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6. Homesign: When gesture is called upon to be language

1. Gesture's role in learning a spoken language
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Abstract

*When people speak, they gesture, and young children are no exception. In fact, children
who are learning spoken language use gesture to take steps into language that they cannot
yet take in speech. But not all children are able to make use of the spoken input that sur-
rounds them. Deaf children whose profound hearing losses prevent them from acquiring
spoken language and whose hearing parents have not exposed them to sign language also
use gesture, called homesigns, to communicate. These homesigns take on the most basic
functions and forms of language – lexicon, morphology, sentential structure, grammatical
categories, sentential markers for negations, questions, past and future, and phrasal struc-
ture. As such, the deaf children's homesign gestures are qualitatively different from the
co-speech gestures that surround them and, in this sense, represent first steps in the
process of language creation.*

*All children who learn a spoken language use gesture. But some children – deaf chil-
dren with profound hearing losses, for example – are unable to learn the spoken language
that surrounds them. If exposed to a conventional sign language, these deaf children will
acquire that language as naturally as hearing children acquire spoken language (Lillo-
Martin 1999; Newport and Meier 1985). If, however, deaf children with profound hearing
losses are not exposed to sign, they have only gesture to communicate with the hearing
individuals in their worlds.*

The gestures used by deaf children in these circumstances are known as homesigns. They are different in both form and function from the gestures that hearing children produce to communicate along with speech, and resemble more closely the signs that deaf children of deaf parents and the words that hearing children of hearing parents learn from their respective communities. We begin with a brief look at the gestures that hearing children produce in the early stages of language learning, and then turn to the homesign gestures that deaf children create to substitute for language.

1. Gesture's role in learning a spoken language

Gesture is very often a young child's first way of communicating with others. At a time when children are limited in the words they know, gesture can extend the range of ideas they are able to express. The earliest gestures children use, typically beginning around 10 months, are deictics, gestures whose referential meaning is given entirely by the context and not by their form, e.g., holding up an object to draw an adult's attention to that object or, later in development, pointing at the object (Bates et al. 1979). In addition to deictic gestures, children also use iconic gestures. Unlike deictics, the form of an iconic gesture captures aspects of its intended referent and thus its meaning is less dependent on context, e.g., opening and closing the mouth to represent a fish. These iconic gestures are rare in some children, frequent in others. If parents encourage their children to use iconic gestures, these gestures become more frequent, which then facilitates, at least temporarily, the child's production of words (Goodwyn, Acredolo, and Brown 2000). The remaining types of gestures that adults produce – metaphorics (gestures whose pictorial content presents an abstract idea rather than a concrete object or event) and beats (small baton-like movements that move along with the rhythmical pulsation of speech) – are not produced routinely until relatively late in development.

The early gestures that children produce not only predate their words, they predict them. It is, for example, possible to predict a large proportion of the lexical items that eventually appear in a child's spoken vocabulary from looking at that child's earlier pointing gestures (Iverson and Goldin-Meadow 2005). Moreover, one of the best predictors of the size of a child's comprehension vocabulary at 42 months is the number of different objects to which the child pointed at 14 months. Indeed, child gesture at 14 months is a better predictor of later vocabulary size than mother speech at 14 months (Rowe, Ozcaliskan, and Goldin-Meadow 2008; Rowe and Goldin-Meadow 2009).

In addition to presaging the shape of their eventual spoken vocabularies, gesture also paves the way for early sentences. Children combine pointing gestures with words to express sentence-like meanings ("open" + point at box) months before they can express these same meanings in a word + word combination ("open box"). Importantly, the age at which children first produce gesture + speech combinations of this sort reliably predicts the age at which they first produce two-word utterances (Goldin-Meadow and Butcher 2003; Iverson and Goldin-Meadow 2005). Gesture thus serves as a signal that a child will soon be ready to begin producing multi-word sentences. Moreover, the types of gesture + speech combinations children produce change over time and presage changes in their speech (Ozcaliskan and Goldin-Meadow 2005). For example, children produce gesture + speech combinations conveying more than one

proposition (akin to a complex sentence, e.g., "I like it" + eat gesture) several months before producing a complex sentence entirely in speech ("I like to eat it"). Gesture thus continues to be at the cutting edge of early language development, providing stepping-stones to increasingly complex linguistic constructions.

