STUDIES IN LINGUISTICS

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AN OUTLINE OF THE VISUAL COMMUNICATION SYSTEMS OF THE AMERICAN DEAF

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PREFACE

The present paper, available both from Studies in Linguistics and from Gallaudet College, offers to linguists the first substantial part of an answer to an old question: what of sophisticated visual symbol systems examined by the rigorous methodology of structural linguistics? It likewise offers to all those interested in the deaf and their problems solid evidence that the sign language of the American deaf, unlike such secondary systems as writing or speechreading, has a language-like nature and function. Whether it is a language in the full meaning of the term is a question the linguist ought not to judge until much more evidence of the kind presented here is made available; but the majority of the deaf themselves and many who work with them know that the question was long ago settled pragmatically.

The writer is indebted to the Gallaudet College Research Committee, especially to its former sociologist member, Dr. Anders S. Lunde, and to its chairman, Dean George E. Detmold, who first suggested the study and by his efforts secured institutional support for it. A welcome grant from the American Council of Learned Societies made possible a summer of study with Professor Henry Lee Smith, Jr., as well as acquaintance with Professor George L. Trager, out of which grew the conviction that their methods of linguistic analysis are sufficiently mathematical to apply to a symbol system in a different sensory medium. The Eastman Kodak Company and Georgetown University Hospital very generously permitted us to borrow photographic equipment for the recording of data.

The writer is very grateful, too, for the time and intelligent cooperation given by the several informants who sat, or rather signed, for the movie camera.

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APPENDICES

0. INTRODUCTION

0. The primary purpose of this paper is to bring within the purview of linguistics a virtually unknown language, the sign language of the American deaf. Rigorous linguistic methodology applied to this language system of visual symbols has led to conclusions about its structure which add to the sum of linguistic knowledge. Moreover, the analysis of the isolates of this language has led the writer to devise a method of transcription that will expedite the study of any gestural communication system with the depth and complexity characteristic of language.

Second, the system of transcription presented here as a tool for analysis may recommend itself to the deaf or hearing user of the language as a way of recording for various purposes this hitherto unwritten language. Those whose work in education or other social service brings them into contact with deaf children or adults may find both the conclusions and the system of writing the language helpful and suggestive.

0.11. Communication by a system of gestures is not an exclusively human activity, so that in a broad sense of the term, sign language is as old as the race itself, and its earliest history is equally obscure. However, we can be reasonably certain that, even in prehistoric times, whenever a human culture had the material resources, the familial patterns, and the attitudes toward life and 'the normal' which allowed the child born deaf to survive, there would grow up between the child and those around it a communicative system derived in part from the visible parts of the paralinguistic, but much more from the kinesic, communicative behavior of the culture (Trager, 'Paralanguage', SIL 13.1-12,1958). Based on the patterns of interactive behavior peculiar to that culture, the communication of the deaf-mute and his hearing companions would develop in different ways from the normal communication of the culture. To take a hypothetical example, a shoulder shrug, which for most speakers accompanied a certain vocal utterance, might be a movement so slight as to be outside the awareness of most speakers; but to the deaf person, the shrug is unaccompanied by anything perceptible except a predictable set of circumstances and responses; in short, it has a definite 'meaning'. That shrug would certainly become more pronounced, even exaggerated, in the behavior of the deaf-mute and perhaps also in that of his hearing partners in communication.

This hypothetical discussion of the origin and development of the gesture

language of the congenitally deaf individual in any society is not to be taken as a prejudgement of the vexed question of language genesis. Surely total response of the organism precedes the selection of vocal or manual or facial signalling systems, but special signalling systems of the deaf, though a reversion in a way to the antelinguistic patterns of the race, can only develop in a culture, built, operated, and held together by a language, a system of arbitrary vocal symbols. The kinesic, or more broadly, the metalinguistic communicative phenomena out of which the primary communicative patterns of the deaf are built may once have been the prime phenomena, with vocal sounds a very minor part of the complex; but it cannot have been until long after the development of human speech as we know it that human culture had advanced to a point where individuals deprived of the normal channels of communication could be given a chance to develop substitutes.

Whenever such a chance of surviving and experimenting was afforded, the supposition is strong that individuals without hearing tended to group themselves, and hence to develop their visual communication systems in ways still more divergent from the communicative norm than would be the case if the deaf individual remained alone among hearing siblings, parents, or friends. To support the supposition there is both biological and linguistic reasoning. Many of the diseases which in modern times cause deafness in the infant before he has acquired speech would have been immediately or soon fatal in earlier times; but some ex-natu deafness is genetic, not only occurring in all periods of history but tending to give the deaf child one or several siblings as well as parents or more distant relatives similarly affected. The linguistic argument is simple but telling: the effect on social grouping of having or lacking a common language is obvious and intense enough ordinarily; but when the difference is not between dialects or languages but between having or lacking language, the effect is enormously intensified.

There are records of successful attempts to teach persons deaf from birth to communicate in more socially acceptable ways, namely, by reading and writing, by manually spelling out language, and by lipreading and artificially acquired speech. But in the long stretch of time from antiquity to the middle of the eighteenth century these amount to the merest scattering of instances.

0.12.   The real history of the sign language examined in this study begins in France in 1750.   In that year the Abbé de l'Épée undertook the teaching of

two deaf-mute sisters. What distinguished him from other brilliant practitioners in the art of teaching language to the congenitally deaf was an open mind and a boundless charity. While others had instructed one or at most a handful of pupils, and seeking reputation and emolument, had paraded their successes while making a mystery of their methods, l'Épée gave his life, his considerable private fortune, and his genius to a school which in theory at least was open to every child born deaf in France, or in all of Europe. For nearly three decades he taught in and directed the school, making known its results only through monthly demonstrations open to the public until 1776, when he felt it necessary to answer criticism of his methods by rivals in a full exposition of his theory and practice.

This work, L'institution des sourds et muets, par la voie des signes méthodiques (Paris, 1776), shows clearly that the basis of his success is an amazingly astute grasp of linguistic facts. A few years before l'Épée began his career Jacob Rodrigues Pereira had come from Portugal to France and begun teaching deaf-mutes. His method was to begin with practice in articulation and much later to teach writing and reading with the aid of a one-hand manual alphabet. Although one of his pupils, Saboureaux, was a striking example of his success, composing works on the education of the deaf, and attacking l'Épée in print, there is no doubt that demonstrations of it could be misleading. As l'Épée says, a pupil taught to recognize the manual alphabet and form letters with a pen could demonstrate great decoding and encoding ability without really understanding anything of what he wrote; or a pupil could pronounce fairly intelligibly every French syllable without comprehending anything. In short, the language of the Pereira method was French, taught through articulatory exercises, ordinary writing, and a set of manual symbols corresponding to the letters of the alphabet.

L'Épée also taught speech but relegated it to a minor part of the educational program. His pupils too demonstrated their ability to write correct and elegant French. But they could also reason and answer questions calling for opinions supported by an education in depth. What is more his dictations were given, not in a one-for-one symbolization of French orthography, but in one or the other or both of two very interesting sign languages.

The difference between l'Épée and all his predecessors as well as many who followed him is his open-minded recognition of the structure of the problem.

He could see his own language objectively and analyze its grammar in a way which made possible its transmission to and synthesis in the mind of a bright teen-age, congenitally deaf pupil in two years. He could also see the mind of a pupil as a human mechanism functioning by means of a language, without being alarmed at the fact that until the education was complete that language was not French. His detractors seem to have treated pupils as automata into which the French language—that is its pronunciation and orthography—could be built with the aid of suitable coding devices.

Though not the first to recognize the existence of a sign language among deaf-mutes—Montaigne two centuries earlier had been struck by its precision and rapidity (Essays, 2:29)—l'Épée was the first to attempt to learn it, use it, and make it the medium of instruction for teaching French language and culture to the deaf-mutes of his country. This language of the deaf, he, like writers for the next two centuries, called 'the natural language of signs', or le langage des signes naturelles. But for teaching the intricacies of French grammar, and through it the art of abstract thought, he devised what now would be called a meta-language. This was his system of signes méthodiques.

