

## Displaced Communication in a Self-Styled Gesture System: Pointing at the Nonpresent

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The ability to refer to objects or events that are not in the here and now is widely recognized as an important feature of language, one that sets it apart from other forms of communication. The purpose of this article is to determine whether a deaf child who was not exposed to a usable model of a conventional language could use his self-styled communication system to refer to objects that were out of his perceptual field. We found that, beginning at the age of 3 years and 3 months, the deaf child consistently and reliably used gesture to refer to objects that were not present in the room. Although delayed with respect to the onset of displaced communication in hearing children, the deaf child's use of gesture to refer to nonpresent objects developed despite the fact that his hearing mother rarely used her spontaneous gestures for this purpose. Thus, the techniques necessary to communicate about the "there-and-then" appear to be so fundamental to human language that they can be reinvented by a child who does not have access to a culturally shared linguistic system.

The ability to refer to objects or events that are not in the here and now is widely recognized as an important feature of language, one that sets it apart from other forms of communication. Hockett (1960, 1977), in his description of the defining features of language, called this characteristic "displacement"—the fact that linguistic messages may refer to things out of the perceptual field of the communicators (see also Bloomfield, 1933). According to Hockett, gibbon calls are never displaced, but bee dances are always displaced. What is unique about

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language is that displacement is possible but not obligatory; that is, utterances can be displaced but need not be.

Even though most of a young child's talk is about what that child is seeing and doing (e.g., Bloom, 1973), at a relatively young age children are capable of using language to refer to topics not in the here and now. For example, Sachs (1983) found that at 17 months a child was able to use language to request objects that were remote or absent (see also Bruner, Roy, & Ratner, 1982; Greenfield & Smith, 1976), and could search for nonpresent objects named by an adult (see also Huttenlocher, 1974; Zukow, Reilly, & Greenfield, 1982). By the age of 2½ years, children are able to participate in conversations about events that are not currently taking place, particularly past events from their own experience (Miller & Sperry, 1988; see also Eisenberg, 1985; Fivush, Gray, & Fromhoff, 1987; Keenan & Schieffelin, 1976; and Nelson, 1989, who shows that a 2-year-old child can talk about nonpresent events even when engaged in monologic discourse alone in the crib).

The ability to refer to objects that are not clearly visible requires that the child be able to hold an object in mind even if that object is not within his or her perceptual field. However, communicating about a nonpresent object not only involves holding the object in one's own mind, but also bringing that object to the fore in the mind of another. It is possible that a child may require exposure to a conventional language, not in order to be able to develop placeholders in one's own mind for objects that are not in view, but in order to be able to focus the attention of another on objects that are not in view. A conventional language provides the child with words that, within the language community, are understood to stand for particular objects; these words can therefore be used by the child to call attention to objects even when those objects are not in view.

Exposure to a conventional language not only provides the child with words to refer to the "there-and-then" but also with a model for how to use those words to talk about the nonpresent. For example, Fivush (1991) has shown that the way in which mothers structure their early conversations with their children about the nonpresent (in particular, their conversations about the past) influences the children's developing abilities to recount past experiences. Indeed, when adults and children first begin talking about the past (when the child is about 18–20 months of age), it is the adult who provides the content and the structure of the narrative (Eisenberg, 1985), and, at age 3, displaced topics continue to be initiated primarily by the adult (Sachs, 1983). Even those narratives produced by a young child when alone in the crib tend to be better organized when the narratives are based on a previously heard parental account of an event than when they are not (Nelson, 1989). Fivush (1991) suggests that children may not only be learning *how* to talk about the past in early adult-structured conversations, but they may also be learning *why* one talks about the past; that is, parents may be implicitly teaching their children that talking about the past is an important way of interacting socially with others. Thus, exposure to a conventional language model may

provide children not only with the tools that allow them to refer to objects and events in the “there-and-then” but also with a reason and a technique for using those tools. The question we ask here is: Is exposure to such a model necessary to develop the ability to refer to absent objects and events?

This question is difficult to explore, simply because most children are surrounded by language-using adults who routinely provide them with models of displaced speech. There are, however, certain children who are unable to make use of the conventional language model that surrounds them: deaf children whose hearing losses prevent them from taking advantage of the spoken language model around them and whose hearing parents have chosen not to expose them to a conventional manual language, such as American Sign Language (ASL), or to a manual code of a spoken language, such as Signed English. In previous work, we have shown that deaf children of this sort, despite their lack of a usable conventional language model, develop gesture systems that have many of the properties of language, particularly when compared to the linguistic systems developed by comparably aged hearing children exposed to language models (Goldin-Meadow & Mylander, 1990a). We have studied the gesture systems of 10 deaf children of hearing parents from Philadelphia and Chicago, and found compelling structural similarities between their gestural systems and conventional languages at lexical (Feldman, Goldin-Meadow, & Gleitman, 1978), syntactic (Goldin-Meadow, 1982, 1987; Goldin-Meadow & Feldman, 1977; Goldin-Meadow & Mylander, 1984), and morphological (Goldin-Meadow & Mylander, 1990b) levels.

Although all of the deaf children in our studies developed structured and productive communication systems to describe the here and now, the children may not have been interested in (or capable of) adapting these systems to describe effectively the nonpresent to another. We therefore ask here whether the property of displaced communication is also a characteristic of the deaf children’s gesture system—that is, are the children able to use their self-styled communication systems to refer to objects that are not in the here and now?

We explored this issue in Study 1, and asked whether the one deaf child whose gesture system had been most completely described used gesture to refer to objects that were not present in the room. The deaf child in this study had not been exposed to an accessible conventional language model. Nevertheless, he saw the spontaneous gestures that hearing adults and hearing children typically produce along with their speech (cf. Bekken, 1989; Church & Goldin-Meadow, 1986; McNeill, in press; Perry, Church, & Goldin-Meadow, 1988; Shatz, 1982). Thus, in Study 2, we described the gestures this deaf child saw in his home, focusing particularly on whether the child’s mother used her spontaneous gestures to refer to nonpresent objects. Finally, in Study 3, in order to put in context the deaf child’s use of gesture as a device to refer to nonpresent objects, we explored if and how hearing children use spoken words and their own spontaneous gestures to refer to objects that are not in the here and now.

## STUDY 1

The deaf child's gesture system, although productive at both the level of the word and the sentence, is an indexical and iconic system of representation that depends very heavily on context in order to be understood. Indeed, the pointing gesture, the deaf child's primary technique for indicating objects, can only be understood in context. The point indicates an object by directing an observer's gaze toward that object and, taken by itself, cannot make clear which object is the intended referent. It is only when considered in context, either the nonlinguistic or the linguistic (in the deaf child's case, gestural) context, that the point can indicate an object to an observer.

At first glance, one might think that using points to identify objects would limit the deaf child to communicating exclusively about objects in the here and now, for one can only point at the objects in the room. However, points can be used to refer to things not present in the immediate surroundings. For example, in a conventional sign language such as ASL, a point may be used to refer to a location within the signing space that has been previously set up by the linguistic context as a placeholder for a particular object or person (Newport & Meier, 1985). Even in the spontaneous gestures used by hearing individuals, a point may be used to indicate an empty space that the accompanying speech has established as a placeholder for a particular object or location not in the here and now (McNeill, 1987).

