20; range = 17;0–19;0).

Procedure. After a warm-up period, the infant was seated on a research assistant's lap at a table opposite the experimenter. Mothers were instructed not to interfere or initiate interactions or communication with the infant during testing. The experimenter called the infant's attention to herself and began a trial by holding up an object. There were six trials, each with a different object. These were a pen, eyeglasses, hairclip, toy necklace, toy hammer, and doll. The first three objects were used on *passive* trials during which the infant watched the experimenter using adult objects for herself (handling and manipulating them by herself). The latter three objects were used on *active* trials during which the experimenter and the infant played with toys. We introduced this manipulation because we did not know whether infants would point at all in this new context, and whether they would point only in more motivating trials, or only to request an object. In each trial, after using or playing with the object, the experimenter, without noticing, accidentally dropped it on the floor. After this, first she displayed surprise and looked around saying "Hmm ... ?" Then, if the infant did not point, after approximately 5 sec she asked, "Where is it? Where is the [object name] now?" The order of trial types was counterbalanced for the first trial and alternated on succeeding trials. Each object occurred in each of the six possible positions (latin square). To keep the situation natural, and to have more time in between accidents, between-trials infants were engaged in play or experimental trials of an imitation study not reported here (Carpenter, Tomasello, & Striano, 2005).

Coding. Only points to the test objects were included in analyses. Infants' first point during the experimenter's search was coded when the infant extended the arm (either fully or slightly bent) and index finger or open hand, palm down, in the direction of the object. We included open-hand points because Franco and Butterworth (1996) showed that they are equivalent to index-finger points in that they also serve the function of indicating.

The coder judged each of the points' motives. If infants appeared to want the object (e.g., leaning forward, displaying negative affect, whining, reaching), it was coded as "request." If points were not accompanied by these behaviors and infants simply indicated the location, it was coded as "informing."

Coding of digital video tapes was done in different time passes allowing for a frame-by-frame analysis (25 frames per second) by the research assistant, who was unaware of the hypotheses of the study, with a specialized computer program (In-

teract). Interobserver reliability was assessed on 20% of infants by the other experimenter (a paid student assistant), also unaware of the hypotheses of the study. Excellent agreement was achieved: Cohen's Kappa for points was .81 and for motives was .75.

Results

A total of 88% of 12-month-olds and 93% of 18-month-olds pointed at least once during the session (84% and 88% on active and 72% and 70% on passive trials, respectively). A 2×2 (Active, Passive \times Age) analysis of variance (ANOVA) revealed that infants pointed significantly more on active than passive trials, $F(1, 51) = 8.1, p = .006$, with no age effect or interaction. Adding gender as a between-subjects factor did not reveal significant differences.

Table 1 displays the mean proportions of passive and active trials with a point by motive of gesture and age group. Overall, infants pointed on 58% of all trials. Of these points, the vast majority (95%) were coded as informing. In the passive trials, all points were coded as informing.

Discussion

This experiment shows that infants directed another person's attention to the location of an object she was looking for when it had been dropped accidentally. It is the first study to suggest that infants can point communicatively for reasons other than sharing or requesting, that is, simply to inform another person of the location of an object.

We foresaw the possibility that in the active trials infants might point more or request the objects, and this happened, but only rarely. In passive trials, however, infants still pointed, and none of their points were coded as requestive. In this situation, infants thus pointed not to obtain an object for themselves but instead to point out the object for the adult. However, whereas we addressed the possibility of re-

TABLE 1
Experiment 1: Mean Proportion and Standard Deviation of Trials With
a Point for Passive and Active Trials by Motive of Gesture and Age

Age	Motive	Passive Trials		Active Trials	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
12 months	Informing	.50	.08	.57	.07
	Requesting	.00	—	.07	.04
18 months	Informing	.53	.07	.61	.07
	Requesting	.00	—	.05	.02

questing in this experiment, we did not address other possible motives for infants' points. For example, the displacement of the object involved movement and sound, and thus might have constituted an attention-capturing event to which infants wanted to share attention and interest. Although we find this unlikely because infants pointed only later when the object was lying still on the floor, we cannot completely exclude this possibility.

Alternatively, another possibility is that infants might have responded to the task as if it were a naming game. That is, the experimenter verbally asked for the object shortly after she had begun searching for it, so infants did not have very much time to react before the experimenter's question. Consequently, we do not know whether infants pointed to the object simply because they heard the object label. Infants often point to objects in social routines, showing their understanding of the association between object label and object. Thus, we conducted a second experiment in which we modified the general procedure in several ways to minimize requesting, sharing, and other noninformative motives.