'The natural language of signs' is a term with a long history; from 1776 to the early years of this century its denotation has varied with the metaphysical and linguistic theory of the writer who used it. Particularly interesting is the almost magical effect of the adjective natural. Some of those who use it are confident that throughout time and terrestrial space there is a necessary and unbreakable connection between a sign and its meaning. Here, for example, is Valade, who wrote some penetrating studies of the sign language (1854): 'Les signes sont naturels quand ils ont, avec l'objet de la pénsée, un rapport de nature tel qu'il est impossible de se méprendre sur leur signification. Ils ont une valeur qui leur est propre et qu'aucune convention ne peut changer.' L'Épée in his use of the term is less the metaphysician and more the linguist, but even he concludes his conspectus of 1776 with a 'Projet d'une langue universelle par l'entremise des signes naturelles assujétis à un méthode.'

Actually 'the natural language of signs' is a false entity. A 'natural' sign language must be very much what is described in the first paragraph of this section. Any extremely close, non-arbitrary, relation of sign to referent will be in those few areas of activity where pantomime and denoted action are

nearly identical, for instance, eating. Or it will be in the cases where pointing is as clear as language: you, me; up, down; etc. But most of the signs taken as natural, necessary, and unmistakable in the past are, of course, those parts of the total communicative activity of a culture which relate to a specific set of circumstances in that culture. This list of Arrowsmith's, in The art of instructing the deaf and dumb (London, 1819), contains some of all three kinds: 'yes, no, good, bad, rich, poor, go, come, right, wrong, up, down, white, black, walk, ride...' but whether a nod or some other sign was the 'natural' sign for yes in Arrowsmith's England, that sign is just as arbitrary, just as much culturally determined, as any syllable in a vocal system.

L'Épée realized that this natural language, indispensable as it was in the day to day existence of uninstructed deaf-mutes, was insufficient as a medium for teaching them French language and culture. When the language had a sign which could be used for a certain concept of French grammar he adapted it. He found that the pupils he encountered signified that an action or event was past by throwing the hand back beside the shoulder once or repeatedly. In his carefully worked out set of lessons he shows how he teaches the past tenses of French verbs in connection with days of the week and institutes at the same time some of his signes méthodiques. He uses one backward motion of the hand, over the shoulder, for the simple past, two coups de la main for the perfect and three for the pluperfect tense. When the language of 'natural' signs lacked a sign, as it did for the articles, he invented one out of hand. The definite article le was signed by a crooked index finger at the brow, la at the cheek. For some of these signes méthodiques of l'Épée and his successors the etymologies can be accepted as with any explicit coinages. The crooking of the index finger, he says, was a reminder to the pupil that the definite article chose one of many possible instances of the noun; the brow was to recall the male custom of tipping or touching the hat brim; the cheek is the feminine sign because the coiffure of ladies of the period often terminated (showily) there.

Another of l'Épée's signes méthodiques shows how he fashioned a bridge between natural signing and French. He found it necessary to invent several signs for the prepositions (as for other 'function words'), not that the natural sign language could not express relationships, but because the exact word demanded by idiomatic French had no single sign equivalent. One such coinage

was his sign for the preposition pour. He says it begins with the index finger pressed against the forehead, the seat of the reason or intention, and terminates with the finger pointing toward the object. The sign 'for' in American sign language is still made identically.

L'Épée's work shows an acute awareness of the several levels on which he was working. Gaining the confidence of his pupils by his ability to converse with them in their own 'natural' language, he could introduce them to the quite foreign French language in all its formal elegance through the meta-language of his signes méthodiques. His pupils still in school could demonstrate letter-perfect transcriptions when dictated to in these methodical signs; but his finished students, who from the first became the primary teachers in the school, had thoroughly learned French and could translate from natural sign language into literary French with a considerable saving in time; or they could just as easily transmit the import of written French to their pupils by using natural sign language.

0.13. It is greatly to be regretted that from l'Épée's day to the present his grasp of the structure of the situation of the congenitally deaf confronted with a language of hearing persons has escaped so many working in the same field. However, to continue the history, l'Épée died in 1789 and was succeeded by the Abbé Sicard who had studied under him a few years before and been put in charge of the new school for the deaf founded at Bordeaux.

Sicard is credited by some with even greater success than his master in bringing the most gifted of the deaf pupils to the highest levels of intellectual attainment. Certainly two of his proteges, Massieu and Clerc, wrote and reasoned with a skill outstanding among their hearing contemporaries. Clerc's articles in the first volumes of The American annals of the deaf (1847ff) are remarkable for their lucidity, good sense, and complete lack of the mannerisms of style which date the writing surrounding them in that journal. Moreover Sicard is the direct link between the French development of the sign language and the American sign language which is the subject of the present study.

0.14. In 1815 Thomas Hopkins Gallaudet was sent to Europe by a group of public spirited citizens of Hartford, Connecticut, to study the methods of teaching the deaf. Visiting England first, he found little encouragement in the Watsons' London Asylum (Hodgson, The deaf and their problems, London, 1953); but Sicard welcomed him, indoctrinated him in the method of the Paris school,

and sent back with him Laurent Clerc who became the first deaf teacher of the deaf in America. The American School for the Deaf was established with Gallaudet as head at Hartford in 1817, and the New York School soon after. At both of these and at many which followed all over the country, the natural sign language as well as the methodical sign system originated by l'Épée was firmly established as the medium of instruction.

0.15. Actually these two sign languages must have tended to become one from the first. The advantages of having, instead of the 'home made' gestures of the uninstructed deaf-mute, a sign language similarly executed but expressly designed to translate the French language and the culture to which that was the key must have impressed every signer who knew of it even in the eighteenth century. One may guess that some notion of the French system had preceded Gallaudet's formal introduction of it to the United States. How else explain the rapid flourishing of the language and the schools using this method to the point where a national college for the deaf was deemed necessary and established by Act of Congress in 1864 for the higher education of the graduates of these schools?

At any rate the present language of signs in general use among the American deaf stems from both the natural and methodical sign languages of l'Épée, but even the 'natural' elements have become fixed by convention so that they are now as arbitrary as any, and users of the language today are disdainful of 'home signs' as they call those signs that arise from precisely the same conditions that generate the 'natural' signs but that have local and not national currency.

Much condensed, this brief history has not always distinguished between signs themselves, which are analogous to words, and a sign language which is a system with levels corresponding to phonological, morphological, and semological organization. Actually one might distinguish not two but three kinds of signs: 'natural' signs whether 'home' signs or the accepted signs of a sign language in use; 'conventional' signs which are coinages with or without direct borrowing from another language; and 'methodical' signs, which in origin at least were sign-like labels for grammatical features of another language and were used only in teaching that language. Toward the latter two the language of signs seems to have behaved as have other languages toward borrowings. When the social and educational revolution in the life of the deaf initiated by

l'Épée flooded the visual language with new vocabulary, the language adopted
many of these conventional signs. But the meta-language of methodical signs
was a different system, just as the symbolic code language of electronic compu-
ters is different from English; and its contributions could be only individual
signs (such as 'for') which came into the language with the same status as the
conventional signs. That the French language, and later the English language,
through the medium of the methodical sign language, or through persons bilin-
gual in French and sign language, affected the syntax of the sign language
actually in use by the deaf may be suspected; but the writer's projected rigo-
rous demonstration of such influence will have to wait until the analysis of
the present sign language is complete enough to allow such historical investi-
gation. (See p.31)

0.16. Studies of the sign language of the deaf uncomplicated by prescrip-
tions for its use in teaching, by controversy about the advisability of using
it at all, or by special pleading for its use as a universal language are not
to be found. The work of l'Épée already referred to, despite its emphasis on
the teaching of French grammar and syntax, is valuable both for its scattered
descriptions of the 'natural' signs of the uninstructed deaf-mutes and for its
attitude: none before him and all too few after him to the present day have
been willing to face the fact that a symbol system by means of which persons
carry on all the activities of their ordinary lives is, and ought to be treated
as, a language.