In the examples just given, the empty space indicated by the pointing gesture is arbitrarily established as a placeholder for an object, and thus can serve as a symbol for that object. According to Huttenlocher and Higgins (1978), the function of a symbol is to call to mind the elements to which it is linked; that link may be established not only by arbitrary rule or convention, as Peirce (1940) and Goodman (1968) argue, but also by a nonarbitrary relationship between the symbol and the elements to which that symbol is linked. Huttenlocher and Higgins describe two such nonarbitrary links, one based on spatiotemporal contiguity, and one based on perceptual similarity. Applying their analysis to the pointing gesture, one might imagine that a child could point at the chair where Dad typically sits, in order to call to mind the father of the household. Or, the child might point at a Mickey Mouse toy that walks, in order to call to mind a toy that is perceptually similar to the indicated object (e.g., a Mickey Mouse toy that swings on a trapeze). In this way, the point can be used to indicate an object that is present in the room, and that object can then serve as a reminder of (or, in Huttenlocher and Higgins' terms, a symbol for) the intended referent that is not present in the room.

The first goal of Study 1 is therefore to explore the pointing gestures of a deaf child of hearing parents to determine whether those gestures are used to refer to objects that are not present in the here and now. We pursue this issue by examining the pointing gestures of one of our original subjects, whom we call David,

and by focusing on whether the object he pointed at was, in fact, the object he intended to refer to.

The pointing gesture is the predominant technique the deaf children in our studies used to indicate objects. However, David (and, indeed, all of the deaf children we have studied) also used a second technique to indicate objects: the *placement* of a characterizing gesture. *Characterizing gestures* are stylized pantomimes whose iconic forms vary with the intended meaning of each gesture (e.g., a fist pounded in the air to indicate that someone was hammering). The deaf children typically produced their characterizing gestures in one of two places: on or around the body (e.g., a hand jabbed several times toward the mouth to indicate that someone was eating), or in an area in front of the chest that we call “neutral” space (e.g., a flat palm moved forward in a straight path at chest level to indicate that the toy car had gone forward, or a twisting motion produced in front of the chest to request that a jar be twisted open). However, at times, the children produced their characterizing gestures near (but not actually on; see the following) objects in the room (e.g., the twisting motion might be produced near the jar the child wanted open). In these instances, the placement of the gesture served to identify an object, typically an object playing a particular thematic role in the predicate represented by the gesture (in the preceding example, the object indicated was the jar, which was the patient of the twisting relation). Extending our analysis of the pointing gesture to the characterizing gesture, we can ask the same questions about reference to nonpresent objects. That is, we can ask whether the object near to which the characterizing gesture is placed is, in fact, the object to which the deaf child intended to refer; or, alternatively, is the child using the gesture’s placement “symbolically” to recall another similar object no longer in the here and now? We can determine in this way whether the deaf child used the placement of his characterizing gestures, as well as his pointing gestures, to refer to objects that were not present.<sup>1</sup> This, then, is the second goal of Study 1, which we pursue by analyzing the placement of the characterizing gestures David produced.

## Method

**Subject.** Deaf children born to deaf parents and exposed from birth to a conventional sign language such as ASL acquire that language naturally; that is, these children progress through stages in acquiring sign language similar to those

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<sup>1</sup> The deaf children in our sample had one other technique for referring to objects: They produced action characterizing gestures in contexts where the gesture seemed to identify an object rather than refer to the action itself; for example, the child produced a “fly” characterizing gesture to describe a picture of a bird pedaling a bicycle; since the action portrayed in the picture was pedaling rather than flying, the child seemed to be using his gesture to identify the pedaler (i.e., the bird). The children’s use of characterizing gestures to identify objects in this fashion will not be considered here, but will be discussed in a forthcoming report (Goldin-Meadow, Mylander, Butcher, & Dodge, 1991).

of hearing children acquiring a spoken language (Newport & Meier, 1985). However, 90% of deaf children are not born to deaf parents who could provide early exposure to a conventional sign language. Rather, they are born to hearing parents who, quite naturally, tend to expose their children to speech (Hoffmeister & Wilbur, 1980). Unfortunately, it is extremely uncommon for deaf children with severe to profound hearing losses to acquire the spoken language of their hearing parents naturally, that is, without intensive and specialized instruction. Even with instruction, deaf children's acquisition of speech is markedly delayed when compared either to the acquisition of speech by hearing children of hearing parents, or to the acquisition of sign by deaf children of deaf parents. By age 5 or 6, and despite intensive early training programs, the average profoundly deaf child has only a very reduced oral linguistic capacity (Conrad, 1979; K. Meadow, 1968). Moreover, although many hearing parents of deaf children send their children to schools in which one of the manually coded systems of English is taught, some hearing parents send their deaf children to "oral" schools in which sign systems are neither taught nor encouraged; thus, these deaf children are not likely to receive input in a conventional sign system.

The subject of this study, David, is profoundly deaf ( $> 90$ dB bilateral hearing loss), and his hearing parents chose to educate him using an oral method. At the time of our observations, David had made little progress in oral language, occasionally producing single words, but never combining those words into sentences. In addition, at the time of our observations, David had not been exposed to ASL or to a manual code of English. As a preschooler in an oral school for the deaf, David spent very little time with the older deaf children in the school who might have had some knowledge of a conventional sign system (i.e., the preschoolers only attended school a few hours a day and were not on the playground at the same time as the older children). In addition, David's family knew no deaf adults socially and interacted only with other hearing families, typically those with hearing children. One of the primary reasons we were convinced that David had had no exposure to a conventional sign system at the time of our observations was that he did not know even the most common lexical items of ASL or Signed English (i.e., when a native deaf signer reviewed our tapes, she found no evidence of any conventional signs; moreover, when we informally presented to David common signs such as those for mother, father, boy, girl, dog, etc., we found that he neither recognized nor understood any of these signs).

David was videotaped in his home during free-play sessions that lasted as long as the child was cooperative, typically for an hour or two. A large bag of toys, books, and puzzles served as the catalyst for communication (see Goldin-Meadow, 1979). We videotaped David eight times over a period of approximately 2½ years, beginning when he was 2;10 (years; months) and ending when he was 5;2.

