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In memory of Jan Wind

Time and again: Displaced reference in the communication of linguistic isolates

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Summary

Displaced reference, proposed by Hockett (1960) as one of the principle design features of language, is defined as the ability to communicate about information that is 'remote from the site of the communicative transaction.' In this chapter we depart from past attempts to provide evidence for or against displaced reference as a specific design feature, and ask instead whether displaced reference will appear in the first generation of language creation, or whether it appears in a language only after many generations of use. Although rare, circumstances where humans create 'language' can be found. Specifically, deaf children of hearing parents are often unable to acquire the spoken language used in their communities, and are at times not exposed to a signed language. Under these circumstances, deaf children will generate an idiosyncratic communication system based upon gesture. This study examines whether deaf children use their gestures to make displaced reference. The results indicate that the children devise a means of referring to the non-present, increasing the level of abstraction in their displaced reference in a progression of three steps. The means the children use to evoke non-present ideas demonstrate a variety of ways in which humans, even without an historically evolved language, can transcend the perceptual boundaries of their environment.

1. Introduction

Many investigators of the role of language in human evolution propose that *displaced reference* is a design feature that made language an adaptive behavior (e.g., Barber and Peters 1992; Davidson and Noble 1993; Pinker and Bloom 1990; Williams 1966). Displaced reference is the feature of language that allows humans to establish reference to objects, events and ideas that are not present at the time of Interaction, obviating a dependence on environmental conditions for communication. In other words, displacement enables humans to transcend the physical and temporal boundaries of their environments and experience vicariously through language what others have experienced directly at other times and other places. In this chapter, we ask whether the capacity for displaced reference arises in a language only after many generations of adaptation to human use, or whether it will appear in the first generation of language creation.

Although extremely rare, there are a few cases of modern humans who create 'language.' Specifically, deaf children of hearing parents are sometimes unable to acquire the spoken language used in their communities, and are not exposed to a signed language. Under these circumstances, deaf children will generate an idiosyncratic communication system based upon gesture, called homesign (Kuschel 1973; Macleod 1973; Feldman, Goldin-Meadow and Gleitman 1978; Scroggs 1981; see also Morford 1996 for a review of research on homesign). Homesign systems display many of the structural features found in conventional languages, such as a stable vocabulary (Feldman, Goldin-Meadow and Gleitman 1978; Goldin-Meadow, Butcher, Mylander and Dodge 1994; Kuschel 1973), a distinction between nouns and verbs (Goldin-Meadow, Butcher, Mylander, and Dodge 1994; Macleod 1973), and gesture-internal structure (Goldin-Meadow and Mylander 1990; Goldin-Meadow, Mylander and Butcher 1995). Homesigners are also able to combine gestures productively such that their gesture strings exhibit simple grammatical structure (Goldin-Meadow and Feldman 1977; Macleod 1973; Scroggs 1981) and display recursion (Goldin-Meadow 1982, 1987). Goldin-Meadow and Mylander (1984, 1990) have determined that the specific structures, both morphological and syntactic, found in the homesign of the children they study, are not consistently present in the gestures used by the children's hearing parents. Thus, the study of homesign provides us with the rare opportunity to observe linguistic development with an absolute minimum of input from the environment.

In a recent study, Butcher, Mylander and Goldin-Meadow (1991) found that one profoundly deaf child used homesign gestures to refer to objects that were not present, despite the fact that the child's mother rarely used gesture in this way. Interestingly, they found that the child's points did not always refer to the objects and locations pointed to. The child sometimes pointed to *present* objects and locations to indicate an *absent* person or object. For example, one November day the child pointed to the corner of the living room where his family sets up the Christmas tree each year in order to refer to the absent tree that would be placed there in a few weeks time (Butcher et al. 1991: 328). Similarly, he requested a left-hand mitten puzzle piece from the experimenter by pointing to the right-hand mitten puzzle piece that he had already inserted into the puzzle (Butcher et al. 1991: 328). Further analyses revealed that non-pointing gestures (i.e., descriptive gestures) were also used to refer to absent referents. Butcher et al.'s findings are the first indication that *displaced reference* may arise in human language within the first generation of creation.

Communicating about absent objects is but a small part of displaced communication, and one of the first aspects to develop in children who are exposed to a language model (Bruner, Roy and Ratner 1982; Gopnik 1984; Lewis 1934; Sachs 1983). Between the ages of one and three, children undergo

considerable changes in their communication about the non-present. By two years of age, most children understand offers that are not perceptually supported by their surrounds (Zukow, Reilly and Greenfield 1982), and are beginning to refer to events in the past and future (Lucariello and Nelson 1987; Lewis 1934; Miller and Sperry 1988; Sachs 1983; Weist 1989). Reference to imaginary events also begins around the age of two, and may be related to acquiring past reference (Miller and Sperry 1988; Wanska and Bedrosian 1986). Finally, between two and three years of age, children develop the ability to refer to hypothetical events (Cromer 1974; Kuczaj and Daly 1979), first describing what they hope will happen (future hypotheticals), and eventually describing what could have happened instead of what did happen (past hypotheticals). Reference to past hypotheticals is particularly difficult for children to master, perhaps because past hypotheticals contradict children's knowledge about the past (Kuczaj and Daly 1979). In sum, humans who are exposed to an historically evolved language already possess the ability to refer to a wide range of displaced topics by the age of three—from requesting food to remarking that the tree wouldn't have fallen if it hadn't been struck by lightning.

In this chapter, we build upon Butcher et al.'s (1991) efforts to describe the use of homesign to refer to non-present objects. In particular, we explore the ability of linguistic isolates to communicate *all* types of information not perceptible in the environment, including events that are spatially and temporally displaced. We investigate this ability in a population of four profoundly deaf children, describing both individual and group patterns in development, as well as the devices that the children use to introduce non-present topics in their communication with their parents.