2. Gesture's role when a model for language is not available: Homesign

Children make use of gestures even if they are not learning language from their elders but are, instead, forced to create their own language. Deaf children whose hearing losses are so severe that they cannot learn a spoken language and whose hearing parents have not exposed them to a sign language nevertheless communicate with the hearing individuals in their worlds and use homesign gestures to do so (Lenneberg 1964; Moores 1974; Tervoort 1961). Interestingly, homesigners use their gestures for the functions to which conventional languages are put. They use homesigns not only to get others to do things for them (i.e., to make requests), but also to share ideas and request information (i.e., to make comments and ask questions). Homesigners even use their gestures to serve some of the more sophisticated functions of language – to tell stories (Phillips, Goldin-Meadow, and Miller 2001), to comment on their own and others' gestures, and to talk to themselves (Goldin-Meadow 1993). In this sense, the children's communications are qualitatively different from those produced by language-trained apes who use whatever language they are able to develop to change peoples' behavior, not to change their ideas (see, for example, Greenfield and Savage-Rumbaugh 1991). The homesigners' gestures serve the functions of language.

The homesigners' gestures also take on the forms of language. They are structured in language-like ways despite the fact that the children do not have a usable model of a conventional language to guide their gesture creation (Goldin-Meadow 2003). We describe the properties of homesign that have been studied thus far in the following sections.

2.1. Lexicon

Like hearing children at the earliest stages of language-learning, deaf homesigners use both pointing gestures and iconic gestures to communicate. Their gestures, rather than being mime-like displays, are discrete units, each of which conveys a particular meaning. Moreover, the gestures are non-situation-specific – a *twist* gesture, for instance, can be used to request someone to twist open a jar, to indicate that a jar has been twisted open, to comment that a jar cannot be twisted open, or to tell a story about twisting open a jar that is not present in the room. In other words, the homesigner's gestures are not tied to a particular context, nor are they even tied to the here-and-now (Morford and Goldin-Meadow 1997). In this sense, the gestures warrant the label *sign*.

Homesigners use their pointing gestures to refer to the same range of objects that young hearing children refer to using, first, pointing gestures and, later, words – and in the same distribution (Feldman, Goldin-Meadow, and Gleitman 1978). Both groups of children refer most often to inanimate objects, followed by people and animals. They also both refer to body parts, food, clothing, vehicles, furniture and places, but less frequently.

Homesigners use iconic gestures more frequently than most hearing children learning spoken language. Their iconic gestures function like nouns, verbs, and adjectives in conventional languages (Goldin-Meadow et al. 1994), although there are fundamental differences between iconic gestures and words. The form of an iconic gesture captures an aspect of its referent; the form of a word does not. Interestingly, although iconicity is present in many of the signs of American Sign Language (ASL), deaf children learning American Sign Language do not seem to notice. Most of their early signs are either not iconic (Bonvillian, Orlansky, and Novack 1983) or, if iconic from an adult's point of view, not recognized as iconic by the child (Schlesinger 1978). In contrast, deaf individuals inventing their own homesigns are forced by their social situation to create gestures that not only begin transparent but remain so. If they didn't, no one in their worlds would be able to take any meaning from the gestures they create. Homesigns therefore have an iconic base.

Despite the fact that the gestures in a homesign system need to be iconic to be understood, they form a stable lexicon. Homesigners could create each gesture anew every time they use it, as hearing speakers seem to do with their gestures (McNeill 1992). If so, we might still expect some consistency in the forms the gestures take simply because the gestures are iconic and iconicity constrains the set of forms that can be used to convey a meaning. However, we might also expect a great deal of variability around a prototypical form – variability that would crop up simply because each situation is a little different, and a gesture created specifically for that situation is likely to reflect that difference. In fact, it turns out that there is relatively little variability in the set of forms a homesigner uses to convey a particular meaning. The child tends to use the same form, say, two fists breaking apart in a short arc to mean "break", every single time that child gestures about breaking, no matter whether it's a cup breaking, or a piece of chalk breaking, or a car breaking (Goldin-Meadow et al. 1994). Thus, the homesigner's gestures adhere to standards of form, just as a hearing child's words or a deaf child's signs do (Singleton, Morford, and Goldin-Meadow 1993). The difference is that the homesigner's standards are idiosyncratic to the creator rather than shared by a community of language users.