***Coding the Gestures: Criteria for a Gesture and Gesture Interpretation.*** David's videotapes were coded initially according to a gesture transcription system described in detail in Goldin-Meadow (1979). Our criteria for isolat-

ing gestures grew out of a concern that the gestures meet the minimal requirements for a communicative symbol, and were as follows:

1. The gesture must be directed to another individual; that is, it must be communicative. In particular, we required that the child establish eye contact with a communication partner in order for the child's act to be considered a gesture.<sup>2</sup>
2. The gesture must not itself be a direct manipulation of some relevant person or object (i.e., it must be empty-handed; cf. Petitto, 1988). When a child puts a telephone to the ear and pretends to have a conversation, it is not clear whether that act should be regarded as designating the act of telephoning (and therefore a symbol), or as the child's attempts to practice the act of telephoning (and therefore not symbolic at all; cf. Huttenlocher & Higgins, 1978). To be conservative, we excluded all acts that were done on objects; for example, if a child picked up a toy hammer and pretended to hit an object, that act would not be considered a gesture.
3. The gesture must not be part of a ritual act (e.g., to blow a kiss as someone leaves the house) or game (e.g., patty-cake). In general, the symbolic nature of language allows for a particular type of communicative flexibility: A word can be used for multiple discourse functions. Acts that were tied to stereotyped contexts of use clearly did not have this flexibility, and thus were not considered gestures.
4. The gesture must not be an imitation of the communication partner's previous gesture. This criterion assures that the child was not merely copying—with little or no comprehension—the gestures his communication partner produced.<sup>3</sup>

Particularly because the deaf child's gesture system was not a conventional system shared by a community of users, our interpretations of the child's gestures necessarily remain tentative and represent our best guesses at the child's intended meaning. Context, of course, played a central role in shaping these interpretations. For example, a point at a cookie on a plate followed by an "eat" characterizing gesture might be interpreted as (a) a request for a cookie if the child had no cookie but wanted one, (b) an invitation to the experimenter to take a cookie if

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<sup>2</sup> Strict application of this criterion breaks down in the few instances where David was found to gesture with no one else around, that is, as though he were gesturing to himself. The fact that the child was found to use his gestures to "talk" to himself indicates that the gesture system can take on additional functions of language beyond communication with others.

<sup>3</sup> It is worth noting that our criteria for a gesture are different from and somewhat more stringent than those often used to isolate gestures in hearing children during the early stages of spoken language acquisition. For example, in their studies of gesture in hearing children, Volterra, Bates, Benigni, Bretherton, and Camaioni (1979) did not require a gesture to be communicative, nor did they require a gesture to be divorced from the actual manipulation of an object (but see Petitto, 1988, and Acredolo & Goodwyn, 1988, whose studies of gesture in hearing children are based on criteria that are very similar to those used here).

the child already had a cookie and was offering the plate, or (c) as a report of a past event if the child showed no interest in the cookie at hand but, according to his mother, was recounting the cookie-eating the dog had done earlier that day. Note that, although there may be several interpretations possible for the same gesture, each of these interpretations is likely to include the same core information (in this example, reference to a cookie and to eating), which is derived, to a large extent, from the gesture form of the gestures themselves (see Goldin-Meadow & Mylander, 1984, pp. 24–26, for discussion of the role that form plays in the interpretation of gestures).

The task of gesture interpretation was, in general, made easier by the fact that we included as part of the context any responses the interlocutor made to the child's gestures, and the child's reactions to those responses. On occasion, the interlocutor offered a series of interpretations until the correct one was affirmed by the child. It is important to note that this process of negotiation between the deaf child and his interlocutor is no different from the negotiations that take place between young hearing children and their communication partners, particularly when the subject of the conversation is a nonpresent object or event (cf. Sachs, 1983; Sperry & Sperry, 1989). Indeed, researchers routinely include the give-and-take between the child and the interlocutor as part of the context, when attempting to identify and describe talk about the "there-and-then" in young hearing children. For example, Miller and Sperry (1988) were able to reliably code young hearing children's talk about past events even when the children did not produce explicit past tense markers by using contextual support of the sort outlined here.

Gesture interpretation was also facilitated by our familiarity with the toys and the activities that typically occurred during the taping sessions, and by the parents frequently sharing their intimate knowledge of the child's world with us during the taping sessions. Not only did we bring the same set of toys to each taping session, but this set was accessible to the coders when they transcribed the tapes, a procedure that allowed the coders to verify, for example, that a particular toy did indeed have wheels, or that the cowboy in a particular picture was in fact holding a gun. In addition, the parents were familiar with the child's own toys and activities outside the taping session and, if we were puzzled by a child's gestures, we asked the parents during the session what they thought the child was looking for, commenting on, and so forth. The parents' comments, as well as our own, were therefore on tape, and were accessible even to coders who were not at the original taping session. Thus, when David sat playing with the toy cowboy in our set of toys and pointed at his own head, the gesture could be interpreted with some confidence as a reference to the toy hat that he had played with many times before and knew belonged to the cowboy. Or, when David pointed at the corner of his living room and produced a "hang" (ornaments) characterizing gesture, we queried his mother, who told us that their Christmas tree traditionally stands in that corner; we therefore felt relatively confident in coding the point at the corner as a reference to the absent Christmas tree. Thus context, bolstered by the

parents' and our own knowledge of the child's world, constrained the possible interpretations of the child's gestures, and helped to disambiguate the meanings of those gestures.

In addition, whenever there was more than one interpretation possible for a gesture, we arbitrarily assigned the more conservative interpretation to the gesture; that is, if a gesture could be interpreted as referring to objects or events at hand, it was. Only when, from context, it was clear that a gesture could not refer to the here and now, were other interpretations considered. Fortunately for our coders, young children do not have many private experiences, and the parents who shared experiences with their children were part of the taping session and helped with interpretation (see Miller, 1982, for a comparable use of parental input in interpreting the spoken utterances of hearing children). Of course, when the child moved too far afield, the gesture became impossible to interpret and was coded as ambiguous. Approximately 5% of David's characterizing gestures and 6% of his pointing gestures were coded as ambiguous. In general, reliability between two independent coders was 93% for assigning lexical meaning to gestures, 87% for assigning semantic relations to single gestures, and 100% for assigning semantic relations to gesture sentences (see Goldin-Meadow & Mylander, 1984). David's gestures have been previously coded for syntax (as described in Goldin-Meadow & Mylander, 1984) and for morphology (as described in Goldin-Meadow & Mylander, 1990b). For this study, we further coded the pointing and characterizing gestures that David produced for displacement, according to the system described in the following sections.

***Coding Pointing Gestures for Displacement.*** For each of the 1259 pointing gestures that David produced, we recorded the object that was actually indicated by the point and, using context, the object that was the intended referent of the point. The points were classified into the following two groups:

***Points Referring to Present Objects.*** These were the points for which the object indicated was, in fact, the intended referent. For example, David pointed at a battery and then produced a "give" characterizing gesture in order to request that that particular battery be given to him. As described previously, if it was possible to interpret the point as a reference to a present object, we did so. For example, David pointed at a picture of an animal playing a horn and then produced a "blow" characterizing gesture; although one might argue that David was pointing at this particular horn to refer to a class of horns (those that are blown in the manner depicted in the characterizing gesture) and thus was referring to a nonpresent object, a more conservative interpretation would be that the child was describing the horn and the action shown in that particular picture, and thus was referring to an object in the here and now. We chose to make the conservative interpretation whenever possible; if we erred, we therefore erred in the direction of underestimating David's references to absent objects.

***Points Referring to Absent Objects.*** These were the points for which the object indicated by the point was *not* the intended referent of the point. For

example, David was looking around the room for the soldier toy that played a large bass drum. He was unable to find the toy and, to request it, he pointed at a second soldier toy, one that played a xylophone, and produced a "beat" characterizing gesture (two fists moving toward and away from each other as though beating a bass drum). The point at the soldier with the xylophone could not have been intended as a request for that toy, because the soldier with the xylophone was already in the child's possession. Rather, the point was used to indicate an object that was present in the room (the soldier with the xylophone), which then served as a symbol for the absent and desired object (the soldier with the drum). This interpretation received additional confirmation from the fact that the child stopped gesturing and seemed pleased when given the soldier with the drum. In almost all instances of this type, the object that David intended to refer to was not present in the room. Occasionally, however, David did point at object 1 to refer to object 2 even though object 2 was also in the room; in these instances, object 2 was typically either not visible or not easily accessible.