2. The study

2.1. Subjects

The data were collected in part in previous studies (see Goldin-Meadow 1979, Goldin-Meadow and Mylander 1984, Butcher and Goldin-Meadow 1996, Butcher et al. 1991, and Goldin-Meadow and Morford 1985) and in part for the present study. Four profoundly deaf (>90 dB bilateral hearing loss across the speech range) children of hearing parents living in the U.S. were followed longitudinally for two years starting at the ages of 2;3, 2;10, 2;11 and 3;1. The subjects are referred to here by the names of Abe, David, Marvin and Kathy. The parents chose to raise their children according to an educational method that forbids the use of a signed language and focuses on developing the children's speech skills. The best evidence that the children were not exposed to a signed

language was the absence of common signs in their gesture repertoires. Moreover, during the period we focus on here, none of these children had made significant progress in acquiring spoken language. They could produce only a few spoken words or holophrases, and did not combine words productively. Thus, the children all communicated primarily via gestures. None of the subjects exhibited any abnormalities in cognitive development. All four children came from working class families with native English speaking parents.

Cross-sectional data were also collected on a control group of hearing children acquiring a language that had been passed down over many generations, in this case, English (see Morford and Goldin-Meadow 1997, for a more detailed report on the development of displaced reference in hearing children acquiring English). Subjects included 4 children, 2 girls and 2 boys, at 6 points in development (ages 1;4, 1;9, 2;2, 2;7, 3;0 and 3;5). When possible, the hearing subjects were followed longitudinally, but most subjects appear in the data at only one age. There were a total of 18 hearing children, 8 girls and 10 boys. All the hearing subjects learned English from birth from native English speaking parents and showed no delay in language or cognitive development. The socio-economic status of the hearing children's families was working class to professional.

2.2. Procedure

The children were videotaped while playing with their mothers and/or an experimenter for approximately one hour. Longitudinal data were collected every two to four months. The parents were asked to play with their child using a set of toys provided by the experimenter. A wide variety of toys was used including picture books, bubbles, wind-up animals, puzzles, and various vehicles. The subjects were encouraged to remain within camera range, but otherwise their play was not directed.

2.3 Data transcription and coding

The speech and symbolic gestures produced by the subjects were transcribed from one hour of each taping session for the deaf children, and one half hour of each taping session for the hearing children.[1] Transcriptions included information about the speaker, the form of the gestures, any speech or vocalizations, whether gesture and speech co-occurred, whether gesture and speech were spontaneous or imitated, who initiated the communication topic, and contextual information (see Goldin-Meadow and Mylander 1984: 15-32, for a detailed description of gesture

coding and how meaning is assigned to gestures). The deaf children's communications were comprised almost entirely of gesture (94%, n=2713 utterances). When they did speak, they often imitated their caretakers (51%, n=162 utterances). Spoken imitations, as well as all gesture imitations, were not included in the analyses.

All utterances from the first half hour of each taping session for the deaf children were coded for displacement; this enabled us to analyze the relation of communication about present topics to communication about non-present topics. For the hearing children a similar analysis was carried out on a ten minute sample. For the remainder of the session we transcribed only utterances that referred to the non-present. The displaced utterances from the entire session were used to investigate linguistic devices and to calculate the hourly production rate of different categories of displaced communication. A total of 4603 utterances were transcribed from the videotapes (2713 from the deaf sample and 1890 from the hearing sample). 6% of the utterances from the deaf sample and 5% from the hearing sample were excluded because they could not be interpreted; another 5% of the utterances from the deaf sample and 4% from the hearing sample were excluded because they were imitations. Thus, the database used for the following analyses included 4139 utterances, 2417 from the deaf sample and 1722 from the hearing sample.

2.3.1. Coding displacement

According to Hockett's (1960) description of the design features of language, an utterance exhibits displacement if it directs the interlocutor's attention to some information that is not perceptible in the environment of the communicators. We classified displaced utterances, both gestured and spoken, into nine categories based on their degree of displacement from the present. Following is a description of each category, with a gestured and a spoken example of each (see Appendix for an explanation of the homesign transcription system).

(1) Non-occurring action
Child asks adult to perform an action that is not presently occurring. Utterance indicates that child can imagine a consequent change to the present context.

Gesture: "Index [Mother] - KNOCK DOWN," gestured in the context of the child building a tower of blocks with mother.
Speech: "Can you open this?" said in the context of the child examining a shape box.

(2) Non-visible object
Child indicates a characteristic property of an object that is not visible in the room in order to request the object or to signal that he or she is searching for the object.

Gesture: "HAT - WHERE" gestured in the context of searching until the child retrieved a paper crown that the experimenter had brought to him.

Speech: "Ball," said in the context of the child's mother unzipping the toy bag the experimenter had brought.

(3) Non-present characteristics (actions, attributes, or locations) of a present object

Child describes a characteristic action, attribute or location associated with an object. The object is present in the context, but the characteristic described by the child is not.

Gesture: "Index [picture of football] - Index [rubber ball] - KICK" [A football is a ball you kick; OR Footballs, like rubber balls, are for kicking] gestured in the context of looking at a picture of a football and using the ball lying on the floor to explain an attribute of the ball in the picture. No kicking occurs either prior to or following the utterance.

Speech: "This is... for looking with," said in the context of the child handing her mother a toy mirror that does not show a reflection.

(4) Immediate past

Child refers to an event that occurred during the observation session. Utterance indicates that the child can represent events after they have been completed, but it is not clear whether the child categorizes these events into a different temporal category or whether they are included in an extended present.