EXPERIMENT 2

The general context was changed in several important ways. To emphasize the adult's need for help and to further foster a motive to inform, we had her enact sequences of actions for which she always needed an object, for example she was punching holes or watering plants. This needed object was then displaced.

To minimize a requestive motive the adult did not engage infants in mutual play with the objects, unlike on the active trials in Experiment 1. The actions were adult-centered and in themselves mostly uninteresting with regard to their effects. Again we used different object types but most of them were not particularly interesting and infants were never allowed to play with any of them during the trials so that they could not have expected to obtain the objects for themselves.

To investigate whether infants had a motive to share attention rather than to inform, the displacement of the object was changed in two ways. First, a second object was introduced into each displacement to see whether infants generally pointed at objects that were displaced, or, instead, if they pointed only at the object that was relevant to the adult. Second, other types of displacement were added (including no displacement at all) to see whether infants would still point when sounds and sudden movements were absent.

Finally, to minimize the likelihood of infants seeing the situation as a naming game, we controlled the experimenter's search behavior more systematically, giving infants more time to respond while the experimenter was searching nonverbally, to see whether pointing occurred before the experimenter asked the infant or named the object.

Method

Participants. Infants were recruited as in Experiment 1. Forty two infants were tested. None of them had participated in Experiment 1. Ten infants were excluded because of fussiness. This relatively high dropout rate was probably due to the fact that infants were not allowed to play with any of the objects used during demonstrations in this study. The final sample included 32 infants: 16 twelve-month-olds (9 girls, 7 boys; M age = 12;15, range = 12;0–13;13) and 16 eighteen-month-olds (7 girls, 9 boys; M age = 18;15, range = 18;0–19;15).

Materials and design. A child-sized table was covered with a sheet down to the floor under which materials could be hidden. A research assistant, Experimenter 2, hid behind a large screen made of white cloth sheets at the back of the testing room. In front of the screen at a distance of 2.5 m and approximately 15 degrees left and right from the infant were two 90-cm-high boxes covered with sheets on which the objects were placed during trials. Infants and Experimenter 1 were recorded by three cameras from frontal and side views that Experimenter 2 could watch on a monitor.

Sixteen objects were used and composed into fixed object pairs. Four pairs had uninteresting adult objects: (a) comb and clothes brush, (b) stencil and pen, (c) hole-puncher and cardboard box, and (d) water bottle and binder clips. Another four had more interesting toys: (a) “man-on-ladder” and clip, (b) two toy cars, (c) wind-up mouse and wind-up train, and (d) toy bricks and lid. On each trial, there was additional material involved (the substrates, e.g., paper, binder, dry plant, toy house, mouse house).

For each adult object pair, the target on one trial became the distractor four trials later, thus constituting eight trials with adult object pairs. Two of the toy object pairs were counterbalanced for target and distractor across infants and another two had fixed target and distractor, thus constituting four trials with toy object pairs. The first four trials (first block) always involved adult objects because these were the main focus of this experiment. In the following eight trials (second block), we alternated between adult and toy objects, to keep infants interested in what the experimenter was doing. Although we did not maintain the trial manipulation (active/passive) from Experiment 1, we kept the object manipulation to see whether infants would point in this new context only to objects that were interesting to them. The procedure for both object types was the same. Trials were counterbalanced for order of object pairs, target–distractor, and side, with the target alternating between sides, never being more than twice at the same location.

Procedure. The session began with a brief play period in which all 16 objects were successively given to infants so they could become familiar with them. Infants then sat on their mother’s lap facing Experimenter 1 across the ta-

ble. Mothers were informed that we were interested in infants' spontaneous behavior and they were instructed not to initiate interactions or communication with the infant during testing. In each of 12 trials, a target–distractor pair and the substrate were placed on the table. Experimenter 1 presented infants with the substrate (e.g., a blank piece of paper) and said something like, "I cannot put it in the binder, I have to punch holes in it." Of the target and distractor, which each sat on one side of the table, she picked up the target (e.g., hole-puncher), drew infants' attention to it, and named it. She then used it, for example to punch holes in the paper and put it in the binder. The action was repeated. Then, the target and distractor were displaced.

The displacement of objects happened in four different ways, corresponding to each object pair mentioned earlier: (a) accidental: Experimenter 1 pushed both objects off the table accidentally; (b) self: Experimenter 1 distractedly displaced both objects herself before, for example, getting another piece of paper, and then forgot the location; (c) other: Experimenter 2 came from behind the screen while Experimenter 1 had gone (e.g., to answer the telephone) and displaced both objects; and (d) no: the original objects were used up, but more were present throughout the trial on the table in infants' view but invisible behind a barrier for Experimenter 1.

