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ANALOGUE GRAMMAR IN THE AMERICAN SIGN LANGUAGE
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I present in this paper certain facts which have been
both troubling and exciting to me. They are facts from
American Sign Language (ASL), and with them I intend to
seduce you. That is, I intend to coax you into doing some-
thing you might not ordinarily do, namely, change some
of the ideas I suspect you have concerning the ways a lang-
uage can work. I will do this in the following way: First,
I will present and describe two sentences in Sign represent-
ing a paradigm. I will also show that these sentences
can be immediately analysed in a standard reasonable, stand-
ard fashion. Then, I will present and describe a story,
a very short one, in Sign. There are signs I use in the
story which are related, both in form and meaning, to the
paradigm. The realization of these signs in the story will
not, however, be accounted for by any standard, reasonable
analysis, or at least I hope that they won't. And, of course,
I talk about why such analyses won't work. Finally, I will
suggest and discuss ways one might come up with a proper
analysis.

Let me begin my description of the two Sign sentences
with the sign for GIRL (I will use the convention of gloss-
ing signs with their nearest English equivalents in all up-
per case type). This sign is formed by drawing the ball
and side of the thumb, which is extended from a closed fist,
across the cheek, starting from a position near the ear and
stopping at a position off the face near the mouth. Most
Sign researchers have adopted a framework wherein a sign
is described in terms of four parameters, namely, hand con-
figuration, orientation of the hand, movement of the hand,
and the place on the body, or in the space in front of the
body, where the sign is made (that is, hand configuration,
orientation, movement, and place of articulation). It has
also been claimed widely that these parameters are distinc-
tive (see Stokoe, Casterline, and Croneberg [1965], and
Friedman [1974] for discussion and description of Sign par-
ameters). Thus, with GIRL, the configuration can be con-
trasted with an open palm, holding other parameters constant
such that BEE is formed. If we change the place of articu-
lation to, say, the nose, we have the sign POLISH. If we
change the movement to a bumping motion against the cheek,
we have the sign MENSTRUATE. If we change the orientation
such that the point of the thumb draws across the cheek,
we sign SURGERY- or CUT-ON-THE-CHEEK.

Next, I will describe an indexical anaphor. I can
point with my index finger to, say, my right. By doing
this, I place a point in space which stands for (in this
case) GIRL, and any further reference to the girl will be
made by referring in various ways to that point. This

sequence (GIRL INDEX-RIGHT), then, might be translated as
something like 'there was this girl'.
    There is a sign made by extending the index and middle
fingers from a closed fist with the two fingers spread in
a V-like shape. In citation form it is moved from the eye
to a position somewhere in front of the body, or from a
position somewhere in front of the body to the eye; it can
be glossed LOOK or LOOK-AT. The difference in the begin-
ning and ending points in the movement parameter of the
sign is quite important, for if the movement starts at the
eye and ends off the body, the sign is I-LOOK-AT-SOMETHING,
whereas the reverse of that movement, that is, from off
the body to the eye, is SOMETHING-LOOKS-AT-ME.
    I have thus presented all of the necessary elements
of a Sign paradigm:
    (1) GIRL INDEX-RIGHT I-LOOK-AT-RIGHT
         'I looked at the girl'
    (2) GIRL INDEX-RIGHT RIGHT-LOOK-AT-ME.
         'The girl looked at me'
The problem in this paradigm is, of course, predicting the
direction of the fingers (outward from the signer or inward
toward the signer) and the beginning and ending points of
the movement associated with LOOK-AT. Actually, there is
a large class of directional verbs of this sort which have
been most recently discussed in print by Friedman (1975).
She chooses to account for these verbs within a case frame-
work, claiming that a proper analysis specifies movement
in these verbs from agent to patient. This is a reasonable
way of handling these verbs; we might mark each nominal
element or pronominal element with a case marking and then
postulate a rule in the grammar which maps movement from
agent to patient. There are other ways of handling these
data, but the simple analysis above can epitomize a class
of possible analyses all of which will involve a rule gen-
erating the movement in the sign such that the rule will
mention some sort of discrete markers like case markers or
markers defining grammatical relationships such as subject
and object.
    Now, I will describe (with some difficulty) a story
in Sign. Imagine that I sign GIRL with my left hand. I
then move my hand to a position about one foot in front
of my body at the level of my chest. My hand has the in-
dex finger extending from a closed fist such that the in-
dex finger points upward. This sign is another sort of
anaphoric marker, a substantive anaphor (see Mandel in this
volume), which stands for the girl. I have thus far signed
something like 'There was a girl, and to talk about her,
I'll put her here (in front of my body)'. Next, I sign
ME by pointing to my chest with my right hand (the left
hand is being held in the substantive anaphor), and then
move my hand to a mirror image place of articulation, con-
figuration, and orientation of the left hand. At this

point, I have signed something like 'There was this girl, and I was located to the right of her'.