Various bibliographers have credited l'Épée with beginning a dictionary
of signs which was completed and issued by Sicard. Actually this work (Théorie
des signes, Paris, 1808) is a two volume list of French words, arranged by sub-
ject matter, with their translation into methodical signs. Most of the words
require at least three signs for their rendering: a base sign for the lexical
meaning; a sign showing whether verb, substantive, adjective, or other; and
further signs for determining case, gender, number, etc. This systematically
logical way of rendering French vocabulary and semantics in gesture and panto-
mime is in many ways similar to the New Sign Language invented by Sir Richard
Paget except that a word translated by his method begins with determinants,
such as a sign for 'concrete' or 'abstract', and a subject-category sign, and
progresses to the particular or base sign. (The new sign language: notes for
teachers. London, Phonetics Dept., University College, n.d.) Both the eight-

eenth century and the modern systems are really methods of teaching, not lan-
guages capable of colloquial use.

Sicard also published a brief study of the method he followed in the
Théorie volumes (Signes des mots, considérés sous le rapport de la syntaxe;
à l'usage des sourds-muets; Paris, 1808); but this too concerns the use of
'methodical' signs for teaching French vocabulary.

A different approach is apparent in the work of Bébian. His Mimographie,
ou essai d'écriture mimique propre à régulariser le langage des sourds-muets
(1825) is a most ingenious attempt to devise a system of writing for the natural
sign language. He was a teacher at the Paris school. His method of writing
the signs is analytical, but his avowed purpose is to compose a vocabulary or
dictionary of signs to serve as a regulator of the language much as the Academy
and Dictionary performed that function for French. Considering the stage that
linguistic analysis had reached in his time, his work is excellent in concep-
tion and execution. His symbols for rendering the hands and other parts of the
body involved in the sign are representational enough to be easily remembered
and read, and at the same time sufficiently conventionalized to be rapid and
economical. He also used a few 'diacritical' marks to denote facial expres-
sions: 'questioning', 'surprise', 'reverence', and so on. Movement seems the
least well-handled part of his system; but there is a possibility that his
writing system, as judged by one familiar with present sign language, falls
short of succinct and accurate description of the language because the natural
sign language itself in his time lacked uniformity in some ways. For example,
the present American signs for 'chair' and 'name' are regular in every way.
Both use the index and second fingers of both hands and both cross these fin-
gers of one hand over the same fingers of the other hand at or near the second
joint. The sole distinction is the orientation: edgewise (index finger upper-
most) for 'name'; flat (palmar surface down) for 'chair'. But in Bébian's
time, though 'name' was signed just as now, the sign for 'chaise' was panto-
mimic, the signer making a more or less abbreviated attempt to sit in an imagi-
nary chair. (The authority for 'chaise' is the picture-dictionary of Pelissier
discussed below.)

In Études sur la lexicologie et la grammaire du langage naturel des signes
(Paris, 1854), Y.-L. Remi Valade rejects Bébian's system as too cumbersome and
its symbols as too numerous. He retains, however, the purpose: a dictionary to

regularize signs, to make for more uniformity, both in the language and in the
education of the deaf. He understands very well why a dictionary of signs can-
not be expected to resemble, or fulfill the same function as, a standardized
French dictionary. What he projects in short is a French-Sign Language diction-
ary. Following each entry of a French word with etymological and grammatical
notation would be a description of the natural sign which that word most nearly
translates. Henceforth, he says, the French word would stand for the sign and
could be used for it in writing sign language.

These considerations of the nature and function of the lexicological task,
and the rejection of symbols in favor of skillfully worded descriptions are
echoed in two recent discussions of the sign language of the American Indian.
C.F. Voegelin (1958) and A.L. Kroeber (1958) disagree about the importance or
priority of lexicology in analysis and description of this language, which is
in some ways intricately related to the sign language of the American deaf.

The Indian sign language, also, has been most often written about as a
universal language, an instrument of international peace and understanding.
To that end its advocates, aware of the deficiency of its vocabulary for this
laudable purpose, have enriched it by borrowings, unacknowledged in detail,
from the sign language of the deaf. There is also the vexed question of its
origin, whether indigenous or directly caused by the sudden impact of a totally
foreign culture. Its relation to other elements of some culture or sub-culture
needs to be ascertained. Was it ever a language in a strict sense or was it
from the beginning a trade and treaty code? These and other questions need to
be explored, and it is the conviction of the writer that the proper approach
is not through Tomkins' (1926) or Mallery's (1880, 1881) descriptions of indi-
vidual signs. Even working with an informant, as Lamont West is reported to be
doing (Kroeber, Voegelin, 1958), may not produce the kind of results intended.
Kroeber's article suggests that it survives mainly as a performance for, and
is even modified to meet the demands of, an audience of tourists. The surer
way is through a rigorous analysis of the structure of the sign language of the
deaf, which has in almost every respect the role of a language in a (minority)
culture (0.2 below). Knowledge gained about the structure of the various levels
of this language, the categories discovered, the nomenclature and symbology
developed in the linguistic analysis of a living visual language will surely
expedite the investigation of other gesture languages including the 'sign-talk'

of the American frontier.

Valade's studies began with lexicography, but he also makes some interest-
ing observations on the syntax of the natural language of signs. Like all the
l'Épée school of grammarians, he is able to get sufficiently outside his own
language to compare sign language with French, Latin, and English grammar objec-
tively. For example, he states that the syntax of sign language has no need
for the copula in such statements as 'the corn is green' or 'the girl is
beautiful' because the visual juxtaposition of the signs for substantive and
adjective serves the same purpose. Such analysis is far superior to the con-
clusions sometimes encountered that the language of signs has no grammar or
syntax, or that the absence of systems of verb inflection argues a defect in
the language or an abnormal psychology of the user traceable to his aural defi-
ciency. On the other hand Valade's conviction, shared by later French and
American writers, that the order of signs in an utterance is closer than that
of French or English to the 'natural' order of occurrence or importance will
not bear scrutiny.

A different treatment of signs is given in the final portion of Pelissier'
L'enseignement primaire des sourds-muets mis à la portée de tout le monde avec
une iconographie des signes (Paris, 1856). Here he gives some four hundred
drawings with dotted lines and arrows to show movement, each captioned with the
French word it renders. These are now being transcribed in the system of nota-
tion introduced in the present study by the writer's associates (0.3 below);
and studies of their structural and semantic relation to present signs are
contemplated.

All the French writers on sign language so far reviewed are primarily
educators of the deaf; l'Épée, Sicard, Bébian, and Valade are grammarians as
well. Pelissier, however, writes less for the theoreticians of grammar than
for a new group that must be reckoned with. In a century a linguistic commu-
nity had developed, and a committee composed of deaf adults instructed in the
Parisian and similar French schools, and of interested hearing persons, were
making their views felt in the linguistically complicated educational contro-
versies. Their interest was in the use, the extension, and the public accept-
ance of their language, which from Pelissier's iconography appears to be the
'natural' sign language with a difference. In 1856 this language retained some
of the signs which were doubtless encountered by l'Épée when he met his first

uninstructed deaf-mutes; but its 'vocabulary' also included many coinages, con-
ventional signs, and signs derived from the 'methodical' signs of the schools.

Pelissier's work, as the title indicates, attempts to use the language as
a means of dispelling the mystery which had surrounded the teaching of the deaf
since the middle ages. Does one wish to teach French to a deaf-mute? Let him
learn the latter's language and proceed from there. This rationale as well as
the language was imported to America, as this resolution of the World Congress
of the Deaf held in St. Louis, in 1904, proclaims:

'The educated deaf have a right to be heard in these matters and they
shall be heard.

'Resolved, that the oral method, which withholds from the congenitally and
quasi-congenitally deaf the use of the language of signs outside the schoolroom,
robs the children of their birthright; that those champions of the oral method,
who have been carrying on a warfare, both overt and covert, against the use of
the language of signs by the adult, are not friends of the deaf; and that in
our opinion, it is the duty of every teacher of the deaf, no matter what method
he or she uses, to have a working command of the sign language' (Annals, 1904).

American writing on the language itself may be represented by three
manuals:

Joseph Schuyler Long, The sign language: a manual of signs, being a descriptive
vocabulary of signs used by the deaf of the United States and Canada, Omaha,
1952; 1st. ed., Des Moines, 1918.

J.W. Michaels, A handbook of the sign language of the deaf, Atlanta, Ga., 1923.

Father Daniel D. Higgins, How to talk to the deaf, St. Louis, 1923.