After the displacement, Experimenter 1 began again with the action demonstration but did not find the target object and thus began looking for it. Her search was divided into three intervals. First, Experimenter 1 looked at the location where the object previously had been, raised her arms, palms up, frowned, looked around and said: "Hmm? ... hey! ... strange" Second, after about 15 sec, Experimenter 1 further said: "Where is it? Where has it gone?" Third, after about another 10 sec, Experimenter 1 addressed the infant directly and said: "[Name], do you know where the [target] is?" Either shortly after this question, or if the infant directed the experimenter's attention to the target before, Experimenter 1 turned to the actual location of the target saying "Ah! There it is!," retrieved it, and then continued with the action (for approximately 8 sec). If the infant drew Experimenter 1's attention to the distractor or to something else, Experimenter 1 looked there briefly, noticing it with neutral affect, and then continued her search.

Coding. For each trial, infants' first point to one of the test objects was coded (using the definition of pointing used in Experiment 1), specifying the direction to either target or distractor. Interobserver reliability was assessed for 20% of the infants, again with coders who were unaware of the hypotheses of the study. Cohen's Kappas for points to target and to distractor were excellent: .98 and .92, respectively. In addition, we coded for behaviors typically associated with imperative points: reaches (all fingers extended and widespread), frustrated or negative facial expressions (eyebrows close, tensed expression, lips turned downwards, no smiling or neutral, relaxed expression), change of body position toward the direction of

the referent, and whining (negative vocalization). Finally, we coded gesturing toward the object pointed at after Experimenter 1's retrieval of the target (e.g., attempts to grab the object, reaching, repeated pointing). Reliability for behaviors typically associated with imperative points and for gesturing toward the object after retrieval also yielded excellent Cohen's Kappas, which for each measure were above .80.

Results

All infants pointed in this new context at least once across trials either to target or distractor, totaling 144 points. The proportion of trials with a point did not differ significantly between 12- and 18-month-olds (independent t test; $M = .34$ and $.45$, respectively) with no effect of gender (t test, ns). There was no bias in infants' preference for pointing at any specific object used as stimuli in each pair (Wilcoxon-exact and Mann-Whitney = ns).

To see whether infants directed the experimenter's attention to inform her about the object, we investigated whether infants took into account for which object the experimenter was looking, or whether infants generally pointed at objects that were displaced, as if to comment on and share this. A 2×2 (Target, Distractor \times Age) ANOVA revealed that across trials, infants of both ages pointed significantly more frequently to the target than to the distractor, $F(1, 30) = 43.74$, $p < .001$. There was a marginally significant tendency for this difference to be greater for 18-month-olds than for 12-month-olds, interaction of age and object type, $F(1, 30) = 3.16$, $p = .09$, but paired comparisons still revealed significant differences between choosing the target and the distractor for both 12-month-olds, $t(15) = 3.30$, $p = .005$, and 18-month-olds, $t(15) = 6.17$, $p = .001$; see Figure 1. Thus, infants did not generally point at objects that were displaced but instead pointed specifically at the object for which the experimenter was looking. In addition, we investigated whether infants pointed in this situation to share interest in attention-capturing sounds or movements of some displacements. This was not the case. Infants still pointed on trials when sounds and movements were absent and even when there was no displacement at all. Although the design did not allow for an analysis of differences in frequency of pointing between displacements (because objects were assigned to fixed displacement types), it is interesting to note that pointing was more frequent in the *accidental* and *no* than *other* or *self* displacements ($M = .57$, $.36$, $.30$, $.29$, respectively)

To investigate whether infants only pointed to request the objects, rather than to direct attention and inform the experimenter, we conducted two types of analyses. We investigated whether infants' pointing occurred mainly on trials with toys or was mediated by toy trials, and whether accompanying behaviors revealed any signs of a requestive motive.

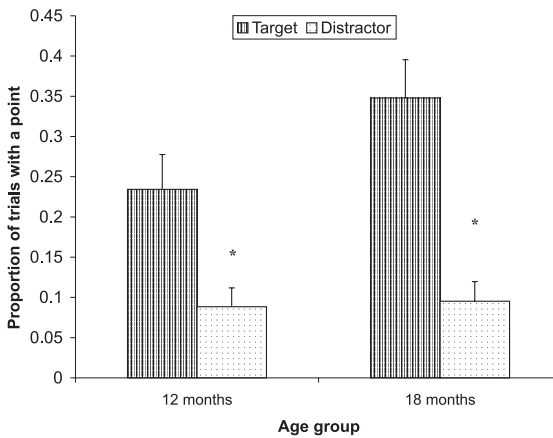


FIGURE 1 Experiment 2: Mean proportion of trials with a point to target and distractor for each age group. *Statistically significant differences, $p < .05$.