Now, imagine further that I change the configuration of both hands from that of the substantive anaphor to the extended finger of LOOK-AT, with the extended fingers of both hands pointing outward from my body. I then begin simultaneously changing the orientation of both hands by changing the direction that the fingers are pointing, say, slightly leftward with my left hand and slightly rightward with my right, and then slightly rightward with my left hand and leftward with my right. I am also changing the horizontal plane of movement in both hands such that the extended fingers of both hands are continuously describing small circles and ellipses in space. What I am doing is signing a particular varient of LOOK-AT which might be glossed as LOOK-AROUND. Thus, at this point, my story could be translated as 'There was a girl (at some as-yet-unspecified time and place), and I was located to the right of her. We were both looking around in a sort of aimless fashion.'

I will interrupt my story here with a short digression. Notice that the form of LOOK-AROUND begins to present some difficulty for the analysis of the LOOK paradigm presented above. That is, there is no particular position in space that the fingers are pointing to, and there is no movement of the configuration from some starting point to some ending point as there was in the paradigm case. We can preserve the analysis of the paradigm case by postulating a special case varient of LOOK-AT which is outside the domain of the movement/orientation rule governing the paradigm. Actually, I have implicitly chosen such an alternative by glossing the varient LOOK-AROUND; as the reader will see below, however, there are conclusive arguments against such a choice.

I now continue my Sign story by having the extended fingers of the left hand point directly at the right hand, which is continuing its circular/elliptical motion, and hold that position. The fingers of the right hand then cease their movement, stopping at such a position that the extended fingers of the right hand are pointing directly at the extended fingers of the left. The left hand immediately twists counterclockwise, such that the extended fingers no longer point to the extended fingers of the right. The left fingers begin again to circle while the right fingers remain pointing to the left hand for a few moments. Then, the right fingers too begin again to circle. This cycle is repeated three times, except that on the last cycle the right fingers do not resume circling as before, but rather hold the position pointing to the left hand. The left fingers slowly cease circling until they end up pointing directly at the right fingers; both hands change to the substantive anaphor configuration (index fingers pointing upward) with the palms facing each other; and, finally,

the right hand moves slowly, and with some hesitation, toward the left hand until the two hands are touching at the thumb and closed fingers. The story ends, and what I have signed can be translated into English as something like the following: 'There was this girl, and I was located to the right of her within seeing distance. We were both looking around rather aimlessly, not taking particular note of each other. Then, the girl noticed me and began to stare at me. I noticed her looking at me, but when my eyes met hers, she immediately averted her gaze and started looking around again I continued looking at her for a moment, but then I, too, went back to looking around. After a few moments, she started to stare at me again, but when I noticed this, and again caught her eye, she looked away as she did before, as if she didn't want me to know that she had been looking at me. I started looking around again, and she again started looking at me, but this time when I looked back at her, and she averted her eyes, I continued to stare at her. She finally stopped pretending to be just looking at the sights, and directed her eyes toward me. Our eyes met and held, acknowledging our interest in each other, and then I went up to her.'

The problem in this story is again predicting the direction and movement of the signs for looking, seeing, staring, and so forth. I trust that the reader has no difficulty in seeing that the question is a good deal more complicated than the case analysis of the paradigm would suggest As it turns out, the movement, orientation, and place of articulation in the sign LOOK can take an unlimited range of values, though the hand configuration remains constant. And furthermore, each value has semantic import; each time the sign is made in a different way, it is different in meaning, or refers to a different sort of event in the referent world.

What do we want our grammar to do with these facts? Well, first we want our grammar to be able to capture the fact that all tokens of the LOOK sign are related, that they are indeed the same sign. We also want it to be able to state how each token is different, and how that difference is correlated to meaning differences. Suppose we choose to extend the case analysis which worked so nicely in the paradigm case where different case relationships were postulated to account for different movements and orientations of the sign. I can see at least three possibilities in this regard, each of them unsatisfactory: 1) We could postulate an unlimited set of cases or case relationships correlated by rule with the unlimited set of possible meaningful changes in movement and orientation in the sign. Since I assume agreement that one of the minimum requirements for a proper grammar be that it comprise a finite set of theoretical terms and rules, this possibility must be discarded. 2)

