The Roots of Language in the Sign Talk of the Deaf

ALMOST ANYONE WHO WATCHES a deaf person use sign language can tell only that the person is moving his hands rapidly; he cannot be sure when one sign ends and another begins; for that matter, he cannot distinguish between the making of a sign and some irrelevant hand movement. One cannot even infer the subject of the conversation. Just as one cannot infer the meaning of the Spanish word *hermano* from its sound alone, so one could not guess the meaning of the hand sign for *brother* in the sign language of the deaf.

We are interested in the biological basis of language, its structure, and the structure of human thought as expressed in language. Our research group includes Susan Fischer, a linguist, and Bonnie Gough, a deaf woman who is very articulate in sign language. One way to learn about these universals is to study the communication that persons develop when they are born unable to hear and therefore do not speak. To do so, we first learned sign language, and now we are exploring how deaf children of deaf parents learn sign as a native language; how the form and structure of spoken and sign languages differ, and how they may be alike.

To begin our investigation of the language we use studies of spontaneous signing, of paraphrase, of folk art, and experiments in memory for signs.

See. Sign and speech differ fundamentally in the organs that perceive them: the eye and the ear. The deaf cannot communicate unless they can see each other; they analyze language by sight whereas we analyze language by sound. As a result, sign language is not simply parallel to or derivative of spoken English. In its deepest and most interesting respects, sign seems to be a language in its own right, with properties that are different from spoken languages in general and from English in particular.

There are several kinds of hand language. Most of us are familiar with fingerspelling: a symbol for each letter of the alphabet, with words being spelled in the air. This is like writing in the air and is based on English. Another variety of hand language, also based on English, combines fingerspelling and signs. One version, called *Seeing Essential English*, used in some teaching and in formal situations, is close to written English in word order and morphology.

But the language that most of the deaf in this country use with each other is called American sign language (ASL) and is the object of our study. (*A Dictionary of American Sign Language on Linguistic Principles* by William C. Stokoe, *et al.* presents more than 2,000 signs.) American sign language is the language that deaf children usually learn from their deaf parents, and it is not based on English. It has its own processes of word formation, its own methods of incorporating semantic variation into the basic units—the sign, and sign phrase. It is a self-contained, largely arbitrary system, not a universally understood language or pantomime. For example, deaf persons in Britain use a sign language that is radically different from the sign language used by the American deaf.

Differ. In our studies we have begun to ask about the structure of signs. How are the basic units or elements of a language that is produced by hands different from a language that is produced by the vocal apparatus? In Stokoe's system, each sign is made up of three parameters that occur simultaneously: a) a particular hand configuration; b) the place of articulation in relation to the body; c) the movement of the hands. For example, the sign for *home* calls for the hand to shape a tapered *O* on the cheek, with movements that include touching the cheek near the side of the mouth, moving away slightly, and touching again on the upper cheek. A change in any of the parameters may transform the sign *home* into a different sign. If one closes the hand with the thumb and little finger extended and touches the cheek

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by Ursula Bellugi and Edward S. Klima

A Song in Sign

"The vocabulary of sign language makes many more discriminations about ways of looking and seeing than spoken English does."

with the same motion, it is *yesterday*. If we change the location and make the sign on both sides of the nose, it is *flower*. If we make a small circular motion on the cheek with the hand in the same tapered *O*, it is *peach*.

Share. In our early studies of the language, we began to notice that these parameters are recombinable in various ways and that some semantic families of signs share a common parameter. (However, as in sound segments of spoken languages, the parts may recombine in ways that are semantically related or in ways that are purely arbitrary.) Since we are interested in language regularities, we have begun to study semantically and formationally related signs in more detail.

Some signs are alike in one parameter and different in others. Thus some signs that have to do with emotion (*e.g., heart, terrible, hate, feel, sick, excited, pity, discouraged*) share a common handshape. The placement of the hand and its accompanying motion distinguish each sign.

Other signs are identical except for place of articulation. Many male-female sign pairs—e.g., *father/mother, man/woman, brother/sister, husband/wife* and even *male cousin/female cousin*—are identical except that the one sign is made near the forehead and the other sign on the lower cheek.