2.2. Morphology

Modern languages (both signed and spoken) build up words combinatorially from a repertoire of a few dozen smaller meaningless units. We do not yet know whether homesign has phonological structure (but see Brentari et al. 2012). However, there is evidence that homesigns are composed of parts, each of which is associated with a particular meaning; that is, they have morphological structure (Goldin-Meadow, Mylander, and Butcher 1995; Goldin-Meadow, Mylander, and Franklin 2007). The homesigners could have faithfully reproduced in their gestures the actions that they actually perform. They could have, for example, created gestures that capture the difference between holding a balloon string and holding an umbrella. But they don't. Instead, the children's gestures are composed of a limited set of handshape forms, each standing for a class of objects, and a limited set of motion forms, each standing for a class of actions. These handshape and motion components combine freely to create gestures, and the meanings of these gestures are predictable from the meanings of their component parts. For example, a hand shaped like an "O" with the fingers touching the thumb, that is, an

OTouch handshape form, combined with a *Revolve* motion form means "rotate an object <2 inches wide around an axis", a meaning that can be transparently derived from the meanings of its two component parts (*OTouch* = handle an object <2 inches wide; *Revolve* = rotate around an axis).

Importantly in terms of arguing that a morphological system underlies the children's homesigns, we note that (1) the vast majority of gestures that each deaf child produces conforms to the morphological description for that child, and (2) this morphological description can be used to predict the forms and meanings of the new gestures that the child produces. Thus, homesigns exhibit a simple morphology, one that is akin to the morphologies found in conventional sign languages. Interestingly, it is much more difficult to impose a coherent morphological description that can account for the gestures that hearing speakers produce (Goldin-Meadow, Mylander, and Butcher 1995; Goldin-Meadow, Mylander, and Franklin 2007), suggesting that morphological structure is not an inevitable outgrowth of the manual modality but is instead a linguistic characteristic that deaf children impose on their communication systems.

2.3. Sentence structure

Homesigners frequently combine their gestures with other gestures, unlike hearing children who rarely produce gesture + gesture combinations (Goldin-Meadow and Morford 1985). We consider a string of gestures to be a single unit if the child does not pause or relax his hand between gestures (Goldin-Meadow and Mylander 1984). For example, a homesigner combined a point at a toy grape with an "eat" gesture to comment on the fact that grapes can be eaten, and at another time combined the "eat" gesture with a point at a visitor to invite her to lunch with the family. The same homesigner combined all three gestures into a single sentence to offer the experimenter a snack. Interestingly, homesign sentences convey the same meanings that young children learning conventional languages, signed (Newport and Meier 1985) or spoken (Brown 1973), typically convey with their sentences (Goldin-Meadow and Mylander 1984).

In addition, homesign sentences are structured in language-like ways. For example, the homesigners' gesture sentences are organized around predicate frames (e.g., x sleeps, x goes to y, x beats y, x gives y to z) and thus are structured at an underlying level (Goldin-Meadow 1985). Moreover, the gesture sentences often contain more than one predicate frame or proposition and, in this sense, constitute complex sentences (e.g., drum beat straw sip, produced to describe a scene in which a solder is beating a drum and a cowboy is sipping a straw; Goldin-Meadow 1982).

The homesigners' gesture sentences also exhibit (at least) three devices for marking who does what to whom. Homesigners indicate the thematic role of a referent by preferentially producing (as opposed to omitting) gestures for referents playing particular roles. Homesigners in both America and China are more likely to produce a gesture for the patient (e.g., the eaten cheese in a sentence about eating) than to produce a gesture for the actor (e.g., the eating mouse; Goldin-Meadow and Mylander 1998).

Homesigners' second device for indicating thematic roles is to place gestures for objects playing particular roles in set positions in a sentence. In other words, they use linear position to indicate who does what to whom (Feldman, Goldin-Meadow, and Gleitman 1978; Senghas et al. 1997). Surprisingly, homesigners in America and China use the same particular linear orders in their gesture sentences despite the fact that

each child is developing his or her system alone without contact with other deaf children and in different cultures (Goldin-Meadow and Mylander 1998). The homesigners tend to produce gestures for patients in the first position of their sentences, before gestures for verbs (*cheese–eat*) and before gestures for endpoints of a transferring action (*cheese–table*). They also produce gestures for verbs before gestures for endpoints (*give–table*). In addition, they produce gestures for intransitive actors before gestures for verbs (*mouse-run*).