Gesture: "Index [Bubble jar] - EXPAND" gestured in the context of having just blown a very big bubble that popped.

Speech: "See, I flipped over," said just after the child did a flip on the couch.

(5) Immediate future

Child describes an event before performing it or before another performs it. Utterance indicates that the child can represent events before they have taken place, but it is not clear whether the child categorizes these events into a different temporal category or whether they are included in an extended present.

Gesture: "WAIT! WAIT - Index [camera]. WAIT - Index [self]. WAIT" gestured in the context of the child wanting to temporarily halt play to go take a look through the camera. After gesturing, the child walks to the camera and looks through it.

Speech: "I'm gonna hook cars," said just before a child stood up and retrieved a toy car that he then pretended to lift with the toy helicopter.

(6) Past

Child refers to event that occurred prior to taping session. Utterance indicates that child can represent past events without evidence of their completion in the present context.

Gesture: "Index [self] - LAUGH - MOUSTACHE - Index [own knee] - FIRETRUCK - EAT. Index [self] - NON-PRESENT MARKER - Index [self]," gestured in the context of eating a pretzel that was given to the child after a visit to Santa earlier that day, during which the child had sat on Santa's knee and requested a firetruck for Christmas.

Speech: "When I was a baby, my mom used to take me on a tractor," said spontaneously in the context of looking at some pictures in a book with the experimenter.

(7) Future

Child refers to event that will occur after the taping session. Utterance indicates that child can represent events before they occur and before preparation to carry them out.

Gesture: "Index [chair] - MOVE AWAY - MOVE AWAY. Index [chair] - Index [downstairs]. CHIMNEY. MOVE AWAY [chair/table] - MOVE HERE [cardboard chimney]," gestured in the context of playing with a Santa doll shortly before Christmas. Mother explains that they always put up a cardboard chimney where the chair is sitting since they don't have a real fireplace. In the past they have moved the chair to one side, but this year they plan to move the chair downstairs.

Speech: "And after three, I'm going to be four," said by a child after the experimenter had asked how old she was.

(8) Potential

Child describes contingency of two events. Utterance indicates that child can distinguish between two possible relations, at least one of which is not present.

Gesture: "ALLGONE. KNOCK DOWN - CAN'T" gestured in the context of someone urging the child to knock down a tower just before it falls on its own. The child expresses inability to hit the tower after it has fallen.

Speech: "If we close that up, she won't go out," said after the child has placed a toy animal in a toy barn.

(9) Fantasy

Child refers to non-actual event. Utterance indicates that child represents events that he or she knows did not or will not actually occur.

Gesture: "Index [picture of fish] BITE [me]!" gestured in the context of looking at a picture of a fish in a book. Child gestures, pretends to be in pain, then laughs.

Speech: "She's findin' some monsters," said by a child when his mother asks him what a toy animal is doing in the toy barn.

2.3.2. Coding devices

In addition to determining *whether* the homesigners were able to refer to a variety of displaced topics, we explored *how* they evoked the idea of a non-present referent in their communication partner. Thus, in a second step, the transcription of each displaced utterance was read out of context. If the utterance could only be interpreted as referring to the non-present, the specific gesture that referred to the non-present was then listed as an *explicit device*. Subsequently, the remaining utterances were analyzed in context to determine the contextual information that had permitted the utterance to be interpreted as a reference to the non-present. These strategies are described as *implicit devices*.

2.4. Reliability

One of the authors (JM) transcribed and coded all of the data with the exception that a portion of the homesign sessions had previously been transcribed. A second coder independently analyzed a subset of the data. Interrater reliability for dividing the data into utterances was 80% (n=94) for the homesigning children and 88% (n=304) for the hearing children; reliability for dividing the utterances into topics was 94% (n=111) for the homesigning children and 91% (n=223) for the hearing children; reliability for distinguishing between communication that was displaced and communication that was not displaced was 88% (n=128) for the homesigning children and 83% (n=201) for the hearing children; reliability for determining the type of device used to convey displaced reference was 89% (n=61) for the deaf children (this analysis was not done on the hearing children).

3. Displaced communication without exposure to language

3.1. Three steps in development

Table 1 reports the mean number of displaced utterances produced per hour for each category of displaced reference over development. The nine categories of displaced reference are listed across the top of the table in the order that children began referring to them. The most striking feature of this table is the stair step pattern of onset ages for *both* sets of subjects. Rather than a gradual developmental progression through these categories, the data cohere into three larger steps that are conceptually coherent. First, at around age 2;7 for the homesigners and age 1;4 for the English speakers, we found that the children referred to *non-present objects, actions, attributes or locations* with their gestures and speech. In these utterances, the children demonstrated the ability to refer to what they knew about an object or action—and were not limited to what was currently visible. In order to be classified in one of the three types of displaced reference in this first step (i.e., Request Action, Non-Visible Object and Non-Present Characteristics), the child's utterance had to reflect knowledge that the child had about an object, action or characteristic that was not currently perceptible; it was not sufficient for the utterance merely to refer to the absence of the object, action or characteristic. Thus, for example, when a child was searching for a toy crown and looked at his mother with a shrug, the gesture was *not* considered an instance of displaced reference simply because the gesture, although indicating that the child was looking for an object, did not provide information specifying the missing object. In contrast, when the child patted the top of his head (thus indicating the habitual location of the missing crown) along