In addition, for each of the points referring to absent objects, we described the relationship between the object that was indicated by the point and the intended referent, that is, the object pointed at might be an arbitrarily established placeholder for the intended referent, it might be an object that was perceptually similar to the intended referent, or it might be a location in which the intended referent was typically found (see Results for further elaboration and examples).

Reliability was established by having a second observer independently code a randomly selected portion of the videotapes. Interrater agreement was 93% for categorizing points referring to present versus absent objects, and for categorizing the different types of points referring to absent objects.

***Coding Characterizing Gestures for Displacement.*** As described previously, David produced characterizing gestures on or around his body, in neutral space, or oriented toward objects in the room. For this analysis, we considered only those characterizing gestures that were produced near objects (30% of the 893 characterizing gestures David produced overall). For each of these characterizing gestures, we recorded the object that was near the characterizing gesture produced and, using context, noted whether that object was the intended referent. Characterizing gestures were classified into the following two groups:

***Characterizing Gestures Referring to Present Objects.*** These were characterizing gestures produced near an object that was, in fact, the intended referent. For example, David produced a "twist" characterizing gesture near the jar that he wanted his mother to open for him.

***Characterizing Gestures Referring to Absent Objects.*** These were characterizing gestures produced near an object that was *not* the intended object. For example, David produced a "twist" characterizing gesture near an open and empty jar of bubbles to request that his mother get and open the full jar of bubbles in the kitchen. In most instances of this type, the object that the child

intended to refer to was not present in the room. Occasionally, however, David did produce a characterizing gesture near object 1 to refer to object 2 even though object 2 was in the room, although typically not within reach. For example, David produced a "press down" characterizing gesture over the Donald Duck pop-up toy at his side in order to ask his mother to press down the catch on a similar-looking Mickey Mouse pop-up toy which was near her.

In addition, for each of the characterizing gestures referring to absent objects, we described the relationship between the object that was indicated by the gesture and the intended referent, that is, the object near which the characterizing gesture was placed might be an arbitrarily established placeholder for the intended referent, it might be an object that was perceptually similar to the intended referent, or it might be a location in which the intended referent was typically found (see Results for further elaboration and examples).

Reliability was established by having a second observer independently code a randomly selected portion of the videotapes. Interrater agreement was 88% for categorizing characterizing gestures according to placement, for categorizing the gestures that were placed near objects referring to present versus absent objects, and for categorizing the different types of characterizing gestures referring to absent objects.

## Results

**Overall Developmental Pattern.** Figure 1A (p. 326) displays the proportion of both pointing and characterizing gestures that David used at each age to refer to absent objects. Note first that the child did indeed use both types of gestures to refer to objects that were not in the here and now and, by age 3 years and 11 months, was using them to refer to absent objects at least 20% of the time. In addition, the developmental pattern was quite comparable for both types of gestures; David erratically used a very small proportion of each type during the early sessions, and began to consistently use both types sometime after age 3 years and 3 months.

**Pointing Gestures.** Table 1 (p. 327) displays the pointing gestures David produced, categorized according to the relationship between the object pointed at and the intended referent.<sup>4</sup>

David first began to consistently use pointing gestures to refer to absent objects at the age of 3 years and 3 months, pointing at a temporary or habitual

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<sup>4</sup> One type of pointing gesture is excluded from Table 1. David pointed at an object in order to refer to the color of that object. For example, David pointed first at the brown rug, then at the brown of his pants, and then at a brown toy, apparently referring not to the objects but to the brown color they had in common. This type of point, which was infrequent (David produced two at age 5;2), was used to refer to a property of an object rather than the object itself, and was therefore eliminated from the analysis.

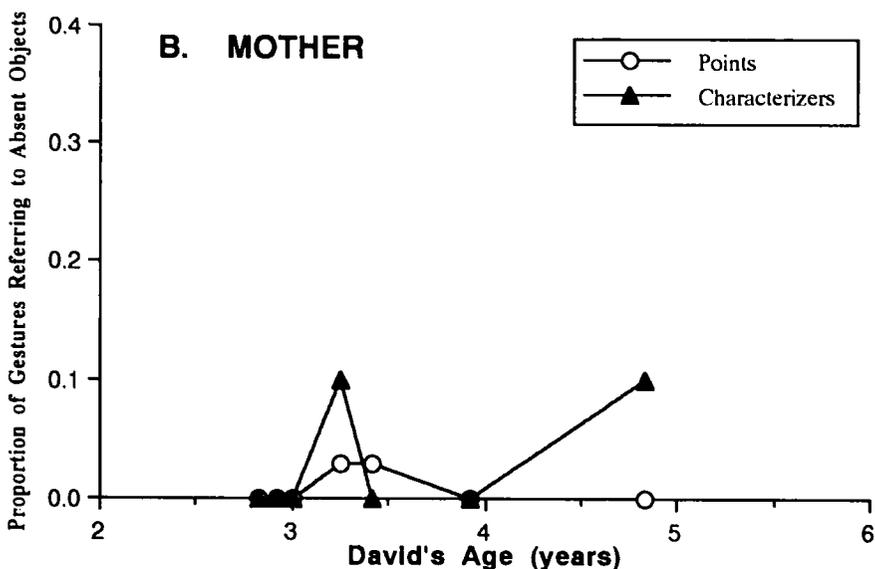
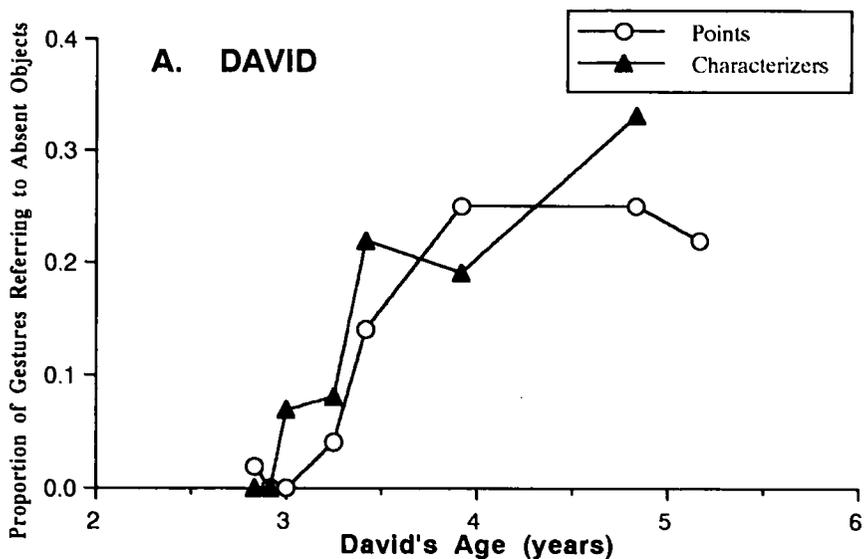


Figure 1. Pointing gestures and characterizing gestures referring to absent objects produced by the deaf child (David) and his mother. The figure displays the number of pointing and characterizing gestures used to refer to absent objects, as a proportion of the total number of gestures of each type that David (panel A) and his mother (panel B) produced at each of David's ages. The total number of pointing and characterizing gestures placed near objects that David produced at each age are displayed in Tables 1 and 2, respectively. Characterizing gestures were not coded for David at the age of 5 years and 2 months; neither pointing nor characterizing gestures were coded for Mother at this age.