Homesigners' third device for indicating thematic roles is to displace verb gestures toward objects playing particular roles, as opposed to producing them in neutral space (at chest level). These displacements are reminiscent of *inflections* in conventional sign languages (Padden 1983, 1990). Homesigners tend to displace their gestures toward objects that are acted upon and thus use their inflections to signal patients. For example, displacing a *twist* gesture toward a jar signals that the jar (or one like it) is the object to be acted upon (Goldin-Meadow et al. 1994). Thus, homesign sentences adhere to simple syntactic patterns marking who does what to whom.

2.4. Grammatical categories

Young homesigners use their morphological and syntactic devices to distinguish nouns and verbs (Goldin-Meadow et al. 1994). For example, if the child uses *twist* as a verb, that gesture would likely be produced near the jar to be twisted open (i.e., it would be inflected); it would not be abbreviated (it would be produced with several twists rather than one); and it would be produced *after* a pointing gesture at the jar (*that–twist*). In contrast, if the child uses that same form *twist* as a noun to mean "jar", the gesture would likely be produced in neutral position near the chest (i.e., it would not be inflected); it would be abbreviated (produced with one twist rather than several); and it would occur *before* the pointing gesture at the jar (*jar–that*). Thus, the child distinguishes nouns from verbs morphologically (nouns are abbreviated, verbs inflected) and syntactically (nouns occur in initial position of a two-gesture sentence, verbs in second position after the patient). Interestingly, deaf homesigners' adjectives sit somewhere in between – as they often do in natural languages (Thompson 1988). Adjectives are marked like nouns morphologically (*broken* is abbreviated but not inflected) and like verbs syntactically (*broken* is produced in the second position of a two-gesture sentence).

Older homesigners also have the grammatical category *subject* (possibly younger ones do, too, but this has not been investigated yet). Grammatical subjects do not have a simple semantic correlate. Also, no fixed criteria exist to categorically identify a noun phrase as a subject, but a set of common, multi-dimensional criteria can be applied across languages (Keenan 1976). A hallmark of subject noun phrases cross-linguistically is the range of semantic roles they display. While the subject of a sentence will likely be an agent (one who performs an action), many other semantic roles can be the subject. For example, the theme or patient can be a subject (*The door* opened), as can an instrument (*The key* opened the door) or instigator (*The wind* opened the door). Older homesigners studied in Nicaragua used the same grammatical device (clause-initial position) to mark agent and non-agent noun phrases in their gestured responses, thus indicating that their systems include the category *subject* (Coppola and Newport 2005).

2.5. Sentential markers for negations, questions, past and future

Homesigners' gesture sentences contain at least two forms of sentence modification, negation and questions (Franklin, Giannakidou, and Goldin-Meadow 2011). Young homesigners express two types of negative meanings: rejection (e.g., when offered a carrot, the homesigner shakes his head, indicating that he doesn't want the object) and denial (e.g., the homesigner points to his chest and then gestures *school* while shaking his head, to indicate that he is not at school). In addition, they express three types of questions: where (e.g., the homesigner produces a two-handed flip when searching for a key), what (e.g., the homesigner produces the flip when trying to figure out which object his mother wants), and why (e.g., the homesigner produces the flip when trying to figure out why the orange fell). As these examples suggest, different forms are used to convey these two different meanings – the side-to-side headshake for negative meanings, the manual flip for question meanings. These gestures are obviously taken from the hearing speakers' gestures that surround the deaf children. But the homesigners use these gestures as sentence modulators and produce them in systematic positions in their gesture sentences: headshakes appear at the beginning of sentences, flips at the end.

Homesigners also use particular gestures to make reference to the past and future (Morford and Goldin-Meadow 1997). For example, one homesigner produced a gesture, not observed in the gestures of his hearing parents, to refer to both remote future and past events – needing to repair a toy (future) and having visited Santa (past). The gesture is made by holding the hand vertically near the chest, palm out, and making an arcing motion away from the body. Another homesigner invented a comparable gesture to refer only to past events. In addition to these two novel gestures, homesigners have been found to modify a conventional gesture to use as a future marker. The gesture, formed by holding up the index finger, is typically used to request a brief delay or time-out and is glossed as *wait one minute*. The homesigners used the form for its conventional meaning but they also use it to identify their intentions, that is, to signal the immediate future. For example, one homesigner produced the gesture and then pointed at the toy bag to indicate that he was going to go retrieve a new toy. Hearing speakers use *wait* to get someone's attention, never to refer to the immediate future. The form of the homesigners' gesture is borrowed from hearing speakers' gestures but it takes on a meaning of its own.