Use. The third parameter is movement. Signs take shape in the physical space in front of the signer's body between signer and addressee. The use of space, direction, movement, are all crucial in sign language and give it a different character from spoken language. Signs may be made with one or both hands, and on occasion two different signs may be made at once. Signers often use the space in front of their bodies to locate objects, persons, the subjects of their discourses, and (perhaps because our memory for spatial arrangements is so well developed) they can then continue to refer to these topics in the allocated direction or space.

Space and movement in space have other functions in sign:

1) Space can provide intonational cues. A signer's hands may be seen, in slow motion, to come to rest in front of the body at the end of a sentence or clause. When they pause in midair, or move slightly toward the addressee, they may indicate a question; these are subtle differences that the uninitiated may not notice.

2) A change in direction of movement may turn one sign into its opposite. A simple reversal of hand motion turns *join* into *disconnect; thrilled* into *discouraged; appear* into *disappear; with* into *without*.

3) Change in movement may add negation to a sign. The sign for *know* is a bent hand, fingers together, with fingertips touching the head. The sign for *don't-know* is the same handshape, also touching the forehead, but followed by a movement of the fingertips downward and away from the signer. This same downward movement marks the negation of *like, want* and *good*.

4) Movement may signal the tense. Signs for the future move forward from the signer, usually at the level of the face; signs for the past generally move toward the signer and in the direction of over the shoulder. The sign for *look*, when it is made in a forward arc, means *prophecy*; the same sign, made in an arc that moves back across the ear, means *reminiscing*. Other such pairs are *will/past; tomorrow/yesterday; next year/last year*.

5) Motion may distinguish singular from plural or collective nouns. The sign for *forest* is identical to that for *tree*, but the wrist motion is repeated several times—literally many trees.

6) Finally, movement may indicate the subject and/or object of a sentence. Since signs are made in the space between signer and addressee, direction of hand or movement often indicates the subject or object of a verb. The signs for *I-inform-you* and *you-inform-me, I-inform-him, he-informs-me* are the same except for direction of movement; the same process works for other verbs such as *teach, copy, invite, look-at, arrest* and *help*. (There are, as in all languages, many exceptions to this rule. Among signs that do not change are *chase, follow, lead* and *fire*.)

Err. American sign language uses these parameters productively to express semantic variations and grammatical relations. We have been looking for clues to regularities in sign. We find them not only in what deaf people sign but in the mistakes that they sometimes make in conversation.

In certain kinds of anticipatory errors (called "spoonerisms" in speech) we find clues to formational rules of sign language. Spoken spoonerisms have a tightly structured economy that frequently produces two nonsense words, as in "this nipper is zarrow." The process is apparently the same in sign: some parameter of two signs are exchanged, the result being nonexistent signs that are nevertheless physically possible.

One young woman was signing to a friend about putting pennies in a parking meter and found that she did not have the correct change. She intended to make a sign that means *I'm-sick-of-it* and then *I'm-reluctant* (to go looking for change). Instead of making the signs correctly, she used the hand configuration of *I'm-reluctant* in the place of articulation for *I'm-sick-of-it* and vice versa. This seemed funny to her companion just as many spoonerisms sound funny to us. The important point to a linguist is that the inadvertent switch resulted in two possible signs (because they use parameters of the language), that are nevertheless

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nonexistent signs in American sign language.

Recall. In a series of experiments in short-term memory for signs, we have been finding unexpected evidence for a kind of psychological reality to these parameters of sign. In one memory study, we showed lists of videotaped signs to congenitally deaf persons and asked them to sign them back to us as soon as a list was completed. (In another condition we asked deaf subjects to write down what they remembered in the English-word equivalents for the signs they had seen.) When we looked at the errors that occurred more than once in their ordered recall of signs, we found that the errors nearly always shared some properties in common with the original sign. These errors occurred when the response was written as well as when it was signed. The errors, then, resembled the correct stimulus, sharing most of its properties but differing on one or more parameters. For example, one subject saw the sign for *time* but remembered it as *potato*. These signs differ only in that the handshape for *time* uses one finger while the one for *potato* uses two. Another subject saw *tea* but remembered *vote*; the difference is that the motion for *tea* is a small circle, while the one for *vote* is a direct motion. Still another subject saw the sign for *onion* and remembered it as *key*; the two are the same in hand and motion but one is made at the forehead and the other on the palm of the hand. (In each case the subjects had named the original signs correctly.) The parameters we have been using to analyze signs appear as features of these errors.