An analysis of the first block of trials that involved only adult objects and no toys showed that 75% of the 12- and 69% of the 18-month-olds already pointed in these first four trials with adult objects. A 2×2 (Target, Distractor \times Age) ANOVA again revealed that infants pointed significantly more often to the target than distractor, $F(1, 30) = 10.03, p = .004$, with no age effect or interaction (see Table 2). Although in the second block infants pointed quantitatively more on trials with toys than with adult objects, infants' pointing in the first block was not confined to or mediated by such trials with toys. Instead, infants also pointed at adult objects and did so already on the first four trials, when no interesting toys had yet been introduced.

Qualitatively, infants' pointing lacked typical accompaniments of object requests, for example, whining and reaching occurred very rarely (for whining 0%, and for reaching 12% of all trials with points). When reaching occurred it was more often on trials with toys than adult objects, paired t test, one-tailed, $t(20) = 2.36, p = .029$. The vast majority of points were index-finger points that occurred with no change of body posture and with a neutral facial expression, the most common intelligible vocalization being "There!" In addition, if infants were requesting the object, we would expect continued pointing after the adult retrieved it. But repeated pointing or reaching after the adult had retrieved the object and returned to the table with it was rare, a total of 14% of all trials with points. When this occurred it was again more often on trials with toys than adult objects, paired t test, one-tailed: $t(20) = 1.86, p = .038$. When we excluded from the statistical analyses the points with requestive accompaniments and those that were followed by continued pointing or reaching after the adult had retrieved the target, none of the find-

TABLE 2
 Experiment 2: Mean Proportion and Standard Deviation of Trials With a
 Point to Target or Distractor by Object Type, Block, and Age

Age	Object Role	First Block		Second Block				Total			
		M	SD	Adult Object		Toy		Points		Points Without ^a	
				M	SD	M	SD	M	SD	M	SD
12 months	Target	.22	.07	.20	.05	.30	.07	.24	.06	.18	.03
	Distracter	.08	.03	.05	.03	.14	.05	.09	.04	.07	.02
18 months	Target	.22	.06	.31	.07	.52	.07	.35	.07	.25	.05
	Distracter	.05	.03	.13	.05	.11	.04	.10	.04	.08	.03

^aPoints without “fingers-wide-spread” form and gestures after object retrieval.

ings changed. Fully 88% of the children pointed at least once across all trials without any signs of a requestive motive and without continued pointing after the adult retrieved the target. The rightmost column of Table 2 displays means and standard deviations of this conservative analysis.

Finally, infants did not just point in response to the experimenter’s question or object label in the second and third search interval. A 3×2 (Search Interval \times Age) ANOVA revealed that infants pointed significantly more often before than after the experimenter’s verbal questions, in the first search interval, $F(2, 60) = 41.83$, $p < .001$, with 80% of all points occurring before the adult verbally asked where an object was (for each interval at 12 and 18 months: $M = .26, .04, .02$; $M = .35, .03, .07$, respectively). The explicit verbal cue in the third search interval did not trigger a substantial amount of pointing but made it significantly more likely to occur in the older than the younger, less verbal age group, paired t test, one-tailed, $t(30) = 2.44$; $p = .021$.

Discussion

In this study, we replicated the results of Experiment 1, again showing that infants at both ages pointed, even when in a more adult-centered situation without interesting toys, displacements, or action effects, and before being verbally asked about the location of an object. The findings suggest that infants directed an adult’s attention to inform her of the location of an object that she was looking for.

Overall, infants pointed in this experiment somewhat less frequently than in Experiment 1. This is likely due to various procedural changes; for example, the number of trials, the type of objects, the lack of infants’ active engagement in play, the experimenter’s search behavior, and, especially, the type of displace-

ments. Note that the proportion of trials in which infants pointed was very similar in the accidental displacement trials in this experiment and in Experiment 1, in which all the displacements were accidental. Further, as in Experiment 1, there were no significant age differences, although 18-month-olds performed slightly better than 12-month-olds, pointing more often to the target. However, 12-month-olds already pointed at the target significantly more often than at the distractor.