Table 1
Mean Number of Displaced Topics per Hour

Age (# Subjects)	Nonpresent Objects, Actions, Attributes & Locations			Proximal Events		Distal and Non-actual Events			
	Non-Present Action	Non-Present Object	Non-Present Characteristic	Immediate Past	Immediate Future	Potential	Past	Future	Fantasy
A. Deaf Children									
2;0-2;4 (1)									
2;5-2;9 (1)	3.0	0.5	0.5						
2;10-3;2 (4)	1.5	0.9	0.8	0.6					
3;3-3;7 (4)	4.3	1.0	3.4	0.3	0.4				0.1
3;8-4;0 (4)	3.9	2.0	11.1	1.1	1.9	0.4	0.6		0.6
4;1-4;5 (2)	5.0	4.0	1.5	2.5	1.6	0.1	0.5	0.1	0.5
4;6-4;10 (3)	9.2	6.5	7.2	1.5	4.5	0.5	1.0	0.4	0.2
4;11-5;3 (4)	5.8	4.3	3.8	1.5	3.8	0.8	1.8	0.7	1.3
B. Hearing Children									
1;2-1;6 (4)	2.5	5.5	1.5						
1;7-1;11 (4)	4.0	6.0	2.0	2.0	0.5				
2;0-2;4 (4)	6.0	8.5	5.5	2.0	3.5				
2;5-2;9 (4)	11.5	4.0	6.0	7.8	8.0	1.5	1.3	0.3	6.5
2;10-3;2 (4)	11.5	5.0	8.3	6.3	9.8	4.3	6.0	2.0	13.3
3;3-3;7 (4)	7.0	11.5	24.5	8.5	20.0	14.0	7.8	2.5	5.5

with the WHERE gesture, the gestured utterance was classified as an instance of displaced reference. Also included in this first type of displaced reference were utterances referring to objects that were present in the room, but pointing out a non-present characteristic of that object (e.g., when a child looking at Dumbo the elephant pointed to his ear and gestured FLAP, the child's gestured utterance was considered displaced since it referred to an action that was not currently taking place and thus was non-present). In general, to produce an instance of the first type of displaced reference, the child must attempt to communicate information which in some way goes beyond what is perceptible in the present context.

In a second step, at approximately age 3;0 for the homesigners and age 1;9 for the English speakers, the children began referring to *proximal events*, that is, to events that took place during the observation session but prior to or after the communicative act. This second type of displaced reference differs from the first in that the child describes an entire, specific event rather than a piece of an event—that is, an entire event rather than an isolated object, action, or property. It differs from the third type of displaced reference in that the event described, although not actually occurring at the moment the utterance is produced, is still very much tied to the present context. Reference to proximal events might thus serve as a transitional step in developing the ability to refer to more distant events. As children began using these types of reference, we also noted a sudden decrease in previous communication strategies that did not depend upon displaced reference (e.g., waving a hand so that caretakers would watch them engage in an action, or showing the outcome of their actions, such as a picture or a broken toy, to a caretaker).

It is particularly striking that the children began referring to proximal events *after* they first referred to non-present objects, actions, attributes or locations. Previous studies of reference to proximal events have suggested that children do not distinguish these events temporally from the present in their earliest communicative acts (Antinucci and Miller 1976; Bloom, Lifter and Havitz 1980; Bronckart and Sinclair 1973; but see also Weist 1989, who argues that children acquiring Slavic languages encode temporal deixis as early as 1;6 to 2;0). However, this type of communication does demonstrate an ability to communicate about actions independently from partaking in those actions. Our data suggest that acquiring this ability is a developmental step for the child. Moreover, this developmental step appears to be one that children take even if they are not exposed to an historically evolved language.

Finally, the children made use of what is more traditionally considered displaced reference, reference to *distal or non-actual events*, specifically, reference to remote past and future, hypothetical and fantasy events, starting around age 3;5 for the homesigners and around age 2;7 for the English speakers. Unlike the previous types of displaced reference, in which all four homesigning

subjects made reference to every sub-category, there was a great deal of individual variation in this category among the homesigners (although not among the English speakers). Only David ever made reference to all four types of displaced events. Interestingly, David was also the child who made displaced reference the most frequently as a proportion of his total communication. Two children, Marvin and Kathy, referred to past and fantasy events and not to future and hypothetical events. These subjects were intermediate in their frequency of displaced reference. Abe, who referred to displaced topics the least of all four deaf children, also referred to the fewest types of distal events. He referred only to past events. Thus, although all four children did produce some instances of displaced reference in this third developmental step, it also appears that the more abstract reference becomes, the more variable humans are in their ability to generate a novel means of expression.

The individual data from longitudinal analyses of the homesigners confirm the pattern found in the group analysis.[2] Namely, the onset of reference to non-present objects, actions, attributes, or locations preceded the onset of reference to proximal events which, in turn, preceded the onset of reference to distal or non-actual events. Kathy first referred to non-present objects, actions, attributes or locations at age 3;4, to proximal events at 3;6, and to distal and non-actual events at 4;0. Comparable onset ages were 2;5, 2;10 and 3;7 for Abe, and 2;11, 3;1, and 3;9 for Marvin. David referred both to non-present objects, actions, attributes or locations and to proximal events in his first session at 2;10, but did not begin to refer to distal or non-actual events until 3;3. Thus, for each individual homesigner, and for the group of hearing subjects as well, the ability to communicate about the non-present emerges in three steps. Although these steps occur at different ages in different individuals (and notably earlier in children exposed to a language, cf. Table 1), the order of their appearance is apparently robust.