These all describe the method of making the signs and to some extent of phras-
ing utterances in the language. The greatest space in each is devoted to an
English-Sign vocabulary using illustrations and verbal descriptions of the sign
that translates the English word. Grammatical descriptions and prescriptions
are implied in the linking of each sign to an English word with its inevitable
relegation to a certain part of speech.

There is a similar kind of manual of the Australian sign language: How to
converse with the deaf in sign language as used in the Australian Catholic
schools of the deaf, by teachers of the schools at Waratah and Castle Hill,

N.S.W. (1942). This sign language brought to Australia from the Dominican
School in Cabra, Ireland, has some signs identical with present American signs,
others which seem related, but a great many signs using, as do present American
'wine' and eighteenth century French 'vin', a 'letter' of the one-hand manual
alphabet as an element of the sign.

Of these four handbooks, the Australian and Michaels' seem to show a
greater adherence to the methodical sign system; the latter giving signs for
'verb', 'substantive', etc., in the Sicard manner; the former rendering such
words as 'the', 'be', 'is' by specific signs in a manner foreign to the
'natural' sign language and having signs likewise for prefixes and suffixes of
English words.

The one full length modern study of the visual communication of the deaf
is Father Bernard Theodoor Marie Tervoort's dissertation Structurelle analysé
van visuell taalgebruik binnen een groep dove kinderen (Amsterdam, 1953). This
work, though an interesting exploration of such questions as spontaneous lan-
guage origin and development and the psychological-linguistic implications of
visual instead of visual-acoustic orientation and of esoteric and exoteric
languages and their grammatical-logical categories, has actually slight bearing
on the present study for several reasons: In Holland where his observations
were made, signing alone, or with simultaneous spoken accompaniment as practiced
in many American schools, is not used as a medium of instruction. Officially
prohibited, it occurs as an 'after hours' activity among the school children
he studied, most of them unacquainted with any sign language outside their own
group. His conclusions show that the signs they used were developed in the
school group itself and tended to vanish when the group dispersed. The signs
he observed were always accompaniments of speech or silent speech-like movements
and could thus be in no way substitutes for speech. He therefore analyzed
stretches of this combined visual-oral language by using the categories of
traditional Dutch grammar. The present study is of a sign language which has
a wide geographical currency as well as a recorded persistence through more
than a century, which is accepted as an educational medium, and which will in
this and projected studies be shown to have a syntactical, morphemic, and sub-
morphemic structure different from that of English. Moreover, for several
reasons, the observations in Tervoort's study were limited to children under
the ages of puberty, while the practice in the present study is to follow the

principle of choosing informants from among the intelligent adult members of
the language community.

The writer is well acquainted with Father Tervoort who is making Gallaudet
College his headquarters while engaged in a study of the language and psycho-
logical development of students of two American schools for the deaf over a
six-year period. His working hypothesis is an extension of his original thesis
that the deaf child has 'two languages, an esoteric and an exoteric one; one
for mutual intercourse, the other for talk with outsiders' (English summary,
1.293) and he has stated that in the first two months of the experiment there
are already indications that the esoteric elements tend to disappear as the
child matures in the direction of a more or less standard English. With the
caveat that the writer and Fr. Tervoort disagree amicably on terminology, the
writer in this context would characterize the other's work as more in the nature
of a controlled experiment in the fields of psychology and educational method
than strictly in the field of linguistics (Trager, 1949). The writer also
believes that in the experience of the American deaf person there are two lan-
guages, not esoteric and exoteric and therefore only psychologically distinct,
but linguistically different: these two are American English, known to the deaf
through various substitutes for hearing, and the American sign language, the
subject of this microlinguistic study.

Exploration of the possibilities of sign language for international use
continues also. The World Federation of the Deaf issued at Rome in 1959 a
booklet of 339 photographs (for 323 signs) captioned by numbers only, followed
by alphabetical indices of English and French words keyed to the numbered pic-
tures (Première contribution pour le dictionnaire international du langage des
signes, terminologie de conférence). Some of the English-word=sign-picture
correspondences seem to be identical with the word-sign equivalence generally
accepted by users of the American sign language; other words are connected with
quite unfamiliar signs. There is a third category of correspondences--the word
translated by a sign which in American sign language usually renders a word
more or less distantly related semantically to the WFD entry. This flexibility
of sign-concept relation may account for the phenomena observed by the writers
(Dr. Cesare Magarotto and Mr. Dragoljub Vukotic): 'During the numerous meetings
and international congresses held these last ten years, the deaf-mutes of dif-
ferent countries and continents have been able to hold conversations on different

topics with the sign language, understanding each other without the least help
of an interpreter' (p.vii).

0.2. The application of the techniques of the sociologist and cultural
anthropologist to the linguistic community formed by the deaf is as new as
structural analysis of their language. Much of the information about the group
which is desirable as a background for strictly linguistic analysis is lacking,
but the writer is most fortunate to have been associated in the first years of
the new Gallaudet College research program with Dr. Anders S. Lunde whose paper
'The sociology of the deaf' is the pioneer work in the field.

Dr. Lunde has graciously permitted the quotation of substantially all of
this paper, first presented at the 1956 meeting of the American Sociological
Society in Detroit. Its information is most pertinent here and its delineation—
of areas where research is needed may lead to further collaboration of socio-
logist and linguist. He writes:

'The deaf as a group fall into a completely unique category in society
because of their unusual relation to the communication process and their sub-
sequent adjustment to a social world in which most interpersonal communication
is conducted through spoken language. No other group with a major physical
handicap is so severely restricted in social intercourse. Other handicapped
persons, even those with impaired vision, may normally learn to communicate
through speech and engage in normal social relations. Congenitally deaf per-
sons and those who have never learned speech through hearing (together repre-
senting the majority of the deaf population) never perceive or imitate sounds.
Speech must be laboriously acquired and speechreading, insofar as individual
skill permits, must be substituted for hearing if socially approved intercom-
munication is to take place. The rare mastery of these techniques never fully
substitutes for language acquisition through hearing.

'With his acoustical impairment as a background, the deaf person undergoes
certain conditioning social experiences which separate him from the hearing and
tend to make him a member of a distinct sub-cultural or minority group....The
sociology of the physically handicapped is a neglected field; a few texts
barely touch upon this subject and then, in the case of the deaf, often inaccu-
rately. Only a handful of articles pertaining to the role of the physically
handicapped in society has appeared in sociological journals....

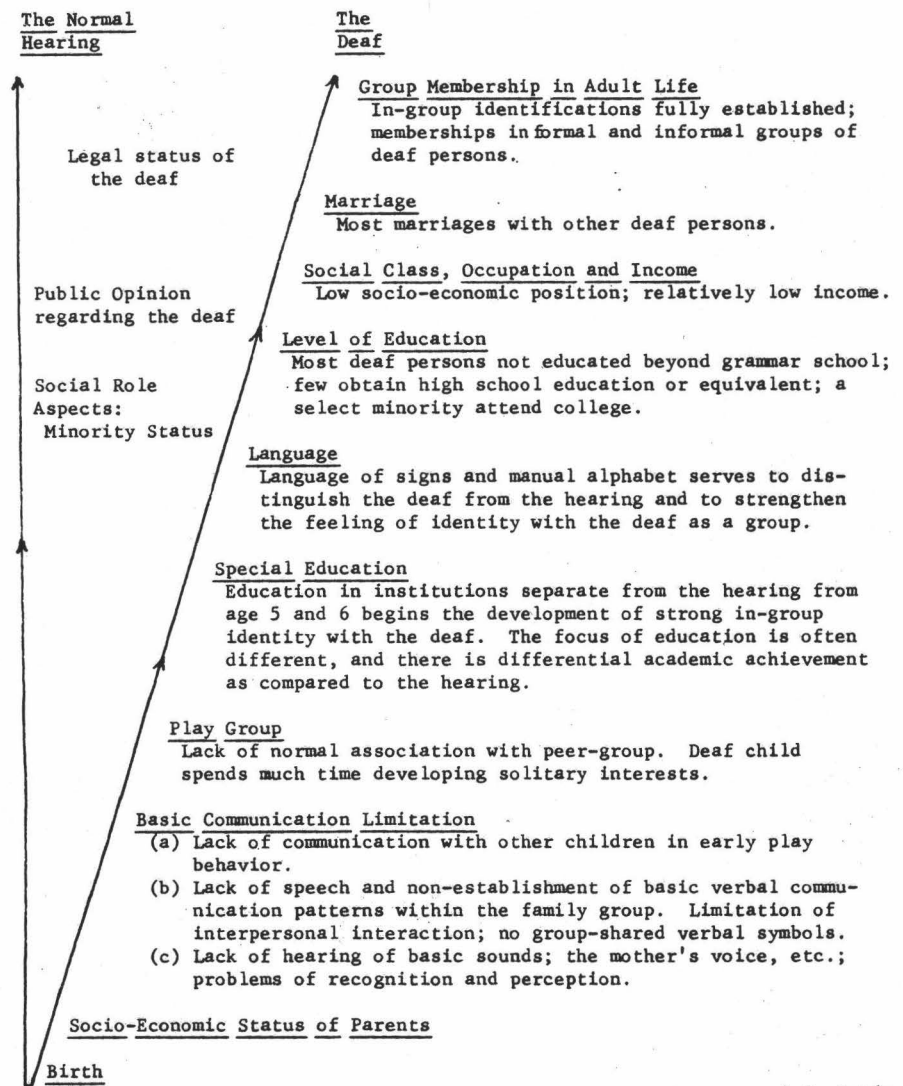'The deaf may be identified as a group for sociological purposes. They