**Table 1. Deaf Child's Use of Pointing Gestures to Refer to Present and Absent Objects**

David's Age (years; months)	Proportion of Points Referring to Present Objects		Proportion of Points Referring to Absent Objects				Total Number of Points Produced Per Session <sup>a</sup>
	Point at Intended Referent	Point at Intended Referent	Point at Temporary or Habitual Location of Intended Referent		Point at Arbitrary Placeholder for Intended Referent		
			Point at Object Perceptually Similar to Intended Referent	Point at Object Perceptually Similar to Intended Referent	Point at Arbitrary Placeholder for Intended Referent	Point at Arbitrary Placeholder for Intended Referent	
2;10	.98	—	—	.02	—	—	43
2;11	1.00	—	—	—	—	—	72
3;0	1.00	—	—	—	—	—	17
3;3	.96	.04	—	—	—	—	114
3;5	.86	.05	—	.09	—	—	176
3;11	.75	.08	—	.16	—	.01	143
4;10	.75	.08	—	.14	—	.03	108
5;2	.77	.05	—	.13	—	.04	586

<sup>a</sup>The videotaped play sessions lasted approximately 1 hr at each age, with the exception of age 3;0 when the child's attention wandered and the session lasted only 30 min, and age 5;2 when the child was particularly attentive and the session lasted 3 hr.

location of an object in order to refer to that object. For example, David produced a “fly” characterizing gesture and then pointed at the space on the puzzle board where the bird piece belongs in order to request that piece from the experimenter. As a second example, David pointed at a box of Christmas tree decorations, produced a “hang” characterizing gesture, and then pointed at the corner of the room where the Christmas tree traditionally stands in order to comment on the fact that he would soon be hanging the decorations on the tree (the tree had not yet been set up, nor was it anywhere in the room). Note that, in this example, David was describing an act that would take place in the future, and was using objects and locations in the room to do so.

At age 3;5, David began to refer to absent objects by pointing at an object that was perceptually similar to the object he intended to refer to. Although David produced one instance of this type of point at age 2;10, he began to use this device consistently, beginning at age 3;5. For example, David pointed at his buttocks and then produced a “move over” characterizing gesture in order to ask the experimenter to move her own buttocks away from the toy area where she was sitting and where David wanted to play. As a second example, David pointed at the mitten puzzle piece that had already been placed on the puzzleboard in order to ask the experimenter to give him the second mitten piece; the child had previously produced a “give” characterizing gesture and had repeatedly rejected the experimenter’s offer of other (nonmitten) pieces.

Finally, at age 3;11, David began to refer to absent objects by pointing at a space or object that he had previously established as a placeholder for the object he intended to refer to. For example, David first established that a Mickey Mouse toy stood for his mother by pointing at the toy and then at his mother. He then produced a “wave” characterizing gesture and pointed at the Mickey Mouse toy in order to comment on the fact that Mother waves good-bye to him each morning as he gets on the school bus, a ritual that his mother told us about in response to our queries. David also established a location in the toy area as his school by producing a “pray” characterizing gesture (David attended a Catholic oral school where each day began with prayer) and pointing at that spot in the toy area.<sup>5</sup>

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<sup>5</sup> Table 1 includes all of the points at pictures that David produced. A point at a picture could be considered either a point at a present or an absent object, depending upon what was portrayed in the picture and the context of it. For example, if the child pointed at a picture of a cowboy who was riding a horse, and produced a “ride” characterizing gesture, that point would be considered a point at a present object, because the child was describing the event occurring in that particular picture. In contrast, if the child pointed at a picture of a cowboy standing alone and not riding a horse, and then produced the “ride” gesture, the point would be considered a point at an absent object, because the child appeared to be describing not that particular cowboy, but cowboys in general. It is important to note, however, that points at pictures do not account for the developmental pattern seen in Table 1. When points at pictures (which comprised 15% of David’s 1259 points) are removed from the analysis, the developmental pattern is unchanged.

Sometime after producing points at objects and locations that had been arbitrarily established as symbols for other objects, at age 4;10 David began to produce points at the symbols in his own system, that is, he began to point at his own gestures. For example, to request a Donald Duck toy that the experimenter held behind her back, David produced a characterizing gesture for Donald Duck's bill (he pursed his lips in imitation of the bill), then pointed at his own pursed lips and pointed toward the toy behind her back. When offered a Mickey Mouse toy, the child shook his head, pursed his lips, and pointed at his own pursed lips. As a second example, in order to describe the fact that he would soon be hanging Christmas tree balls, David pointed first at the Christmas tree balls, then produced a "hang" characterizing gesture and a "round" characterizing gesture (his thumb and finger formed a circle in the air), and finally pointed at his own "round" gesture. These pointing gestures are roughly comparable to the words "I say," as in "I say 'Donald-Duck bill' " or "I say 'round Christmas tree ball.' " They therefore represent communicative acts in which gesture is used to refer to a particular act of gesturing and, in this sense, are reminiscent of a young hearing child's quoted speech (cf. Miller & Hoogstra, 1989). David appeared to be able to distance himself from his own gestures and treat them as objects to be reflected on and referred to, thus exhibiting in his self-styled gesture system the very beginnings of the reflexive capacity that is found in all languages and that underlies much of the power of language (cf. Lucy, in press).

**Characterizing Gestures.** Table 2 (p. 330) displays the characterizing gestures David produced, categorized according to the relationship between the object near which the characterizing gesture was placed and the intended referent.

Just as for the pointing gestures, at age 3;3, David began to refer to absent objects by producing a characterizing gesture near a temporary or habitual location of the object he intended to refer to. For example, to indicate Christmas lights, David produced a "hammer" gesture near the bannister in the living room where the lights are traditionally hung.

Somewhat earlier than his pointing gestures, David began at age 3;0 to refer to absent objects by producing a characterizing gesture near an object that was perceptually similar to the object he intended to refer to. For example, David produced a "beat" characterizing gesture near the soldier toy that beats a drum in order to request the bear toy that also beats a drum.

David produced at age 3;11 a small number of characterizing gestures near objects that had previously been established as placeholders for an intended referent. For example, to comment on the fact that a toy wheel had fallen off an axle, David first established that an arbitrary spot on the floor (which was *not* where the wheel had actually fallen) stood for the wheel by producing a "rotate" characterizing gesture in neutral space and then pointing at the spot. He then produced a "fall over" characterizing gesture over the spot where he had pointed in order to comment that the wheel had fallen over.