Figure 1 shows the proportion of all communication that is displaced (collapsed across types) for each individual homesigner, and for the group of hearing subjects. There was some increase over development in the frequency of displaced reference for all subjects, but the actual proportions differ from child to child and are generally lower for the homesigners than for the hearing children. Abe increased his displaced reference from 0 at age 2;5 to 14% of his communications by age 5. Kathy and Marvin produced displaced reference somewhat more, starting at 0% and 9% respectively at age 3;0 and increasing to 18% and 33% between the ages of 4;8 and 5;1. David, the only homesigner to use displaced reference proportionally as often as the hearing subjects, was referring to the non-present in 11% of his communications at age 2;10 and increased to as much as 43% of his communications by the end of the study. As mentioned previously, this individual variation in the *frequency* of displaced
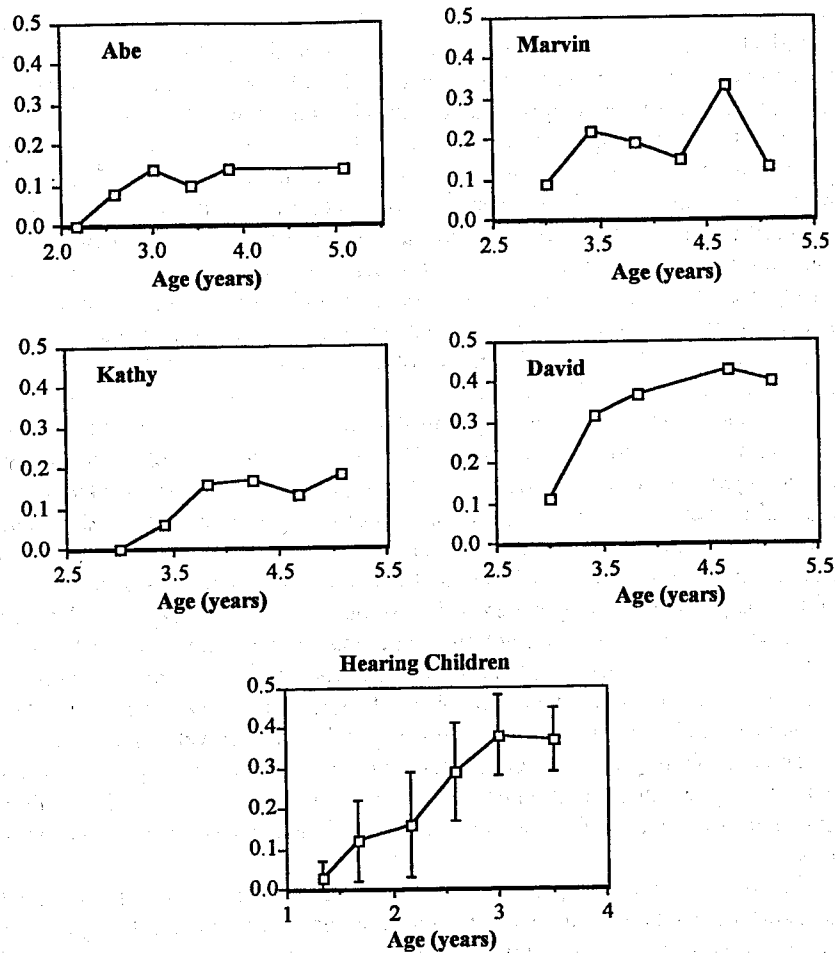
Figure 1

Mean proportion of all topics that were displaced. Each data point represents a 4-month observation period. Error bars for the Hearing Children show the standard deviation.

reference could be related to the *types* of topics the deaf children were able to communicate about with their parents. We turn now to a discussion of the devices the homesigners used to identify non-present referents, in order to understand *how* it is possible to refer to the non-present using a communication system that has evolved over only a single generation.

3.2. Devices for evoking the non-present

Having found that the homesigners were able to initiate communication about non-present topics with their caretakers, it becomes necessary to ask how they were able to do it. Unlike humans who acquire a natural human language, these children had no model in their environment to indicate how time and space are to be categorized and marked. Tense and aspect systems differ from language to language, thus, we had no a priori hypotheses about the realization of displacement in homesign.

We describe first the devices that resemble displacement markers in conventional languages most closely, specifically lexical markers of displacement. We call these devices *explicit*, because they denote a non-present referent irrespective of the sentence context in which they appear. Subsequently we will describe the *implicit* markers, which depend on some shared association between the communicative partners in order to derive the displaced meaning. The deaf children produced a total of four different explicit markers. Two homesigners generated displacement markers that were novel gestures, and several of the homesigners appropriated two conventional gestures from their caretakers, but modified the meaning.

3.2.1. Explicit devices

Novel Gestures. Two of the homesigners generated novel gestures that they used to identify the non-present. These gestures are considered novel because the caretakers were never observed to use them. Moreover, these two gestures and their meanings were each unique, suggesting that they were independently generated by the two children. The evidence for one of the two gestures is very limited. Marvin produced a gesture that clearly referred to the past, but we observed it only once during our taping sessions. This gesture occurred while he was looking at flashcards with his mother. When he saw a picture of a poodle, he showed it to his mother with a look of excitement and recognition. His mother responded, "That's right. We used to have a gray poodle, hunh?" Marvin then pointed over his shoulder behind himself, pointed to the picture, and finally pointed to the floor in front of himself repeatedly. The point over his shoulder was apparently in reference to the past.

The evidence for the second novel displacement marker is stronger. David produced a gesture eight times to refer to both remote future and remote past events, such as repairing toys (Future) and a trip to Santa (Past). The gesture was made by holding the hand vertically near the chest, palm out, and making an arcing motion away from the body. David's caretakers glossed this gesture as AWAY, as though it referred to spatially remote occurrences. In fact, the events David described with this gesture were all both spatially and temporally displaced. There are no examples of this gesture in reference to objects that were spatially displaced, but not temporally displaced; thus we believe that the gesture refers to a combination of spatial and temporal displacement, but not to spatial displacement alone (as the gloss 'away' suggests). For example, David produced this gesture while describing a past experience that occurred on the schoolbus his grandfather drove. In one utterance, he produced the spoken word he used to address his grandfather, "Ba-ba," and then gestured DRIVE followed by the displacement marker. Later in his narrative, he produced this string again, with a repetition of the gesture DRIVE at the end.