are to be distinguished from those who are "hard of hearing", or those of par-
tial hearing who can hear with the use of mechanical or electronic hearing
aids, and those who become deaf late in life after having acquired speech
through hearing and associated, in normal communication, with hearing persons.
By and large, the deaf group as a whole never used hearing for speech. The
available evidence, which is incomplete, seems to indicate that approximately
39 per cent of the total deaf population was born deaf, that another 19 per
cent became deaf by the end of two years of life and that an additional 28 per
cent became deaf between the ages of three and five (Best, 1943). This means
that approximately 58 per cent of the deaf never used hearing for speech and
that 86 per cent of the total deaf population was deaf by age five. The social
implications of this fact are extensive; the deaf as a group have never under-
gone the normal experiences of socialization during the formative years.

'The deaf may be defined therefore as a group composed of those persons
who cannot hear human speech under any circumstances and consequently must find
substitutes (in speechreading, language of signs, etc.) for normal interpersonal
communication. The definition as applied to the group discussed in this paper
is to be understood to include only those persons who become deaf at a rela-
tively early age in life (or are born deaf) and who, for the most part, undergo
the special institutional experiences analyzed below. As far as can be deter-
mined from available data, this group numbers around 100,000 persons, although
some estimates of a more loosely defined deaf population go as high as 180,000
persons. Censuses of the deaf were taken from 1830 to 1930 and were discon-
tinued for reasons of inconsistency and under-enumeration. In 1930, 57,084
persons who had become deaf before eight years of age were enumerated (15th
Census of the U.S. 1930, "The Blind and Deaf-Mutes of the United States 1930",
Washington, D.C., Bureau of the Census, 1931). Estimates based on the U.S.
Public Health Survey of 1935-36 indicated a total deaf population of 170,000
in 1950. Of these it is estimated that approximately 100,000 could be classed
as not having used hearing for speech (Bachman, 1952).

'The deaf person is often taken as an individual adrift in a hearing
society; while this may occasionally be the case, for the most part the deaf
person is a member of a well-integrated group, especially in urban areas. How
he becomes cast as a member of such a group may be investigated by means of a
hypothetical life-cycle, as illustrated on page 23.

SOCIAL FACTORS IN THE ISOLATION OF DEAF PERSONS
AND THE ESTABLISHMENT OF A SOCIAL GROUP OF THE DEAF

Read from the bottom up this chart shows the lines of social divergence from
birth through adulthood.

The Normal Hearing	The Deaf

Group Membership in Adult Life
In-group identifications fully established;
memberships in formal and informal groups of
deaf persons.

Legal status of
the deaf

Marriage
Most marriages with other deaf persons.

Social Class, Occupation and Income
Low socio-economic position; relatively low income.

Public Opinion
regarding the deaf

Level of Education
Most deaf persons not educated beyond grammar school;
few obtain high school education or equivalent; a
select minority attend college.

Social Role
Aspects:
Minority Status

Language
Language of signs and manual alphabet serves to dis-
tinguish the deaf from the hearing and to strengthen
the feeling of identity with the deaf as a group.

Special Education
Education in institutions separate from the hearing from
age 5 and 6 begins the development of strong in-group
identity with the deaf. The focus of education is often
different, and there is differential academic achievement
as compared to the hearing.

Play Group
Lack of normal association with peer-group. Deaf child
spends much time developing solitary interests.

Basic Communication Limitation
(a) Lack of communication with other children in early play
    behavior.
(b) Lack of speech and non-establishment of basic verbal commu-
    nication patterns within the family group. Limitation of
    interpersonal interaction; no group-shared verbal symbols.
(c) Lack of hearing of basic sounds; the mother's voice, etc.;
    problems of recognition and perception.

Socio-Economic Status of Parents

Birth

A.S. Lunde

'It may first be noted that sociological research could throw considerable
light upon the etiology of deafness. There appears to be a prevalence of deaf-
ness among lower income families, reflective of inadequate medical care and
services in infancy and childhood. Beasley (1940) observed a direct relation-
ship between family income and incidence of impaired hearing in the Public
Health Survey of 1935-36.

'The deaf child begins his life separated from the normal associations
with the hearing world to a degree not yet investigated. According to various
observers, sound and hearing are extremely important for orientation from the
first moment of life. The hearing child spends considerable time during the
first four weeks of life "responding" to sound; at the end of 16 weeks the
child seems to identify sounds (Gesell and Ilg, 1953). By 28 weeks he is at
Esper's stage of sound imitation, vocalizing vowels and consonants which will
soon take on the status of words (Esper, 1935; Klineberg, 1940).

'Toward the end of the first year the stage of verbal understanding begins;
by 2-1/2 years the use of spoken language is understood. By 3 years the hear-
ing child begins the development of logical expression in words and sentence-
structuring, and through the expression of ideas, becomes aware of "self". At
4 years he asks "Why" questions, is becoming oriented and plays conversation-
ally with his group. At 5 years the hearing child begins to discuss more
remote and difficult problems such as war and crime in common with friends, and
attacks the problems of sex, time, space, death and God (Gesell and Ilg, 1947).
By the time he enters school the hearing child is equipped not only with a
background of information but with the ability to express himself in language.

'The deaf child is cut off from these experiences; he lacks the orienta-
tion provided by the hearing association with his family and play groups. As
most studies of personality have been made of the deaf child in the school
situation, that is after the age of five or six, there exists no available in-
formation on the first years of deafness. We do not know exactly how the deaf
child learns, orients himself, becomes aware of himself or of his position in
the group. Further research into the operation of socialization and personality
formation of the deaf is urgently required.

'The relation of the deaf child to his family has not been entirely in-
vestigated. It is generally understood that many parents do not learn of their

child's deafness until the child is two or three years of age. Patterns of
reaction ranging from rejection to oversolicitous behavior have been observed.
The role of the parent in the life of the deaf child, the effect of parental
rejection or overprotection, the relation of the deaf child to the other mem-
bers of the family (i.e. sibling relationship)...indeed the total family envi-
ronment of the child during the first six years of life have not been adequately
investigated.

'The social isolation of the deaf child may be increased in the play group
experience. While few studies are available in this area it is obvious that
lack of verbal communication must be a retarding factor operating to limit
interpersonal experience in peer-group relationships. Brunschwig (1936) found,
for example, that deaf children had a smaller number of playmates at any one
time than hearing children and they engaged more frequently in solitary acti-
vities.

'The typical deaf child next enters the school for the deaf. In 1955
there were 23,033 children being taught in educational institutions for the
deaf in the United States (Annals, January 1956). Of these, 66.3 per cent were
full-time residential children and 33.7 per cent were day-school or day-class
children. With respect to social isolation some preliminary studies have indi-
cated that the institutional experience may further remove the child from con-
tact with the hearing world as compared to the day school, from which the child
returns daily to the normal environment of home and community associations.
Some data tend to support the hypothesis that the residential school experience
retards social development (Streng and Kirk, 1938; Burchard and Myklebust,
1942; Avery, 1948). Burchard and Myklebust found that the longer the period
of residence in a residential school the lower the social maturity quotients
on standard tests (p.241-50). There is not sufficient evidence to warrant any
conclusions concerning the effect of attending a school for the deaf; if there
are negative aspects, there are also positive aspects which should also be
investigated.