2.6. Phrasal structure

As noted earlier, homesigners refer to entities either by *pointing* at the entity, or by producing an *iconic* gesture evoking some aspect of the entity. There is evidence that these two types of noun-like gestures can be combined to form a larger unit akin to a Noun Phrase (Hunsicker and Goldin-Meadow in press). For example, rather than point at a penny and then at himself (*that–me*), or produce an iconic gesture and then point at himself (*penny–me*), to ask someone to give him a penny, the homesigner produced the iconic gesture along with the point at the penny (*penny-that-me*). The point + iconic combination thus occupied the patient slot in the sentence and functioned like a single unit. Indeed, point + iconic combinations of this sort serve the same semantic and syntactic functions as pointing gestures and iconic gestures do when used on their own to

refer to objects. In other words, the larger unit substitutes for the smaller units and, in this way, functions as a phrase.

3. The input to homesign

Homesigners, by definition, are not exposed to a conventional sign language and thus could not have fashioned their gesture systems after such a model. They are, however, exposed to the gestures that their hearing parents use when they talk to them. Although the gestures that hearing speakers typically produce when they talk are not characterized by language-like properties (McNeill 1992), it is possible that hearing parents alter their gestures when communicating with their deaf child. Perhaps, the deaf children's hearing parents introduce language-like properties into their own gestures. If so, these gestures could serve as a model for the structure in their deaf children's homesigns. We explore this possibility in this section.

Hearing parents gesture when they talk to young children (Bekken 1989; Iverson et al. 1999; Shatz 1982) and the hearing parents of homesigners are no exception. The deaf children's parents were committed to teaching their children to talk and sent them to oral schools. These schools advised the parents to talk to their children as often as possible. And when they talked, they gestured. The question is whether the parents' gestures display the language-like properties found in homesign, or whether they look just like any hearing speaker's gestures.

To find out, Goldin-Meadow and Mylander (1983, 1984) analyzed the gestures that the primary caregiver (the mother in every case) of six homesigners produced when talking to their deaf children. They attempted to look at the gestures through the eyes of a child who cannot hear and thus turned off the sound and coded the mothers' gestures as though they had been produced without speech.

Not surprisingly, all six mothers used both pointing and iconic gestures when they talked to their children. Moreover, the mothers used pointing and iconic gestures in roughly the same distribution as their children. However, the mothers' use of gestures did not resemble their children's homesigns along many dimensions.

First, the mothers produced fewer different *types* of iconic gestures than their children, and they also used only a small subset of the *particular* iconic gestures that their children used (Goldin-Meadow and Mylander 1983, 1984).

Second, the mothers produced very few gesture combinations. That is, like most English-speakers (McNeill 1992), they tended to produce one gesture per spoken clause and rarely combined several gestures into a single, motorically uninterrupted unit. Moreover, the very few gesture combinations that the mothers did produce did *not* exhibit the same structural regularities as their children's homesigns (Goldin-Meadow and Mylander 1983, 1984). The mothers thus did not appear to have structured their gestures at the sentence level.

Nor did the mothers structure their gestures at the word level. Each mother used her gestures in a more restricted way than her child, omitting many of the handshape and motion morphemes that the child produced (or using the ones she did produce more narrowly than the child), and omitting completely a very large number of the handshape/motion combinations that the child produced. Indeed, there was no evidence at all that the mothers' gestures could be broken into meaningful and consistent parts (Goldin-Meadow, Mylander, and Butcher 1995).

Finally, the hearing mothers' iconic gestures were not stable in form and meaning over time while their deaf children's homesigns were. Moreover, the hearing mothers did not distinguish between gestures serving a noun role and gestures serving a verb role; the deaf children did (Goldin-Meadow et al. 1994).