We could postulate a finite set of cases or case relation-
ships which will account for gross differences, and an un-
limited set of adjustment rules, perhaps prosodic in nature,
to account for the other differences. This possibility
must be discarded for the same reason that the first one
was. 3) We could assume that with each difference in move-
ment, orientation, and place of articulation, we have a
different lexical item, a distinct sign within a single
semantic domain. As far-fetched as this third possibility
seems, it is, in a somewhat weaker and less explicit form,
the position taken by most Sign researchers, such that one
can find discussion of the identity relationship of I-LOOK-
AT-SOMEONE and SOMEONE-LOOKS-AT-ME (that is, a single sign
transmuted by rule) along side discussion of signs glossed
as, say, GLANCE, LOOK-AT-EACH-OTHER-LIKE-LOVERS, WATCH,
and so forth, as distinct signs. This alternative not only
denies us the ability to state systematically within the
grammar the semantic identity of all tokens of the 'looking'
sign, but also denies us the ability to place boundaries
on our lexicon.

Moreover, none of these alternatives captures in any
way the really simple thing that is going on in the data
I have presented. The data I have presented were chosen
for their transparency; as I imagine the reader has sur-
mised, the hand configuration in LOOK represents the lines
of vision from the eyes of the perceptor outwards. Once
this translation principle is established, then each of the
tokens of the 'looking' sign can be understood in terms
of the direction and trajectory of vision in the perceptor.
That is, this manual, gestural representation of the eyes
can do pretty much what eyes in the real world can do.

If I were to analyse the written or vocal rendition
of the Sign story above, I would find myself accounting
for the distribution of elements in my vocal language, or
its written representation, in discrete terms. That is,
I would talk of noun phrases, verb phrases, phrase markers,
case markings, morphemes, and all the other discrete terms
in the vocabulary of ordinary modern linguistic theory. I
would also talk of rules which operate on these discrete
elements. And, for the most part, I would be well justi-
fied in doing so. This notion of discreteness of language
structures constitutes a strong principle of grammar, and
as long as we can see vocal language as we do, comprising
psychologically isolable elements, it is only reasonable
to state its regularities in terms of rules operating on
discrete elements.

If I were to analyse the Sign rendition of my story,
on the other hand, I would immediately notice, as I hope
the reader did, that the surface representation was not at
all discrete, indeed, could not even be described in dis-
crete abstractions as we do with, say, phonetic represen-
tations. So I am left with the question of whether I am

to account for my signs, their form, distribution, and behavior, in terms of discrete underlying structures. And actually, there is no question involved; it is impossible to exhaustively describe the movement and orientation of the 'looking' signs in terms of a finite set of discrete movement and orientation values, for the changes were continuous, the possible number of value assignments unlimited.

Suppose that we give up the sort of semantic or syntactic representations which are composed of discrete units, noun phrases, features, case markings, and so forth, at least within certain domains. Suppose instead we have some sort of visual representation of real world or possible world events. If I have some sort of device or set of devices for creating for you that visual image, it is possible for me to convey to you the picture in my mind, and allow you to figure out what it all means in the same way that I originally formed an interpretation of the actual event. Let me make this point more clear with a concrete example. Imagine that I sign GIRL with my left hand and then sign a substantive anaphor, just as I did in the beginning of the Sign story. Next, I sign BOY (formed by touching the tip of the thumb, which is extended from the closed fist, to the forehead, and then moving the hand outward a short distance from the face) with my right hand and then sign another substantive anaphor. Notice that I now have the two actors placed in space. If I bring my two hands together such that they are touching along the thumbs and folded fingers, I have said that the boy and the girl met. If I pass the two hands in space such that my hands end up with the left hand to the right of the right hand, I have said that the boy and the girl passed each other without saying hello or otherwise acknowledging each other. If I do the same thing, but with my head tilted upward and to the side, I have said that the boy and the girl passed each other while pretending not to see each other. And we can have them meet in secret, just miss each other, have one trip over the other, and so forth, simply by changing the behavior of the substantive anaphors. What happens is that the anaphoric markers for the actors in the event trace in the signing space an analogue of the trajectory of the actors in the event in the referent world. The function of this sort of device is to enable the addressee in the Sign communication to reconstruct the scene in order to infer the relationships holding between the actors.