Conventional Gestures. In addition to the two novel gestures, the deaf children used two other explicit displacement markers that they appropriated from conventional gestures used in U.S. American culture. Three of the four homesigners (Abe, David, Kathy) used a conventional gesture that is made by holding both hands out to the sides, and then flipping the hands from palm down to palm up; the hand movements are often accompanied by a shrug of the shoulders. This gesture is typically used in the United States to express doubt or uncertainty. In addition to using the gesture for this conventional meaning, the deaf children also used the gesture to signal non-visible objects. In these instances, we glossed the gesture with the meaning WHERE. The children first used the WHERE gesture alone, which we considered a transitional stage and did not code as displaced reference since the gesture does not provide any information about the non-visible object. But subsequently, the children began combining the gesture with both pointing and characterizing gestures. For example, Kathy was looking at flashcards and saw a picture of a fish. Later, when looking at a book, she saw another picture of a fish, and she combined a point to the picture in the book with the WHERE gesture to request that the experimenter help her find the flashcard that pictured the fish.

Three of the four homesigning children (David, Marvin, Kathy) used a second conventional gesture that is formed by holding up the index finger, and is often used in the United States to request a brief delay or time-out moment. In addition to using the gesture for this conventional meaning, the deaf children also used the gesture to identify their intentions, that is, to signal the immediate future. In these instances, we glossed the gesture as meaning WAIT. Again, the deaf children first used the WAIT gesture alone, a transitional stage, and then began to

use it in combination with other gestures (often points at themselves and points at the objects they intended to manipulate or places they intended to go to). For example, Marvin gestured WAIT and then pointed at the toy bag to indicate that he was going to go retrieve a new toy. Kathy used the WAIT gesture to signal the immediate future 12 times, David once, and Marvin 3 times.

The caretakers of the deaf children also used these conventional gestures. However, they used these gestures only for their conventional meanings and never as displacement markers (see Morford and Goldin-Meadow 1997). In particular, unlike their children, the caretakers never used the WHERE gesture to request that their children help them find non-visible objects, nor did they use the WAIT gesture to describe their future actions. Thus, the children themselves seemed to be fully responsible for the new function each of these two gestures assumed.

Given the fact that the children appeared to be the 'inventors' of the displacement function for these two gestures, it is somewhat surprising that the three children (who lived in three different cities and did not interact with one another) appropriated the WHERE and WAIT gestures for the same displacement functions. This commonality across three unrelated children suggests that, in each case, the derived meaning for the gesture was likely to have been constrained by the conventional use of that gesture in the caretakers' culture—given similar starting points, the deaf children arrived at similar markers for signaling the non-present. Note, however, that even though all four of the deaf children were exposed to these conventional gestures, in each case, only three of the four modified the gesture for an alternative use (the fourth child used the gesture but did not use it to signal the non-present). Thus, the presence of a conventional symbol in a child's environment is no guarantee that the child will appropriate that symbol and use it to mark displaced reference.

The explicit devices described here were used in only a small proportion of the topics referring to the non-present (5%, n=556). We now turn to the question of how the homesigners were able to refer to non-present objects, actions, and events if they did not make use of an explicit marker. There were five strategies used for this purpose: labeling, indicating multiple constituents, non-literal pointing, inflection, and juxtaposition.

3.2.2. Implicit devices

Labeling. In most cases in which the homesigners wished to communicate about the non-present, they simply labeled an action, object, attribute, agent or event outcome that was not presently located or occurring in the room with a descriptive gesture. This was possible to the extent that the homesigners had

descriptive gestures for these entities in their homesign vocabulary. For example, Marvin was able to request a non-present beverage by gesturing DRINK and pointing to the kitchen, but he was not able to ask for orange juice instead of orange soda because he didn't have separate gestures for these beverages. Moreover, in order for this strategy to be effective the child's labels had to be transparent enough for the conversational partner to understand their significance. In other words, a parent's inability to decipher a gesture acted as a limit on the child's vocabulary development. All four of the deaf children used labeling to refer to the non-present and did so on 74% of the occasions that they used implicit strategies to refer to the non-present (52% for Abe, 83% for David, 65% for Kathy, and 78% for Marvin).

Indicating Multiple Constituents. In a few cases, the children identified an event that was not occurring in their environment, not by labeling a piece of the event with a characterizing gesture, but by pointing to at least two (present) constituents of the event (including the agent, the patient, and/or the location). For example, to comment on the fact that she had blown some bubbles, Kathy pointed to several bubbles and then proudly pointed to herself repeatedly. All four of the deaf children indicated multiple constituents to refer to the non-present and did so on 7% of the occasions that they used implicit strategies to refer to the non-present (10% for Abe, 2% for David, 8% for Kathy, and 6% for Marvin).[3]

Non-Literal Pointing. An alternative implicit strategy that the deaf children used to convey non-present objects was non-literal pointing (see Butcher et al. 1991). The points used by the homesigners did not always refer to the object or locus at the end of their point. Rather, the child often intended to refer to an associated object, agent, or location. Specifically, the children pointed (1) to present objects to refer to perceptually similar objects, (2) to present locations to refer to an agent or object associated with that location, and (3) to present locations where an event was about to occur or where an event had already occurred. In addition, the children often pointed to pictures in order to refer to a real object. All four of the deaf children used non-literal points to refer to the non-present and did so on 20% of the occasions that they used implicit strategies to refer to the non-present (19% for Abe, 19% for David, 25% for Kathy, and 17% for Marvin).