Did the deaf children learn to structure their homesign systems from their mothers? Probably not – although it may have been necessary for the children to see hearing people gesturing in communicative situations in order to get the idea that gesture can be appropriated for the purposes of communication. But in terms of how the children structure their homesigns, there is no evidence that this structure came from the children's hearing mothers. The hearing mothers' gestures do not have structure when looked at with tools used to describe the deaf children's homesigns (although they do when looked at with tools used to describe co-speech gestures, that is, when they are described in relation to speech).

The hearing mothers interacted with their deaf children on a daily basis. We therefore might have expected that their gestures would eventually come to resemble their children's homesigns (or vice versa). But they did not. Why didn't the hearing parents display language-like properties in their gestures? The parents were interested in teaching their deaf children to talk, not gesture. They therefore produced all of their gestures with speech – in other words, their gestures were co-speech gestures and had to behave accordingly. The gestures had to fit, both temporally and semantically, with the speech they accompanied. As a result, the hearing parents' gestures were not "free" to take on language-like properties.

In contrast, the deaf homesigners had no such constraints. They had no productive speech and thus always produced gesture on its own, without talk. Moreover, because the manual modality was the only means of communication open to the children, it had to take on the full burden of communication. The result was language-like structure. Although the homesigners may have used their hearing parents' gestures as a starting point, it is clear that they went well beyond that point. They transformed the co-speech gestures they saw into a system that looks very much like language.

4. The next step after homesign

Although homesigns are structured, they do not display all of the properties found in natural languages, presumably because each child is developing a gesture system on his or her own. But what would happen if individual homesigners were brought together into a community? In 1980, a group of Nicaraguan homesigners were brought together for the first time. Over the next three decades, a sign language with much of the grammatical complexity of well-established sign languages evolved. Nicaraguan Sign Language, as this newly emergent language is called, is far more complex than any of the homesign systems out of which it was formed.

Nicaraguan Sign Language offers us a unique opportunity to watch homesign develop into a fully formed sign language over generations of creators. The initial step in the creation process took place when deaf children in Managua were brought together for the first time in an educational setting. The deaf children had been born to hearing parents and had presumably developed gesture systems in their individual homes. When brought together, these homesigners needed to develop a common sign language. Not surprisingly, we see many of the properties of homesign in the sign system created by this first cohort

of signers. For example, the first cohort combines their signs as do homesigners, adhering to consistent word orders to convey who does what to whom (Senghas et al. 1997).

But Nicaraguan Sign Language has not stopped there. Every year, new students enter the school and learn to sign among their peers. This second cohort of signers has as its input the sign system developed by the first cohort and, interestingly, changes that input so that the product becomes more language-like. For example, second cohort signers go beyond the small set of basic word orders used by the first cohort, introducing new orders not seen previously in the language (Senghas et al. 1997). As a second example, the second cohort begins to use spatial devices invented by the first cohort, but they use these devices consistently and for contrastive purposes (Senghas et al. 1997; Senghas and Coppola 2001).

The second cohort, in a sense, stands on the shoulders of the first. They do not need to invent the properties of language found in homesign – those properties are already present in their input. They can therefore take the transformation process one step further. The Nicaraguan homesigners (and, indeed, all homesigners) take the first, and perhaps the biggest, step: They transform their hearing parents' gestures, which are not structured in language-like ways, into a language-like system (Coppola et al. 1997; see also Singleton, Goldin-Meadow, and McNeill 1995). The first and second cohort of Nicaraguan signers are then able to build on these properties, creating a system that looks more and more like the natural languages of the world.

There is, however, another interesting wrinkle in the language-creation story – it matters how old the creator is. Second cohort signers who began learning Nicaraguan Sign Language relatively late in life (after age 10) do not exhibit these linguistic advances and, in fact, use signs systems that are no different from those used by late-learning first cohort signers (Senghas 1995; Senghas and Coppola 2001). It looks like the creator may have to be a child to take full advantage of the input provided by the first cohort to continue the process of language creation. Thus, we see in Nicaraguan Sign Language that language creation depends not only on what the creator has to work with, but also on who the creator is.

To summarize, when children are provided with a model for language, they use gesture to take steps into language that they cannot yet take in speech. But when children do not have a model for language, they use gesture to fill the void. They create a system of homesigns that assumes the most basic forms and functions of language. These homesign gestures are qualitatively different from the co-speech gestures that serve as input to the system and, in this sense, represent the first steps of language creation.

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