Table 2. Deaf Child's Use of Characterizing Gestures to Refer to Present and Absent Objects

David's Age (years; months)	Proportion of Characterizers Referring to Present Objects		Proportion of Characterizers Referring to Absent Objects				Total Number of Characterizers Placed Near Objects or Locations Per Session
	Character- izer Near Referent	Character- izer Near Intended Referent	Character- izer Near Temporary or Habitual Location of Intended Referent	Character- izer Near Object Perceptionally Similar to Intended Referent	Character- izer at Arbitrary Placeholder for Intended Referent	Character- izer Near Object Perceptionally Similar to Intended Referent	
2;10	1.00	—	—	—	—	—	34
2;11	1.00	—	—	—	—	—	17
3;0	.93	—	—	.07	—	—	15
3;3	.92	.04	.04	.04	—	—	24
3;5	.78	.04	.04	.19	—	—	27
3;11	.81	.01	.01	.15	—	.02	86
4;10	.67	.21	.21	.12	—	—	33

## Discussion

Displacement is the property of language that makes it possible for us to refer to objects and events that are remote in time and place from the act of utterance itself. The data from this study suggest that displacement is sufficiently central to human communication, that it can appear even in a self-styled gesture system created by a deaf child to communicate with those around him.

The deaf child in this study was able to exploit the limited means he had available to refer to objects not in the here and now. To this end, he used both pointing and characterizing gestures to indicate objects and locations in the room that he could assume others would interpret as symbols for objects that were not in the room. The ability to refer to remote objects became a reliable component of the deaf child's gesture system, consistently present in both pointing and characterizing gestures, beginning at age 3;3.

It is worth noting that, at that same point in development, David's gesture system could, for the first time, be characterized as having two levels of structure: (a) structure across gestures within a sentence, akin to syntactic structure, and (b) structure within each gesture, akin to morphological structure. Before this age, there was evidence for structure across gestures in the deaf child's gesture system, but no evidence that the child had broken his gestures into component parts. At 3;3, however, David began to systematize his lexicon, changing it from a collection of gestures, each treated as a whole, into a system in which the component parts of each gesture contrasted in a meaningful way with the component parts of the other gestures in the lexicon (Goldin-Meadow & Mylander, 1990b). In order to be able to systematize his lexicon, David must have been able to treat his gestures as parts of a symbolic system. We speculate that it may be this same ability to distance himself from his gestures that allowed David to manipulate the contexts in which he produced his pointing and characterizing gestures so that his interlocutor could interpret those gestures as symbols for nonpresent objects.

Further evidence that David was able to distance himself from his gestures comes from the way David used his body in his characterizing gestures. At the youngest ages observed, the mimetic actions that David produced on his body were all reflexive; that is, he acted out a person feeding himself, washing his own hair, or putting on his own hat. However, beginning at age 3;3, David would, not often, but at times, produce mimetic actions on his body that were not reflexive; in these gestures, David's body represented person 1 and his hands represented person 2 who was, in fact, acting on person 1. For example, to request that the experimenter put a shirt back on a toy cowboy, David first pointed at the shirt and then produced a "put on" characterizing gesture on his own chest. David could have produced the "put on" gesture near the cowboy itself because the toy was within reach; to do so would have been a more realistic representation because David was not asking the toy to put on its own shirt. Thus, within the same gesture, David had used his hands to represent the experimenter's hands and his

body to represent the cowboy's body. David consequently had developed the ability to use his body as a stage for his own gestures, again suggesting an ability to distance himself from his own gestures and treat them as part of a symbolic system that he could use to communicate about the present as well as the nonpresent.

The deaf child in our study had developed the ability to refer to remote objects even without the benefit of the model of displaced reference typically provided by conventional language. Moreover, David was able to use his gesture system not only to refer to absent objects (remote in space), but also to communicate about past and future events. An example of a future event was described previously (anticipating hanging decorations on the Christmas tree). As an example of a past event, David pointed at a picture of an airplane in a book and produced an "away" characterizing gesture, a "drive" gesture, a "beard" gesture, a "moustache" gesture, and a "sleep" gesture, apparently to comment on the fact that the family had driven away to the airport to bring his uncle (who wears a beard and a moustache) home so that he could sleep over, an event that his mother told us about in response to our queries. Parenthetically, David often used the "away" gesture, which seemed to represent both temporal and spatial distance from the here and now, when he gestured about past events. As an example of an event that was removed in time and space and that was likely to be recurrent in his world, David pointed at a picture of a sand shovel (which he appeared to use as a representation for shovels in general), pointed down toward the basement where their snow shovel was habitually kept, and then produced a "dig" characterizing gesture, a "pull on" (boots) gesture, and a "snowing" gesture, presumably to comment on the fact that he (or someone else) puts on boots and digs with a snow shovel when it snows.

In each of these instances, David had used some aspect of the current context (an object, a picture) to call to mind in his communication partner the event he intended to describe. The success of this strategy obviously depends on the partner's willingness to interpret the child's gestures and his or her knowledge of the event being described—a process of negotiation that, although more extreme in the deaf child's case, is in principle no different from the negotiation that transpires between young hearing children and adults when they talk about nonpresent events (cf. Sachs, 1983; Sperry & Sperry, 1989). Note, however, that without a system of shared symbols, it is difficult, if not impossible, for the deaf child to achieve the full range of displaced communication that is possible with a conventional language. David's mother must have shared his system to some extent in order for communication, particularly displaced communication, to have taken place. We next ask whether there is evidence that Mother herself *introduced* displaced communication into the gestural exchanges she had with David, thereby providing a model for communication about the "there-and-then" from which he could learn.

## STUDY 2

The deaf child described in Study 1 did not have access to a conventional language model. Nevertheless, he did see the spontaneous gestures his hearing parents produced when they spoke to him, and these gestures might have served as a model for the displaced communication the child developed. Although in previous work we have shown that the spontaneous gestures David's mother produced were either less structured or structured differently from her child's gestures, both in terms of syntactic structure (Goldin-Meadow & Mylander, 1983, 1984) and morphologic structure (Goldin-Meadow & Mylander, 1990b), Mother's gestures might have displayed the property of displacement from which David may have learned the technique. To explore this possibility, we examined the spontaneous gestures David's mother produced when she addressed her child, focusing on whether or not the objects she indicated with her gestures were, in fact, the objects to which she intended to refer.

### Method

The subject for this study was David's primary caretaker, his mother. We coded the gestures Mother produced during the free-play sessions when David was age 2;10, 2;11, 3;0, 3;3, 3;5, 3;11, and 4;10 (Mother's gestures were not coded for the videotape taken when David was 5;2).

We coded Mother's pointing and characterizing gestures using the system described in Study 1. As in our analyses of David's gestures, we used both the nonlinguistic and the gestural contexts to determine the objects Mother intended to refer to; however, we did not base any of our decisions about the intended referent on verbal context. In other words, we classified Mother's gestures as referring to present versus absent objects, ignoring her speech. We chose to ignore speech simply because, at this stage of his development, David could not understand the speech directed at him; thus, we hoped to get a sense of the input David not only received, but was actually able to utilize. In addition, in order to determine Mother's intended referents using all available context, we coded her pointing gestures a second time, using her speech to help determine the object she intended to refer to.