I have thus far offered two concepts I feel necessary to a proper understanding of American Sign Language. One is the notion of a mental, visual image; the other is the notion of an analogue construction of that mental, visual image in the signing space using gestural devices. What I need now is some mechanism for matching up particular mental visual images with particular sign visual images. That device is an analogue rule. I conceive of an analogue rule

as a rule type which maps one continuum onto another. That is, in the examples I have given, I suggested the mapping of movements and trajectories of both actors and lines of sight onto movements and orientations of articulators in the signing space. We might conceive of an analogue rule as a statement of the following sort:

    (3) Map the points of $\underline{P}$ onto the points of $\underline{C}$ (where $\underline{P}$ represents some continuous property of the mental image and $\underline{C}$ some continuous feature of the code).

Another way of stating this sort of rule might be

    (4) For every point of $\underline{P}$, there exists a corresponding point of $\underline{C}$.

The mapping would be done in terms of angle equivalencies, matching proportions, and so forth.

This sort of rule, it should be noted, allows us to specify continuous values of Sign parameters without reference to any sort of discrete underlying markings like cases. They need only refer to some property of the visual representation, such as a line, a direction, a distance, a time duration, and so forth.

It's as simple as that. I have only given examples of movements and trajectories, but it should not be assumed that it is only in the domain of movements and trajectories that analogue rules come into play. I quote below what I take to be the substance of an analogue rule taken from Friedman (1975). Here, she is discussing the indexical reference to location far from the signer.

"An index for a locative referent which refers to location of a previously indexed and established referent, is made in the general direction of the nominal referent (i.e. RIGHT, LEFT) but with the superimposition of the feature UP on the index. . . The relative distance of a locative referent from the signer in the real world is indicated by the relative angle of the extended finger in relation to the ground (up to but not including 90°) and the higher the arm is raised and the greater the length of the extension of the arm, the further the distance of the locative referent is from the signer [pp. 30-1]."

Friedman is talking about this sort of result. If someone were to ask me where John went, I might answer by signing OAKLAND, and then pointing in the general direction of Oakland, or by signing MEXICO, and then pointing in the general direction of Mexico; however, in pointing to Oakland, my arm would be less extended, and finger pointed in line forming a smaller angle in relation to the ground, than would the extension and angle be in my pointing to Mexico. As I have already shown, we cannot refer to some n-ary feature UP in order to properly account for the facts in Friedman's description. The continuum of distance is mapped onto the continuum of hand angle, arm extension, and height. This is

the content of an analogue rule, though I do not imagine
Friedman intended it as such.
        I could continue giving examples of areas where ana-
logues come into play in ASL. Rather than do that, I would
prefer to discuss why it is that I took up study of such
a strange aspect of a strange language. One overwhelming
aspect of Sign literature is researchers' constant assur-
ance that Sign language is just like 'real' language, that
it manifests the design features posited for vocal language,
reflects the non-phonological universals of acquisition,
fulfills the sociological functions of vocal language, and
so forth. On the other side were those people who pooh-
poohed Sign language by saying that Sign, well, it is just
iconic, pantomimic, and not at all in the same category as
vocal language. It seems clear to me that the linguist,
intrigued as I was by this weird object, Sign language,
wanted to feel justified in studying it, but that in order
to do this, first had to argue against those pooh-pooh lin-
guists, to first bring Sign language into the domain of
natural languages. It is equally clear to me that this
situation precipitated a pseudo-issue, with the vocal lan-
guage linguists claiming that Sign language was iconic, and
therefore non-arbitrary, and must be ruled out of the do-
main of natural language linguistics, and the Sign linguists
claiming that Sign language is only incidentally iconic, but
in all important respects arbitrary and conventional. The
mistake has occured in contrasting iconicity with arbitrar-
iness, in making them polar opposites. The real case is
that language, even vocal language, can be arbitrary and
iconic at the same time. Take, for example, the notion of
stress and intonation in English. I would like for the
reader to take the following sentence of English and play
with the stress and intonation contour over the underlined
word 'fat':
        (5) John is <u>fat</u>.
Notice that greater degrees of stress, and more convoluted
intonation contours, are associated with greater degrees
of the referred to 'fatness'. The fact that those differ-
ent stress values indicate increasing 'fatness' values is
arbitrary, established by convention. And yet the way in
which degree of stress functions as an analogue of degree
of fatness is iconic, in a not too abstract way. That is,
all we need to know is the principle, or analogue rule if
you will, that maps degree semantics onto degree of stress;
then, we can do all sorts of iconic things along those lines.
        It is just that in looking at vocal language, one can
do a hell of a lot while ignoring its continuous properties;
in looking at Sign language, analogues are central and basic.

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        sual Language Phonology. Ms, Department of Linguistics,
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