'The curricular programs in schools for the deaf vary and progress for
each student is individualized to a considerable extent. The burden of teach-
ing basic communication, speechreading, reading and writing, takes precedence
over course work as such. The omission of sign language is significant.
[Neither Dr. Lunde nor the writer knows of any school where instruction in sign

language itself is part of the curriculum.] The deaf child, already retarded
in communication ability, now is further limited in academic development. Thus
the system of education as well as the institutionalization itself plays a role
in comparative retardation, the deaf child being trained academically at a pace
much slower than the hearing child. This further widens the gap between the
hearing and the deaf, taken as groups.

'The education of the deaf is further restricted by the fact that there
are only twelve accredited high schools for the deaf in the United States
(Annals, January 1956). The majority of the deaf do not obtain a high-school
education or its equivalent. This places them as a group on the lower levels
of educational achievement, another factor in group segregation and which
affects their chances for higher education and better employment opportunities.

'It is at the school for the deaf that most deaf children meet other chil-
dren like themselves for the first time and enter into peer-group associations
without the restrictions the special handicap imposed in their relation with
hearing groups. They begin to develop feelings of identity with the deaf group
and to acquire the group attitudes which tend to set them apart. Preliminary
studies at Gallaudet College reveal that the deaf institutional adult recalls
his first days at the school for the deaf in three categories:--first, his
misery at being taken away from home and family, second, his fear of the insti-
tution itself (his perception of it as a "hospital" or "nut-house"), and third,
his amazement and pleasure at finding other deaf girls and boys like himself.
Homesickness and fear disappear as he becomes a member of the newly-discovered
in-group.

'It is also here that many acquire for the first time a new means of visual
communication, the language of signs, which becomes not only a special language
of a sub-cultural group but serves as a means of identifying the deaf from the
hearing. Although oral schools emphasize speechreading and speech, the plain
fact is that the deaf as a group use the sign language among themselves. Ac-
cording to Best, 78.2 per cent of the deaf used sign language and only 1.0 per
cent used speech alone (Best, 1943, p.203).

'In 1955, 78.6 per cent of the schools for the deaf taught by means of
the oral method, only 5.1 per cent taught by the non-oral method and 14.3 per
cent by the combined method. However, only 19 per cent of the public schools

and 24 per cent of the private schools reported restrictions upon the use of
communication methods outside of the classroom which can only mean that the
sign language was permitted in most of the schools using oral teaching methods
(Annals, January 1956). A study of the sign language, how it is acquired and
transmitted, the significance of its content, and so on, would throw consider-
able light upon the entire process of communication as well as indicate the
thought-process of the deaf.

'Most deaf persons leave school at the end of the grammar school period,
but an almost equal number leave before they have completed the work. In to-
day's competitive market this means that they bear an additional handicap be-
sides deafness itself; lack of schooling is one reason why the deaf are largely
found in the lower-paid occupations. The deaf may therefore most frequently be
found in the lower socio-economic classes, considering the prevalence of deaf-
ness among children of the lower classes and the occupational categories they
largely fill in adulthood (U.S. Office of Education, 1936).

'After the school years the deaf person tends to continue his group asso-
ciation with other deaf persons throughout life, through alumni associations,
state societies of the deaf, religious and welfare organizations, churches for
the deaf and various fraternal orders. The deaf have organized their own news-
papers and magazines, and they have established their own homes for the aged
deaf. The extent of membership in formal organizations is not known, but it is
known that the deaf will go to considerable extremes to seek each other out,
that they prefer the company of the deaf to that of the hearing and feel more
at ease with other deaf persons (Pinter, Fusfeld and Brunschwig, 1937). Among
the adult deaf, in-group feelings are strong and group loyalty is intense. The
extent to which group solidarity might be expressed was indicated in the move-
ment in the nineteenth century to establish a deaf-mute Utopia in the West;
Congress was petitioned to set aside a state or territory for deaf-mutes only
(Annals, 1858).

'Marriage patterns also indicate the tendency for the deaf to associate
with each other. In the only extensive study of the marriage of the deaf, pub-
lished in 1898, Fay found that 85.6 per cent of the married deaf had married
other deaf persons. One preliminary study of attitudes of deaf college students
shows that only 5 per cent would prefer to date a hearing person rather than a
deaf person, and about the same proportion would prefer to marry a hearing

person. About 65 per cent have already made up their minds to marry a deaf person.

'Among the other factors enforcing the social isolation of the deaf from the hearing world is public opinion, as expressed in the attitudes of the hearing majority. These appear to be similar to the fear and hostility patterns which appear in other dominant-minority relations; there is the assumption of the inferiority of the deaf and the stereotype of the deaf as "dumb". There seems to be less public sympathy for the deaf apparently because of the ignorance of the gravity of the handicap and because of its invisibility. The Social Science Research Council reported that the deaf were held more in contempt than the blind, the crippled, and the aged (Barker, et al, 1953). The public is simply not aware that deafness may be the most severe, socially, of all handicaps.

'Thus the deaf, first isolated from normal social relations by the fact of physical handicap become segregated as a group through the operation of institutional patterns in the general culture. Admittedly little is known concerning the social condition of the deaf; few sociologists have been interested in the problems presented. The majority of research studies on the deaf have been made by psychologists who have often reported contradictory findings with respect to the intelligence and achievements of the deaf (Meyerson, 1955). Much of the confusion in these and other areas seems to result from a lack of attention to the social factors or variables involved in personality development and to a lack of recognition of the formation of a deaf sub-cultural group.

'The most recent experimental studies seem to indicate that the average deaf person is of normal intelligence (Hiskey, 1956). The so-called differences between the deaf and the hearing are largely the result of differential social experience (Getz, 1953).

'There is much to be explored in this entire area. Sociological research in this undeveloped field can contribute much to the understanding both of the individual problems of the deaf and of the social problems associated with acoustical impairment.'

0.21. The simplest representation of possible communication behavior of American deaf persons would be a line with these extremes: at one end a completely normal American English exchange, the 'listener' with perfect lipreading

ability receiving all that the speaker with perfect articulation is saying. At the opposite end would be a completely visual exchange, the 'speaker' and the 'hearer' using only a system of gestures, facial expressions, and manual configurations as symbols. Of course, neither end is reached in actuality. Although a very few individuals can attain high proficiency at lipreading, or speechreading, under perfect conditions, and many develop excellent speech, most deaf persons reserve this mode for contact with hearing persons. The purely visual communication with no admixture of English is rare, though it may be that the less formal education he has the nearer the individual's communication would approach the purely visual.

But here the linear representation breaks down. Besides these first two modes of communication, digital symbolization of the orthography of English is also available to the deaf. Therefore the non-oral communication of the typical American deaf person may be anything from 'pure' English printed on the air, so to speak, to sign language with or without an admixture of English words or word-derived symbols. But again, the actually observed communication is a combination in all degrees of these two with or without vocal, whispered, or silent articulation as supplement or accompaniment.

In other parts of the English speaking world there are other ways that the manual alphabets and the signs are combined. In American sign language, as aforesaid, English words manually spelled are often treated just as if they were signs in a stretch of utterance, and some signs (fewer than one would expect) are made by a hand configuration which recalls the initial of an English word that is a translation of the sign. But here too there is regional and individual difference: the magazine of the National Association of the Deaf in a series of illustrated short articles has been advocating a greater use of the initial-sign correspondences (The silent worker). In England a quite different manual alphabet is in use; one which requires both hands to form the letters, and thus one not so easily combined with signs.

However, the American sign language, ultimately deriving from the French, has been extended to a larger population more widely dispersed. It therefore has had a quite different development, not the least important factor of which is its relationship to 'complete' manual spelling, speech, and lipreading.

Total communication behavior is what we would seek to know, but analysis

and synthesis are necessary and the present study is directed toward discovering the structure not of the whole communicative complex but of the sign language. The sign language, as the term is understood in this study, requires only a small, though radical, change in the definition of language given by Trager in his 'Paralanguage' (SIL,1958): 'it is the cultural system which employs certain of (the visible actions of the face and hands,] combines them into recurrent sequences, and arranges these sequences into systematic distribution in relation to each other and in reference to other cultural systems' (p.3).