Look. We find differences between sign language (ASL) and English at the level of vocabulary and not just differences in the way signs, words or sentences are formed. In some parts of its lexicon, American sign is perhaps limited in comparison with English; the deaf have to fingerspell many technical English words or invent signs for them. But sign language has domains that are more highly differentiated than English is. Absence of hearing and reliance on vision characterize the world of the deaf. We find that the vocabulary of sign language makes many more discriminations about ways of looking and seeing than spoken English does.

Many single signs require several English words for translation. Some indicate tense or aspect: *have-already-seen, to-look-forward-to, to-look-continually*. Other signs define the number of persons and the direction of looking. *I-look-at-you, two-look-at-each-other, everyone's-looking-at-me*. Still others describe ways of looking, or objects of looking: *to-look-away-in-disdain, to-do-a-double-take, sight-seeing, to-window-shop, to-gaze-at-one-another-like-lovers, to-make-eyes-at-someone*.

There are also many single colloquial signs that do not readily translate into single English words, such as *I-didn't-mean-that, to-flop-in-under-the-covers, rolling-in-the-aisles-with-laughter, dutch-treat, to-capture-for-love*, and *to-fall-asleep-with-boredom*.

We have been examining the differences between a spoken language and a gesture language. Our basic study also includes research on how one acquires this different language.

Change. What can we find out about the general process of language learning by studying its acquisition in another modality? We began our studies with a deaf child of deaf parents. Pola's sign vocabulary seems to cover the full range of concepts expressed by hearing children of comparable age. Among the signs she used spontaneously before the age of three were: *name, stay, tomorrow, will, where, who, what, how, dead, know, understand, none, nothing, don't-know*, and letters of the hand alphabet. We find in Pola's early combinations of signs the full range of semantic relations expressed by hearing children. We also find a steady increase in the length of her signed sequences that matches the increase found in hearing children. It does seem that, in spite of the change in modality, the milestones of language development may be the same.

In a previous article on language learning, Bellugi reported that "children are systematic, regular and productive in their language . . . Children seem to develop rules of maximal generality, often applying them too broadly at first and only later learning the proper restrictions on them" ["Learning the Language," PT, December 1970]. We now have at least some evidence that this is true for deaf children learning sign language as well as for hearing children who are learning spoken language. We have suggested that the principles underlying regularities in sign language may be quite different from those in spoken language. It seems evident that sign language has its own rich morphology, but is based in part on movement and position of the hands in space, place of articulation, hand configuration, etc.

We already have some evidence of overgeneralization on the part of deaf children based on the parameters and regularities of the sign language itself. Pola seemed to extract the common component of certain negative signs, and use that as a negative indicator in the period when negative forms were first emerging in her language (*not, don't-want, bad, don't-know, none, nothing, can't*). She also sometimes changed the direction of movement of a sign to mean "you do something to me," when the sign was one of the set that does not change in the sign language of adults. This is analogous to the hearing child's use of *holded, digged* and *bringed*. The child may have discovered the general possibility in sign for changing direction of a sign to indicate subject and object relations, and extended this to cases where an adult signer would not.

Pun. We have been describing regularities within a language system. Knowledge of the rules of formation and combination governs one kind of creativity in language—the ability to construct and understand an infinite number of sentences from a finite vocabulary. There are other kinds of creativity in sign language—the kind involved in puns or in wit, and the kind involved in simple songs and poems. Bonnie Gough has been the source of many of the witticisms we have found in the language. Most of them are hard

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to translate into words. Consider the sign for *clever*, an open, cupped hand with the thumb touching the forehead. One time Gough signed that one person was clever, another was . . . (and she added another cupped hand to the one already at her forehead to double the effect and make it "super clever"). She herself was . . . (she made the sign for *clever* on the back of her head instead of on her forehead). This gesture violated the clearly defined space in front of the body that is used for signing, and created a nonexistent sign that means the reverse or negation of the real one. It was a pun on the sign for *clever*.