Inflection. A related implicit strategy involved inflecting characterizing gestures. Verb inflection in signed languages (Padden 1983) and in homesign (Goldin-Meadow, Butcher, Mylander and Dodge 1994) is performed by moving the sign or gesture from neutral signing space directly in front of the signer to another location. For example, in homesign, a TWIST gesture can be combined with a point to a jar, or alternatively, the TWIST gesture can be produced over or near the jar (see Butcher et al. 1991). Inflection was sometimes used by the homesigners to refer to performing an activity not on the inflected object, but on a

similar object. For example, Marvin inflected the gesture EAT for a picture of gumdrops to indicate that he likes to eat real gumdrops. All four of the deaf children used inflection to refer to the non-present and did so on 3% of the occasions that they used implicit strategies to refer to the non-present (6% for Abe, 2% for David, 3% for Kathy, and 2% for Marvin).

Juxtaposition. The final implicit strategy observed in the homesigners' communication, juxtaposition, was used only by David to refer to potential events. In order to show the contingency of two events, David juxtaposed two situations in which a single element had been altered or negated. For example, in order to express the idea that you couldn't see a toy if you didn't remove a part of the packaging, he gestured looking at the toy with the packaging (and squinted his eyes to show that he couldn't see) and then looking at the toy without the packaging (opening his eyes wide to show that he was able to see). In this way, he could demonstrate the contingency between the presence of the packaging and the ability to see the toy. As mentioned above, only David used juxtaposition to refer to the non-present and he did so on 2% of the occasions that he used implicit strategies to refer to the non-present.

In sum, we have identified four *explicit* devices for marking displaced reference, including two novel gestures and two gestures appropriated from the conventional gestures used by the hearing caretakers and modified in meaning. We have also identified five *implicit* devices for marking displaced reference, including labeling non-present entities, indicating multiple constituents of a non-present event, non-literal points, inflection and juxtaposition. Thus, by combining their symbolic abilities with pragmatic strategies, these children generated a variety of ways of communicating about objects and events that were not perceptible in their environments.

4. Conclusions

We began this chapter by asking whether one design feature of human language, displaced reference, can emerge within a single generation of language creation. We have found that children who have been isolated from historically evolved languages will indeed devise a means of identifying non-present referents—not only non-present objects, but entire events as well. They do this by (1) generating novel gestural markers for the non-present, (2) modifying the meaning of gestures used by their parents, and (3) by exploiting pragmatic devices to evoke the non-present in the minds of their conversational partners. Thus, we conclude that the capacity to make displaced reference is a resilient function of human language.

Although there were individual differences in onset and frequency, all four subjects followed a developmental progression in their reference to the non-

present that paralleled the development of displaced reference in children acquiring a spoken language. First, the children referred to objects, actions, attributes, and locations when they were not present in the communication situation. Second, children began to tell others about proximal events, events that took place immediately prior to or after the child's communication about the event. Third, children referred to distal and non-actual events, showing evidence of planning and evaluating experience over much longer time frames. Note that with each of these three steps, the child's communication is becoming progressively more removed from the here-and-now. Given that we find the same developmental progression regardless of whether or not children are exposed to an historically evolved language, a likely explanation for the order of the emergence of different types of displacement is that each step is associated with advances made in conceptual development.

One indication that the children's gesture use reflects their representations of time and space comes from a comparison of the novel lexical markers generated by David and Marvin. These two children developed *different* systems for marking the non-present, suggesting different underlying conceptual structures. David developed a category of events that were 'distal from the body' (recall the gesture: a flat palm pushing away from the body toward the right front). The range of reference thus included spatially displaced events that occurred in both past and future. In contrast, Marvin's temporal marker suggests that he may have conceptualized past events as inhabiting a space behind him—he used a point over his right shoulder to refer to a past event (Marvin may have conceptualized past events separately from future and present events, although more instances of the marker are needed to make this point). Neither of these conceptions of time and space is novel in human communication. Spatial metaphors of time are widespread in language, with the past and future inhabiting spaces both behind and in front of the speaker. The present examples are of interest in part because the children used spatial metaphors for the expression of temporal relations despite the fact that they had never been exposed to the time/space metaphor in a conventional language.

One question that is raised by considering the different conceptual structures reflected in the gestures of these homesigners is the possibility that the children's homesign systems were influenced by cultural forms of representation other than the conventional language spoken by the children's caretakers (Goldin-Meadow 1993). The idea that the past is located behind the speaker is a common conception in U.S. American culture. Might this information be conveyed to a child through visual non-linguistic means? Morford (1993), in a micro-analysis of the references to the past produced by the children in this study, reports that all but three of the child-initiated references to the past were produced in the presence of a photograph, a picture, or a toy.[4] Thus, the presence of cultural

representational products may have played an enormous role in facilitating communication about past events, and perhaps about displaced events more generally. Family photographs are one of the many types of 'objects' about which children acquire knowledge. Referring to the event pictured in a photograph was only a small extension of the earliest type of displacement observed, namely, commenting on objects, actions, attributes or locations which were not present in the room. The two explicit markers that the homesigners adapted from gestures used by their caretakers (the upturned palms, WHERE, and the raised index, WAIT) are additional evidence that the homesigners exploit any representational or symbolic material they find in their environments and combine it with the perceptual categories they have developed independently of linguistic input for the purpose of communicating about the non-present.