### Results

***Overall Developmental Pattern.*** Figure 1B (p. 326) displays the proportion of both pointing and characterizing gestures that David's mother used to refer to absent objects at each age that he was observed. The figure displays the pointing gestures classified without including Mother's speech as part of the context, because this analysis is likely to be a better representation of David's actual intake. Mother produced very few gestures of each type, although she did produce the gestures relatively early compared to David's development.

**Pointing Gestures.** Out of the 311 pointing gestures Mother produced, only three referred to an object that was not the actual object pointed at (i.e., 1% of her total points). When David was 3;3, Mother pointed at her own mouth and produced a “closed” characterizing gesture in order to comment on the fact that the toy animal’s mouth was closed. She produced this example two times. When David was 3;5, Mother pointed at her own elbow and shrugged in order to indicate to David that she wanted him to tell the experimenter what happened to his hurt elbow. All three of these examples were instances of a point at an object that was perceptually similar to the object she intended to refer to. Mother produced no examples of the other types of pointing gestures that David used.

When we analyzed Mother’s pointing gestures a second time, using her speech as part of the context, we found that Mother produced the following two points at the location of an object in order to indicate that object, both produced when David was 2;11. She pointed at the rim of a bubble jar to refer to the lid of the jar, which became apparent only when she said “Where’s the top?” She pointed at a spot on the floor to refer to a bubble that had been there, which became apparent only when she said “Oops, that broke.” In addition, Mother produced the following eight points at objects that were perceptually similar to the objects she intended to refer to (all produced when David was 3;5 or older). She pointed twice at a toy horse to refer to a real horse, a fact that we discovered only through her speech: “Tell Susan we saw a horse today.” She produced six points at replica objects, or at pictures of objects to refer to those objects in general, a fact that was again revealed only through her speech: “That’s an egg,” “That’s a horse,” and so forth. Including these 10 points in the total, 4% of Mother’s 311 points were examples of points at objects that were different from the objects she intended to refer to. Most of these objects were not present in the room.<sup>6</sup>

**Characterizing Gestures.** Mother produced 424 characterizing gestures during the seven sessions, 103 (24%) of which were produced near objects in the room. Of these 103, Mother produced five characterizing gestures near objects that were not the objects she intended to refer to: four when David was age 3;3, and one when he was 4;10. These five gestures accounted for 5% of the characterizing gestures Mother produced near objects overall. As an example, Mother produced a “long and arced” characterizing gesture on David’s nose in order to refer to an elephant’s nose (this example was produced four times). In addition, she produced a characterizing gesture for length on the bannister where the Christmas lights are typically hung in order to refer to the lights themselves. Both

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<sup>6</sup> When we coded Mother’s pointing gestures, including her speech as part of the context, we found two other types of points: (a) Mother produced 21 points where it was clear from her speech that she intended to refer to the color of the object; for example, she said, “What color is this?” “That’s red,” and so forth. (b) Mother produced nine points at her ear, where her intent was not to refer to an object, but rather to get David to be attentive to sound: she said, “I hear that,” “Do you hear that?” and so forth.

examples are instances of a characterizing gesture produced near a place that was a temporary or habitual location of the intended referent. Mother produced no examples of characterizing gestures placed near an object that was perceptually similar to the intended referent, and no examples of characterizing gestures placed near an object that was an arbitrary placeholder for the intended referent.

### Discussion

David's mother did produce a very small number of pointing and characterizing gestures indicating objects that were not the objects she intended to refer to. Moreover, these few gestures were produced early enough in David's development so that it is possible that he may have gained some insight into how to use gesture in this way from observing his mother's gestures. Indeed, it is quite likely that David was able to conceptualize absent objects long before age 3;3, the age he first used gesture to refer to absent objects (in general, deaf children achieve object permanence at the same age as hearing children, approximately age 1;6, cf. Best & Roberts, 1976). Thus, David may well have needed a model (although a relatively infrequent one seemed to have been sufficient) in order to realize that gesture could be used to communicate about the nonpresent. The impetus for displaced communication may indeed have come from Mother.

However, it is important to note that, at least in our gesture sample, Mother did not produce examples of all of the different types of gestures referring to absent objects that David produced. Moreover, the limited set of gestures Mother did produce never became a reliable component of her spontaneous gesture system. In fact, what was most impressive about David's use of gesture for displaced communication was that this type of gesture was incorporated into his communication system, appearing reliably every time his gestures were sampled after the age of 3;3, appearing in a wide range of contexts, and increasing as a proportion of his overall gestural communications. Thus, David seemed to have taken the minimal (although perhaps crucial) input he received about displaced gesture and fashioned it into an integral part of a linguistic system.

## STUDY 3

In Study 1 we showed that, between the ages of 2;10 and 5;2, a deaf child deprived of a usable conventional language model began to use gesture to refer to objects that were not present in the room. In Study 2, we suggested that David's use of gesture for displaced communication was much more extensive than his hearing mother's. In the present study we compared David's use of gesture for displaced communication with the way both gesture and speech are used for displaced communication in young hearing children. To this end, we studied 4 hearing children who were learning English and who spanned the age range of our observations of David, and determined how these children used words and gestures to refer to absent objects.

### Method

The subjects for this study were 4 hearing children, 3 girls and 1 boy, all of whom were exposed to and were learning English. The children were 2;2, 2;5, 2;6, and 5;2 when they were observed (see Table 3, which lists each child's age and Mean Length of Utterance [MLU]). Each child was videotaped for at least 1 hr at play in his or her home, and was provided with the same set of toys and books used during David's play sessions.

The pointing gestures the children produced were coded in the same way Mother's gestures were in Study 2; that is, the pointing gestures were coded once without including the child's speech as part of the context, and a second time including the speech. The children did not produce enough characterizing gestures to allow analysis.

In addition, we isolated all of the nouns and pronouns each child produced in speech and determined whether the object or person the word referred to was present in the immediate environment. We have previously suggested that points for the deaf child function, in many respects, as nouns and pronouns do for the young hearing child (in particular, the referents of the deaf child's points encompass the same range of object categories as the hearing child's nouns, and the deaf child's points play the same structural role in gesture sentences that nouns and pronouns play in the hearing child's spoken sentences; see Goldin-Meadow & Mylander, 1984, pp. 19–22). We therefore thought it appropriate to explore the way hearing children used nouns and pronouns for displaced communication.

### Results

Table 3 presents the proportion of words and gestures that each of the 4 hearing children used to refer to absent objects. Note first that even the 3 younger children used their words for absent objects, and did so between 9% and 14% of the time (this figure accords well with Huttenlocher and Smiley's 1987 findings for a group of children ranging in age from 0;11 to 2;1 who, on average, used

**Table 3. Hearing Children's Use of Words and Gestures to Refer to Absent Objects**

Subject	Age (yrs.; mos.)	MLU	Proportion of Words Referring to Absent Objects		Proportion of Gestures Referring to Absent Objects	
			Nouns and Pronouns		Points Interpreted Without Speech	Points Interpreted With Speech
Mark	2;2	1.58	.14(407) <sup>a</sup>		.00(136)	.00(136)
Beth	2;5	3.35	.12(290)		.00 (13)	.00 (13)
Ann	2;6	2.39	.09(407)		.07(123)	.10(123)
Kim	5;4	6.21	.18(470)		.00 (90)	.07 (90)

<sup>a</sup>The numbers in parentheses represent the total number of nouns and pronouns and the total number of points produced by each child during a 1-hr videotaped free-play session.

their words to refer to absent objects approximately 15% of the time). The older child used words to refer to absent objects 18% of the time.

