

## 2

### When does gesture become language? A study of gesture used as a primary communication system by deaf children of hearing parents

SUSAN GOLDIN-MEADOW

Perhaps the clearest example of the resilience of language comes from the fact that language is not tied to the mouth and ear but can also be processed by the hand and eye. Sign languages of the deaf have been found to take over all of the functions and to assume the structural properties characteristic of spoken languages (Klima & Bellugi, 1979). Moreover, when exposed to a conventional sign language such as American Sign Language, deaf children acquire the language as effortlessly as hearing children acquiring spoken language (Newport & Meier, 1985). Thus, the manual modality can serve as a medium for language, suggesting that the capacity for creating and learning a linguistic system is modality independent.

The manual modality is exploited even by those who use spoken language. Hearing adults and children frequently use gesture along with their speech. However, unlike conventional sign languages, the spontaneous gestures of hearing individuals do not stand on their own and must be interpreted in the context of the speech they accompany (McNeill, 1987). Moreover, although spontaneous gestures may reflect the ideas of the speaker (cf., Church & Goldin-Meadow, 1986; Perry, Church & Goldin-Meadow, 1988), they do so in a form that is distinct from the form assumed by speech and sign (McNeill, 1987). Thus, while the manual modality can assume all of the formal and functional properties of language in the conventional sign languages of the deaf, it does not appear to do so in the spontaneous gestures of hearing speakers.

The purpose of this chapter is to explore one condition under which gesture appears to take on both the form and the function of language. The children who are the focus of my work are deaf with hearing losses so severe that they cannot naturally acquire spoken language. In addition, these children are born to hearing parents who have not yet exposed them to a conventional sign language. Despite their lack of usable linguistic input, either signed or spoken,

these deaf children develop gestures which they use to communicate. My colleagues and I have found that these gestures, which comprise the children's sole means of communication, take on many of the formal and functional properties found in the early communication systems of children learning conventional languages. Moreover, the deaf children's gestures are structured in ways that the spontaneous gestures of their hearing parents are not. These observations suggest that gesture will assume language-like properties when used as a primary communication system (but not when used as an adjunct to speech), and that language-like properties can develop in the absence of a conventional language model. I will consider these findings in terms of the light they may shed on the effects (or non-effects) of the environment on language development in an individual child, and on the circumstances compatible with the creation of language-like structure.

### 1. Background on deafness and language-learning

The sign languages of the deaf are autonomous languages which are not based on the spoken languages of hearing cultures (Klima & Bellugi, 1979). A sign language such as American Sign Language (ASL) is a primary linguistic system passed down from one generation of deaf people to the next and, like spoken language, is structured at syntactic, morphological, and "phonological" levels of analysis.

Deaf children born to deaf parents and exposed from birth to a conventional sign language such as ASL have been found to acquire that language naturally; that is, these children progress through stages in acquiring sign language similar to those of hearing children acquiring a spoken language (Newport & Meier, 1985). Thus, in an appropriate linguistic environment, in this case, a signing environment, deaf children are not handicapped with respect to language learning.

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).

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In addition, unless hearing parents send their deaf children to a school in which sign language is used, these deaf children are not likely to receive conventional sign language input. Under such inopportune circumstances, these deaf children might be expected to fail to communicate at all, or perhaps to communicate only in non-symbolic ways. This turns out not to be the case.

Previous studies of deaf children of hearing parents have shown that these children spontaneously use gestures (referred to as "home signs") to communicate even if they are not exposed to a conventional sign language model (Lenneberg, 1964; Moores, 1974). Given a home environment in which family members communicate with each other through many different channels, one might expect that the deaf child would exploit his accessible modality (the manual modality) for the purposes of communication. However, given that no language model is present in the child's accessible modality, one might not expect that the child's communication would be structured in language-like ways.

My work has focused on the structural aspects of deaf children's gestures and, in particular, has attempted to determine whether any of the linguistic properties found in natural child language can also be found in those gestures. My colleagues and I have analyzed the gestures of ten deaf children of hearing parents, and found that these gestures consistently served many of the functions typical of child language and, in addition, were structured on several levels, as is child language. I will focus here on both the functions of the deaf children's gestures and on three aspects of their structure: lexicon, syntax, and morphology.

The ten children in my sample ranged in age from 1;4 (years;months) to 4;1 at the time of the first interview and from 2;6 to 5;9 at the time of the final interview. The children were videotaped in their homes during play sessions with their hearing parents or an experimenter every 2 to 4 months for as long as each child was available (the number of observation sessions per child ranged from two to 16). Six of the children lived in the Philadelphia area and four in the Chicago area. The children were all born deaf to hearing parents and sustained severe (70–90 dB) to profound (> 90 dB) hearing losses. Even when wearing a hearing aid in each ear, none of the children were able to acquire speech naturally. In addition, none of the children in the sample had been exposed to conventional sign language.

## **2. Functional uses of gesture in deaf children of hearing parents**

All of the children used their gestures as "tools" for communication – to convey information about current, past, and future events, and to manipulate the world around them. Like children learning conventional languages, the deaf