The body of the paper will deal first with observed behavior corresponding with phonetic behavior in spoken languages. Then will follow the analysis of this behavior, and the analysis of the structure corresponding with the phonemic level. Next the morpheme list will be considered, then morphemic structure, and an account of the procedures now in use and contemplated for the analysis of the morphology and syntax.

Chereme, i.e. /kériym/, and allocher are proposed as names for the concepts corresponding with phoneme and allophone (The combining form, cher-, 'handy', as old as Homeric Greek has been preferred to the learned chir- or cheir-). Other terms useful or necessary to avoid confusion or false analogy will be introduced at appropriate parts of the discussion. It seems well to take sign as equivalent to word when the frame of reference is the sign language, or signs. The precise relation of sign to morpheme will be considered in the appropriate section below.

As the invention of a symbol system for the transcription of the sign language has had to go hand in hand with the analysis of its structure, the symbology as well as nomenclature will be presented gradatim with the analysis. For convenient reference a summary of the symbols appears in an appendix.

0.3. The writer, after much consideration of the matter, has chosen to present this study over his name alone; but much of the work at all stages since the beginning has been done by two research assistants who might as easily be named co-authors. Carl Gustaf Croneberg and Dorothy Chiyoko Sueoka have analyzed and transcribed data, discussed the determination of the cheremes, and contributed ideas as well as time to the study to the point where it is difficult to determine authorship. In the detailed discussion of the data, however, the sign or notation when necessary will be identified by initials (CGC, DCS, WS).

1. CHEROLOGY

1.0. Sign language utterances contain both signs and finger-spelled English words in varying proportions, but structural differences make it possible to separate the two. And for the purposes of cherology (the sign language analogue of phonology) the two must be kept separate. The units of the syntactical system are morphemes, but morphemes of two completely different systems of structure. The finger-spelled English word is a series of digital symbols which stand in a one to one relationship with the letters of the English alphabet, but the word itself is a morpheme or combination of morphemes constructed from English language sounds on principles systematically described by the phonemics and morphophonemics of English. Though the deaf person may never have heard a sound, such is the power of symbolics and the adaptability of the human mind, he may still have acquired the ability to use the written or finger spelled word with as much symbolic force as any speaker of English can achieve. The sign, on the contrary, is a unit of the sign language, constructed as are all morphemes from the isolates of its own language system by principles that it will be the purpose of this part of the paper to explain.

To the signer these two kinds of morphemes may, out of awareness, be treated as equivalent because they are freely interchangeable in his utterance: but as soon as their structure is examined, the visually presented English word and the sign are discovered to differ radically. The statement, 'Yes; I know him' remains the same whether each of the four words in it is signed or finger spelled. Thus without any change in the word order there are sixteen different ways of signing it. 'Know', for instance, is spelled by making with the fingers of the hand, successively, the configurations for k, n, o, and w; but 'know' is signed by touching the tips of the fingers of the slightly bent hand to the forehead. It is signed thus in isolation, that is, much as know is said /³nów¹#/ in isolation; but in sign language utterance 'know' may get only a slight movement upward of the bent hand.

The greatest communicative difference between these two structurally different kinds of morphemes available to the user of the sign language is seen in this possibility of variation within a pattern. Finger-spelling is telegraphic in several senses of the word, but the signed 'know' may have modifications which can vary the meaning of the sentence from 'Yes, I am acquainted

with him'; to 'Oh, sure; it's only what I expected of him'; to give but two
possibilities. The completely finger-spelled sentence has only the signer's
facial expression to differentiate it from the same thing written on paper; it
is at one more remove from language itself than writing and thus is a tertiary
symbol system, not itself a sign language. There are no clear indications that
the sign language of the American Indians transcends this kind of relationship.
But the structure of the sign, in the sign language of the deaf, permits con-
siderable linguistic latitude, because the sign itself is not an isolate but a
structure of elements which themselves admit of linguistic variation.

1.1. The twenty-six letters of the English alphabet are represented in
finger-spelling by nineteen distinct configurations. Different attitudes of
three of these configurations add five more letter symbols; and motion of two
of the configurations give the last two. Thus there are three modes of symbol-
izing within the American manual alphabet. The letters a, b, c, e, f, i, l, m,
o, r, s, t, v, w, x, and y are represented by unique configurations of the
hand. The letters d, g, and q share one configuration variously oriented; as
do another triplet, h, u, and n; and a pair, k and p. Two letters are symbol-
ized by configuration plus motion. The i-hand draws a j in the air to symbol-
ize j; and the index finger (d or g) draws the z. Fig. 1 shows these symbols
and configurations.

Except for j and z the symbolization of letters is by static show of con-
figuration. Motion is non-significant and is limited to that needed to change
attitude and configuration. But this is true only for the alphabet considered
as a set of symbols mutually contrasting. In use for spelling, one hand symbol
may need to contrast with itself as is the case when a doubled letter occurs.
There are three ways of signalling this occurrence, their choice structurally
determined. With j and z doubling is simply a matter of making the necessary
movement twice. Configurations which require an opposition of thumb and fin-
gers, or a grip, are doubled by opening or relaxing the fingers and repeating
the configuration. Other configurations are moved to the side with a slight
shake to show double occurrence.

Word endings are marked by holding the terminal letter an almost imper-
ceptibly longer time than the others. Word beginnings may be marked by a dis-
placement of the hand from a previous position. These observations, however,

approach the region of individual preference and style and should be so con-
sidered.

Here is a tabular summary of the contrastive system of the American manual
alphabet:

Contrast by configuration,

normal attitude:	a b c d e f i k l m o r s t u v w x y
and inverted attitude:	q p n
and horizontal attitude:	g h
and motion:	z j /

A great deal of the contrastive load is put on the differences of config-
uration so that the other two resources of the system, attitude and motion,
are very slightly used. So slight are some of the differentiating features
that the system is less effective for communication over distance, to large
groups of viewers, and in poor light than for tête-à-tête use. Nevertheless
it is workable, useful, almost indispensable, and in heavy use by the deaf;
and what is more it is an excellent means of communicating with the deaf-blind.
The writer, introduced to a deaf-blind man after two or three years experience
with using the manual alphabet with deaf persons found that a conversation was
not only possible but amazingly rapid and easy. The deaf-blind person reads
the alphabet by holding his hand lightly against the front or back of the spel-
ler's hand. The relatively small use of motion and attitude change is an advan-
tage under these conditions of reception.

The nature of finger-spelling, evanascent though the symbols are, is that
of a graphemic system. And as any grapheme may have allographic forms, so the
configurations of the manual alphabet actually observed in use show variations.
For example, the pictured e of the manual alphabet has all four fingernails
touching the edge of the thumb, but frequently seen is an allograph in which
only the first two fingers meet the thumb, the others being tightly folded into
the palm. Other allographic differences are the result not only of individual
preference but also of the conformation, flexibility, and muscle tone of the
signer's fingers. A difference between the appearance of men's and women's
formation and articulation of the 'letters' is noticed even by observers who
are not familiar with the system, and this difference, it may be noted, runs
through all sign language activity. Subjectively at least, it is a difference
as great as that of timbre and pitch of men's and women's voices.

1.11. Closely related to the manual alphabet is the system of digital numeration used by the deaf. There is less uniformity in finger numbering than in finger-spelling; but a similar combination of configuration, attitude and motion is characteristic of both. The first five cardinal numerals are often but not invariably made with the palm of the hand toward the signer, while the six through nine configurations are often done with the back of the hand toward the signer. Ten is made by slightly shaking or jerking the fist with thumb uppermost. The system is strictly decimal, the tens symbol being repeated, in full form or vestigally, through the second decade. Eleven through fifteen and sixteen through nineteen may show the same reversal of attitude as the first and second group of digits. Multiple digit numbers are signed by shaking the hand slightly forward at successive points on a line from left to right in front of the signer.

The following table, prepared by CGC and DCS shows many of the features of the numeral system.