Turning to the function of pointing, the situation was constructed to minimize any motives that infants might have other than informing, and several arguments make it unlikely that infants were pointing declaratively to share interest in the object or displacement, imperatively to request the object or action for themselves, or to respond to the experimenters' verbal questions as in social routines of naming games.

First, infants pointed more frequently to one of two similarly displaced objects, which cannot be explained by their intention to comment on and share the event of the displacement. In addition, infants pointed even when the displacement was not especially interesting—in fact even when there was no displacement at all.

Second, infants showed none of the typical behavioral accompaniments of request gestures, either during the point or after the adult retrieved the object, and when questionable trials were omitted from statistical analyses, findings did not change. In addition, infants pointed already in the first four trials, when no toy objects had been introduced. It is also unlikely that infants requested the demonstration of the action because the actions in themselves did not involve especially interesting effects. And after the end of each trial, infants did not protest or get upset as one would expect if they wanted to obtain the object or see the experimenter's action again (recall that this was an action in which they were never involved).

Third, infants pointed mostly before the experimenter began verbally asking questions. Neither the "where" question nor the object label triggered their pointing substantially, and so it is unlikely that infants responded as they might do in social routines of naming games.

Given that nothing in the context, the procedure, or infants' behavior indicates that infants were pointing for other motives, we conclude that infants were pointing as adults would in this situation—to inform the experimenter about the location of an object she was looking for.

GENERAL DISCUSSION

This study shows that infants not only point communicatively to request something or when they see something interesting (Bates et al., 1975), but that they also

point to direct the attention of another person who is looking for an object, to inform. Such informative pointing involves two important characteristics: (a) the cognitive ability to detect what information is relevant for an adult and (b) the motivation to provide information for the other communicatively.

Cognitively, first, to understand that the other needs information the pointer must understand the addressee as an intentional agent. The pointer helps to complete the addressee's unfulfilled intention—for example, the intention to find the hole-puncher to continue binding papers. (Note that this also applies to situations in which the addressee is not actually searching or about to act—for example, when unknowingly dropping a key—because pointing in this situation also requires recognizing the other's intention to keep the key and later open a lock.) This new paradigm of helping others to complete their actions is thus useful in investigating infants' understanding of others' goals and intentions. In line with recent research, our results suggest this ability to be present by infants' first birthday (e.g., Behne et al., in 2005; Kuhlmeier et al., 2003).

Second, like other types of pointing, informative pointing involves directing others' attention. However, in informative pointing, the pointer directs an addressee's attention because of the addressee's relation to the referent, not because of an external, exciting event. The pointer understands that the other person is searching for something and therefore provides information by pointing. One interpretation of our results, like that of Tomasello and Haberl (2003), is that infants understood what the other person did not know. Alternatively, infants might have understood what the other was not attending to, an ability also present at 12 months (Deák, Flom, & Pick, 2000; Liszkowski et al., 2004; Moses et al., 2001; Stenberg, 2003). On both accounts, providing information involves an understanding of others as agents with informational states; that is, persons who can retain and attend to new information. Our findings thus extend previous work on older children's informational exchange in declarative (Franco & Gagliano, 2001) and imperative (O'Neill, 1996) contexts, and suggest that infants' informative pointing already reflects sensitivity to others as agents with informational states.

Motivationally, this study shows that children this young are motivated to use their communicative abilities to provide information for others. The motive of informative pointing—providing information—is different from that of declarative pointing, which is motivated by sharing interest. Both motives are inherently social in nature because a communicative act as such is always, in part, for the recipient. In declarative pointing, the motive is to engage with the other person and receive a comment back about an event mutually attended to (Liszkowski et al., 2004). In contrast, in informative pointing the providing of information is not to engage mutually about *the referent* but instead mainly to benefit *the other person*. The pointing is more about the recipient's relation to the referent than the sender's. Its motivation has prosocial characteristics that underlie helping behavior (Grusec, Davidov, & Lundell, 2002), an important feature of human shared cooperative ac-

tivities (Bratman, 1992). Little is currently known about helping and cooperative behaviors in infants this age. In this study, infants were given the opportunity to help others by providing information communicatively and it may be that humans are especially inclined to provide information (as opposed to physical assistance) freely without concern for personal benefit. Future research should address providing information as the initial ontogenetic emergence of the uniquely human motivation to cooperate with and help others, and the basis of the uniquely human ability to teach and instruct other persons. In this article, we showed that parts of these uniquely human forms of cooperation and instruction emerge initially in human ontogeny very early, before language, in the single quotidian behavior of informative pointing.

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