Another time we went to a captioned film for the deaf. We were sitting behind a large man and our son had to move his head from side to side to read the captions. Someone suggested that he move, but he preferred to stay near us. "Well," the person signed, "the only thing you can do is . . ." and he made the sign for *look-at* the movie, with one change. Starting the sign with both hands in front of the eyes, he traced a path for the eyes that would diverge, move around the obstacle in front of them, and come together again on the side.

The deaf occasionally use fingerspelling for special effect. One deaf woman told us about a girl who was very interested in boys. To describe the girl's preoccupation, she put her hands on her forehead, palms facing away, and spelled with two hands *b-o-y-s*—to indicate, literally, "boys on the mind."

Play. What is a song? We think of poetry as based on rhyme and meter, on structural patterning of words; we think of a song as a poem set to music. In a hand language, there is nothing immediately analogous to rhyming, nothing like a melody.

To find the sign language equivalents of spoken poetry and sung melodies, we have begun to explore children's songs, lullabies, and early rhythmic play among the deaf. A deaf woman signed us a lullaby that her mother used to sign to her every night; she said she thought it was the best song in the world when she was a child. We may translate it as follows, including periods to indicate pauses:

Sleep . . . sleep . . . sleep.
Wake-up.
Eat . . . cake.
Ride . . . beautiful . . . white . . . horse.
Sleep . . . sleep . . . sleep.

In this little song, the signs are somnolent, slow, deliberate and rhythmical, with long pauses between. The song has a hypnotic quality for deaf and hearing alike.

Another young deaf adult, from a large deaf family, signed a song that her brother had made up in sign language at the age of seven. It is a little love song about the boy's first girl friend. We tried to render it in English as follows:

Everybody needs to know
Who my sweetheart is,
Everybody—you, you, you—should know
Who my sweetheart is.
Everybody needs to know
Who my sweetheart is.

Know what?
She has blonde hair,
Like the sun shining down on me.
And has blue eyes,
Like the skies above.

Don't don't be jealous,
Don't don't be jealous,
Don't be envious.
No, no, no, no,
I'm very understanding.

As we watched the young woman sign, we felt very clearly that it was a "song." She began with a dance rhythm: her body moved and swayed with a clear beat, evident in her knees, hips and shoulders. Four beats preceded her signing, and four beats separated each stanza of the song. We recorded her performance on videotape, slowed it down, and found that we could easily count the number of beats per line. It was perfectly rhythmic and regular: eight beats a line in the first stanza, with one or two beats to a sign; *sweetheart* has four beats. She would elongate the sign for *sweetheart* and move it through space to the rhythm of her dancing motion. The middle stanza has a slightly different beat, with alternate lines in parallel rhythm. There were other parallels as well in the formation of signs themselves. The signs for colors are usually initial-letter handshapes: *yellow* is made with a "Y" handshape, *blue* with a "B." Here she modified the signs by moving them from their normal position closer to the nouns they modify: she signed *yellow* next to the line of her hair, and *blue* near her eyes, instead of in front of her. And, instead of signing *sun* or *sunshine* where they normally would have been (close to the body), she made an enlarged, slow poetic sign—hands open and above her, face looking upward—which we interpret as *sun-shining-down-on-me.*

A 12-year-old deaf boy made up a brief poignant poem in sign language, which his teacher translated into English as: "Deafness means my mother cries and I can't hear her. Why?"

Beyond such folk art, there are more highly developed art forms. The National Theater of the Deaf, a superb group of actors, has done opera, classical plays, haiku, children's theater and original works—entirely in sign.

Attest. Many researchers, ourselves included, used to think that sign language lacked inflections and grammar. We have come to believe now that sign language indeed has a rich surface structure, quite different from English, and based on totally different principles from that of any spoken language. For instance, spatial relations in sign have no counterpart in English, but they certainly have grammatical properties; we have seen how a change of direction or movement reverses subject and object in a sentence. We do not yet know the limits of this use of directionality. We can suggest that while the surface structure of sign and speech vary widely, the language-learning process may be the same.

Sign language, it is clear, is far more than mystical hand-waving. Its range and diversity permit humor and pun, song and poetry, whimsy and whispering. What it lacks in comparison with spoken English it amply compensates for in other ways. The study of sign gives us insight into the structure of language and the universality of communication, but even more it attests to the richness of human intelligence and imagination.