The view of the child language learner as searching for and exploiting all forms of representation in their environments fits well in a broader theory of the origin and evolution of human culture and cognition proposed by Donald (1991). Unlike other evolutionary theories that describe human evolution in terms of behavioral changes, Donald characterizes the stages of evolution in terms of the primary "representational strategy" (Donald 1991: 149) underlying human behavior. In particular, Donald characterizes ape culture, which preceded human culture, as "episodic," in that apes are limited to responding to the immediate environment. "Animals excel at situational analysis and recall but cannot re-present a situation to reflect on it, either individually or collectively" (Donald 1991: 160). The one case, to our knowledge, in which animals are said to refer to the non-present, is reported by Savage-Rumbaugh, Murphy, Sevcik, Brakke, Williams, and Rumbaugh (1993). Their bonobos, who have been exposed to both spoken English and a visual symbol system since birth or shortly after, have been reported to refer on at least one occasion to a past event. In terms of Donald's theory, the bonobo experiment suggests that it is possible (although apparently very difficult) to draw a primate beyond the bounds of episodic culture by introducing one of the representational strategies of human culture. In light of this, the relative *inability* of primates to communicate about the non-present through either conventional or non-conventional means in the wild and the relative *ease* of humans to generate a symbol system without conventional input becomes all the more compelling.

How, then, do humans generate novel symbols for referring to the non-present? Do these data suggest that there is a propensity to develop grammaticized spatial or temporal marking? At best, we could argue that the homesigners developed lexical markers of space and time by the age of five. However, in no case did these markers appear to be used obligatorily. In the field of pidgin and creole linguistics, the grammaticization of tense has received considerable attention (Bickerton 1984, 1988; Bybee 1994; Hopper and Traugott

1993; Labov 1971; Mufwene 1983; Sankoff 1990; Singler 1990). In one of the most widely cited papers on this topic, Labov (1971) noted that pidgins lack the obligatory tense markers that are present in creoles. Although speakers of pidgins refer to various times, they mark their references with temporal adverbs or not at all. As pidgins evolve into creoles, various adverbs and verbs are shortened and adapted to auxiliary markers that occur close to the main verb, and eventually can be adjoined to the verb as unstressed bound markers.

With respect to this property, homesign appears to resemble pidgins more closely than creoles[5] (i.e., it appears to use lexical markers or no markers at all). Note, however, that there are significant differences in the conditions under which homesign systems, on the one hand, and pidgins and creoles, on the other, develop. Pidgins draw their vocabulary from an established language, called a lexifier. Homesign systems have no lexifiers[6] (or at best very degraded ones in the gestures of the caretakers) and thus begin from a more impoverished starting point than most pidgins and creoles. Moreover, the homesigners in this study also lacked a community of users since their caretakers were trying to communicate with them through speech. Thus, the strongest conclusion we could draw from the homesign evidence is that the nativization process (i.e., the acquisition of the system as a native language) may not, on its own, be sufficient to generate an obligatory tense system.[7] The presence of a fairly well developed lexicon, as is the case with pidgins and creoles, may be a second condition.

In sum, we are left with the view that humans will generate a means for communicating about the non-present, whether they have a linguistic model for doing so or not. The means they use to achieve that end are varied, and demonstrate that multiple paths can lead to displaced reference. The children's novel gestures reflect an ability to borrow from one conceptual domain to represent another; in the modification of conventional gestures and in the use of other forms of representation, such as pictures and toys, the children demonstrate an ability to exploit the communicative potential of symbols that were created for other purposes. Finally, the children's ability to highlight the information within their environment that would evoke thoughts about the non-present in their interlocutors suggests that, even without the learning that occurs via language, humans can have a remarkably sophisticated understanding of what goes on inside another's mind. Taken together, this evidence provides a strong basis on which to conclude that displaced reference is not an epiphenomenal byproduct of human language. On the contrary, humans can and will generate a means of referring to the non-present even in a single generation.

Notes

1. The hearing children produced many more communications per hour than the deaf children. As a result, the data are reported in proportions.
2. Two of the four deaf children referred to non-present objects, actions, attributes or locations in their first taping sessions (David at age 2;10, and Marvin at 2;11), and one of those two referred to proximal events in his first taping session (David at age 2;10). We therefore cannot be certain that we observed the first production of these types of displaced reference in these two deaf children.
3. At times, the children used more than one implicit device within a single displaced utterance; as a result, the percentages across the five types of implicit devices sum to more than 100% for each of the four children.
4. The remaining three child-initiated references to the past were initiated in the presence of an object that was actually present at the past event.
5. See Kegl and McWhorter (in press) for an interesting discussion of how the evolution of signed languages from homesign systems can inform our understanding of the creolization process.
6. Homesigners must generate their own gesture lexicons, with the exception of the few conventional gestures they adopt from their hearing parents.
7. Recall that only manual devices were investigated in this study. It is possible that the homesigners developed obligatory tense systems via non-manual markers that went unidentified in this study. ASL, for example, uses both manual lexical tense-markers and non-manual tense inflection of verbs in complementary distribution (Aarons, Bahan, Kegl and Neidle 1992).

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Appendix

Notational conventions:

The following notational conventions are used to represent homesign gestures:

1. Characterizing gestures and markers are represented with English glosses in capital letters.

    Examples: WHERE

                KNOCK DOWN

2. Pointing gestures are represented by the word Index followed by the name of the locus of the point in brackets.

    Examples: Index [self]

                Index [picture of balloon]

3. Characterizing gestures inflected for agent, object or place are represented by an English gloss followed by the inflected agent, object or place in brackets.

    Examples: KNOCK DOWN [tower]

                MOVE AWAY [chair]

4. Multiple gestures in a gesture string are separated by a dash.

    Examples: BLOW - Index [Mother]

                Index [picture of apple] - EAT

5. Multiple gesture strings are separated by periods, question marks and exclamation points depending on the child's affect.

    Example: BLOW - Index [Mother]. POP - Index [self].