In contrast, 2 of the 4 hearing children never used their pointing gestures to refer to absent objects. When the points were interpreted without including the child's speech as part of the context, only Ann was found to use her points to refer to absent objects. She produced one example of a point at an object that was perceptually similar to the intended referent: She produced a "type" characterizing gesture and pointed at a picture of a typewriter in order to comment on typewriters in general. In addition, Ann produced seven examples of a point at a temporary or habitual location of the intended referent; for example, she pointed at the space on the puzzleboard where a particular piece belonged; the nonverbal context made it apparent that she was requesting that piece.

Even when their points were interpreted with speech, the children still produced relatively few points referring to absent objects. Beth and Mark produced none. Both Ann and Kim produced examples of points at objects that were perceptually similar to the intended referent (e.g., "eat that," said while pointing at a toy ice cream cone, presumably to comment on ice cream cones in general, because the particular cone that was pointed at was certainly not edible). In addition, Ann and Kim produced at least one example of a point at a temporary or habitual location of an object to refer to that object (e.g., the child pointed at the space on the puzzleboard where the hand piece belonged, and it became apparent that she was referring to the hand piece only after she said "hand").

It is, perhaps, not surprising that the 3 younger children used points so infrequently to refer to absent objects, for David did not begin to use his points consistently to refer to absent objects until age 3;3. However, even Kim, who was 5;4, used very few points to refer to absent objects.

## Discussion

All four of the hearing children in this study used spoken words to refer to absent objects, and tended to do so more often than they used pointing gestures for this purpose. The hearing children did not exploit the potential for displaced reference in their pointing gestures to the extent that the deaf child did, neither in terms of the number of points used to refer to absent objects, nor in terms of the repertoire of points used to refer to absent objects (e.g., none of the hearing children pointed at an arbitrary placeholder to indicate an intended referent). Thus, when hearing children are provided with an oral conventional language model, they will learn the spoken symbols provided by the model, and will preferentially use those symbols to talk about both the present and the nonpresent.

However, what happens when a child does not have access to a conventional language model? Our data suggest that such a child can develop a set of gestures that are also used to communicate about both the present and nonpresent. However, a comparison of the onset of communication about absent objects in the

deaf child in Study 1 and the hearing children in Study 3 suggests that, without a conventional language model, there may well be a delay in the age that the child begins to communicate about objects that are not immediately visible. The 3 younger hearing children, ranging in age from 2;2 to 2;6, produced words referring to absent objects between 9% and 14% of the time. In contrast, David at 2;10 had not yet begun reliably to use his pointing gestures to refer to absent objects.

The fact that the deaf child must, in a sense, invent his own symbols may delay his use of displaced communication, not only because he has a more limited set of symbols than the child exposed to a conventional language model, but also because it may take a considerable period of time for the deaf child to begin to view his gestures as symbols. The appearance of a number of abilities suggesting that David could reflect on his own gestures at age 3;3 when he also began to gesture about the nonpresent (see Discussion, Study 1), suggests that it may have been necessary for the child to distance himself from his gestures and discover their symbolic properties before he could use those gestures for displaced communication. Armed with a lexicon of words from a conventional language model and repeated examples of how to use those words to refer to the nonpresent, hearing children appear to discover quite early that their words are symbols (cf. Huttenlocher & Smiley, 1987). However, unlike hearing children who not only produce their words but are also exposed to other people using those words, the deaf child in our study had no systematic gestural input from which he could learn. Thus, he was forced to discover the symbolic properties of his gestures by reflecting upon his own gestures, a circumstance that could have delayed the appearance of displaced communication in the deaf child's gesture system.

It is worth noting that the deaf child at age 5;2 used pointing and characterizing gestures to refer to absent objects no less often than the oldest hearing child in our study, age 5;4, used words to refer to absent objects. Although it is impressive that the deaf child can communicate about absent objects as often as the hearing child does in a play session context, it is important not to overlook the fact that the deaf child is limited in his ability to communicate about events in the past, in the future, or in his imagination—limited in terms of the range of partners who are sufficiently informed about his world to interpret his gestures and, consequently, limited in terms of what he can communicate about, particularly if the event is not in the here and now. This broadening of partners and conversational topics may be one of the most important advantages that a conventional language model confers on the young child.

A conventional language model may also play a role in fostering the child's ability to understand that one's own mind may be different from another's (cf. Wimmer & Perner, 1983). The fact that David was able to manipulate the contexts in which he produced his gestures so that his interlocutor could interpret

those gestures (for the most part, successfully) as symbols for nonpresent objects, suggests that the child was able to take his communication partner's frame of reference into account, at least to some extent. Nevertheless, one can imagine that, without a shared language, David might have difficulty communicating to us that he knew there was baloney in the refrigerator but that his mother did not know. If appropriate instruments could be devised, it would be of great interest to determine whether the lack of a shared language affects the deaf child's ability, not only to communicate about another's beliefs, but also to realize the extent to which another's mind can be distinct from one's own.

## CONCLUSION

Hockett (1977), in his discussion of the defining features of language, considers the property of displacement, along with the properties of openness and duality of patterning, to be the nuclear or central properties of human language. The findings we present here, although necessarily tentative given the single subject, suggest that the deaf child's gesture system has this property of displacement. Thus, even a human communication system that has been developed by a child without the benefit of a conventional language model appears to allow for the possibility of communication about objects removed in time and space. The fact that displacement was found to be a property of the rather simple gestural system that the deaf child used to communicate reinforces the claim that displacement is indeed a fundamental property of human language.

Our data suggest that it is not necessary to be exposed to a usable conventional language model in order to develop displaced communication. Nevertheless, it is important not to underestimate the role that the child's cultural world might play in his development of displaced communication. The world in which the deaf child is growing up contains countless reminders of things past or imaginary. For example, the child's world contains pictures that the family has taken of past events, as well as pictures in books reminding the child of objects, people, and places that he cannot see at the moment. In other words, the child is surrounded by cues to the nonpresent, and it may be a relatively small step to be able to exploit these cues to refer to objects and events that are not in the here and now.

It is very likely that, as language evolved, the cultural artifacts that characterize our world evolved with it. Indeed, Hockett (1977) argues that the ability to carry artifacts (in particular, tools) and the ability to refer to objects that are not visible (displacement) developed side by side, each developing in small increments, furthered by the already achieved increments of itself and of the other. The deaf child in our study, although lacking conventional language, nevertheless had access to the artifacts that evolved along with language and that could have served as supports for the child's invention of displaced communication.

Thus, the techniques necessary to communicate about the nonpresent appear

to be fundamental to human language—so fundamental that they can be reinvented by a child who has access to the artifacts of the modern world but not to a culturally shared linguistic system.

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