TABLE OF NUMERATION

Number	Configuration (Fingers: tb, 1, 2, 3, 4)	Attitude	Motion
0	o of manual alphabet	edge of palm toward viewer	none
1	1 upraised	palm usually toward signer; this is the case with 1-19, except that, for emphasis or visibility, 6-9 and 16-19 may be signed with palm toward viewer	"
2	1, 2 upraised		"
3	tb, 1, 2 upraised		"
4	1, 2, 3, 4 upraised		"
5	tb, 1, 2, 3, 4 upraised		"
6	tb, 4 tip contact; 3, 2, 1 upraised, slightly relaxed	"	"
7	tb, 3 tip contact; 4, 2, 1 upraised	"	"
8	tb, 2 tip contact; 4, 3, 1 upraised	"	"
9	tb, 1 tip contact; 4, 3, 2 upraised	"	"
10	tb upraised from fist a*	back of thumb to signer	shake or twist to right

Number	Configuration	Attitude	Motion
11	fist s, (1)** [see Motion]	palm usually toward signer	(1) snaps up from under thumb
12	fist s, (2)	"	"	(2) snaps up from under thumb
13	fist s, (3)	"	"	(3) snaps or opens from fist
	[DCS: (3) upraised			nod 1, 2 together]
14	fist a or s, (4)	"	"	(4) snaps or opens from fist
	[DCS: (4) upraised			nod (4), tb in palm]
15	fist a or s, (5)	"	"	(5) snaps or opens from fist
	[DCS: (5) upraised			nod (4), tb upraised]
16-19	a, appropriate unit digit		"	a changes rapidly into appropriate unit digit
20	relaxed L, closed L	palm toward viewer; this is usually the case from 20-99	L closes to pinch; may move slightly to right
21, 23-29	L and unit digit	"	L into unit digit; may move slightly to right
30	(3), closed (3)	"	(3) closes; may move slightly to right
22, 31-99	(first digit), (second digit)	"	(first digit) into (second digit); may move slightly to right
100	(1), c	edge of palm toward viewer	(1) into c
1000	palm of left hand; (1), m on right hand	left palm held out; palm of right hand toward signer	(1); then m tips touch palm of left hand
1,000,000	as above	as above	as above, then repeat m touch farther from wrist

*'Fist a' and 'fist s' refer to configurations of the manual alphabet; see Fig. 1.

**Figures in parentheses refer to configurations already described above.

Approximations by decades: The equivalents of the English 'forties', in his 'thirties', 'doing seventy', are signed by shaking the configuration for the decade (30 through 90) in small arcs from the wrist. A facial expression accompanying such signs also helps to indicate that the number is approximate.

For numbers over one hundred, use digits and signs in the order corresponding to the number. Example: 257,100 is signed: (2) (hundred) (57) (thousand) (1) (hundred). There is no standard rule for signing long numbers; the requirements for clarity will dictate the practice. Where long numbers are not separated into groups, the common practice would be to 'read' off the number, moving hand from left to right. Short numbers, such as telephone numbers, registration numbers, etc., may be read off as above, or may be separated into groups by the signer, without signs for hundred, thousand, etc., as is the usual case with years: 1959 is signed (19) (59).

ORDINALS:

The sign language employs as visible ordinal system only a limited group of numbers (1-9 or 10): The fingers in configuration desired, tips toward viewer, make slight, repeated twisting motions. There is also a second system, used to indicate position on a chart or list, such as a chart of baseball league standings: with fingers in configuration, palm toward signer, finger tips pointing left, the hand moves to the right.

For higher ordinals, these two systems are not used, probably because the movements in these systems, if added to the movements that are elements of all numerals containing more than one digit, would produce awkward combinations. Instead, the ordinal is understood by context or indicated by the addition of a finger-spelled 'th'; spelling for the three lowest ordinals, 'st', 'nd', and 'rd', however, are rarely seen.

FRACTIONS:

Simply sign the numerator as shown in the table of numerals, then sign the denominator below the place where the numerator was signed. For decimal fractions, first indicate decimal point by pecking forward with a closed x hand, then sign the numerals sequentially to the right.

MONEY:

While there is a sign for 'dollar' in the language, it is often omitted, one to nine dollars being signed by the configuration for the number desired moving quickly from prone to supine position. 'Cents' is spelled manually, with a few exceptions. (1), (2), (3), (4), (5), (10) and (25) cents (and the synonyms for the latter three values: nickel, dime, and quarter) are signed by first touching the right part of the forehead with g, palm toward the signer, and then signing the numeral in front of the forehead while the hand maintains the same attitude. One to five cents can also be signed with the fingers already forming the configuration when the thumb tip of manual g touches the forehead.

The statement of the formation of the ordinals is not exhaustive. The following table of equivalents of the English ordinal and adjective second will show something of the possibilities:

Washington was second in the league.	Fingers 1, 2 in a horizontal 'V' are drawn from left to right a short distance.
What's my grade on the second test.	Fingers 1, 2 in a vertical 'V', the hand makes a quick twist or flick in supination.
First the bell rang; second the door opened; and then the lights went out.	Thumb, finger 1 upraised from fist, thumb vertical, the index of other hand touches finger 1.

The English verb second in a parliamentary context is signed by moving forward the upright forearm, thumb and first finger upraised from the fist. This sign has an interesting antonym: the same configuration swung back (even until the thumb touches the signer's chest or shoulder in some instances) signifies 'I'm next'; or 'I want to follow you'.

Manual spelling and numeration as shown operate in part by static presentation of visibly different configurations, in part by motion. In general the static mode of manual symbolizing seems to be used with symbols themselves fairly well fixed, as letters and numerals are; while the symbolization of relationships, such as the ideas expressed by second, tends to find expression in motion.

1.2. In sign language proper the signs always have a component of motion. In fact the structure of signs is identical with that of the two exceptional letters of the manual alphabet j and z. The nature of the symbolization, however, is radically different. The essential features of z are that the hand having a certain configuration, in a certain place, makes a certain motion. In the context of other alphabetical symbols this action will symbolize simply the letter 'z'. But when the same configuration, in the same position, is moved in a very slightly different way, the context being signs, the action symbolizes not a letter but the idea expressed in English by the word where.

The sign clearly is, as the morpheme, the smallest unit of the language to which meaning attaches. That is, as the foregoing example shows, the significance resides, not in the configuration, the position, or the movement but in the unique combination of all three. The sign-morpheme, however, unlike the

word, is seen to be not sequentially but simultaneously produced. Analysis of
the sign cannot be segmented in time order but must be aspectual. The aspects
of the sign which appear to have the same order of priority and importance as
the segmental phonemes of speech are the aspects of configuration, position or
location, and motion.

Other features of sign language appear to operate with these basic aspects
in some such way as do pitch, stress, and juncture with the segmental phonemes.
One such feature is facial expression already noted above. It seems likely
that behavior of the kind classified as kinesic when it accompanies speech
(Trager, 1958), may have a more central function in a visual language. That is,
the same activity which is kinesic with respect to American English may actually
be suprasegmental, or metaspectual, in sign language. But analysis of these
features presents many difficulties, and if the assumption of the writer and
his research associates is correct, this analysis will be much more feasible
after the analysis of the basic aspects.

Like consonant and vowel, the aspects position, configuration, and motion
may only be described in terms of contrast with each other. Position may be
signalled by proximity of the moving configuration to a part of the signer's
body: a fist moved at the chin, the forehead, and the chest, makes not one, but
three distinct signs--'ice cream'; 'Sweden'; 'sorry'. But when the marker is
the non-moving hand, position is signalled by configuration of that hand: for
example, let the configuration of the moving hand be the index extended, the
motion be brushing down or out across the tips of the fingers of the non-moving
hand; if the non-moving, position-marking hand has all fingers outstretched one
sign is made, 'what'; but if only the little finger is held out, a quite dif-
ferent sign is made, 'last' (for some signers). Configuration is here a fea-
ture of both the moving and the marking hand, but it is serving configuration-
ally for the one and positionally for the other.

Similarly the aspect of motion may be observed to be sometimes a change
in configuration without movement in space. But a change in configuration will
still be motion as determined by the language, because it has the same function
structurally as movement through space.

1.21. The aspects of the structure of the sign need more convenient terms
than position, configuration, and motion; and it will be as well to avoid the

suggestion of mutual exclusiveness these words have in their ordinary uses.
Tabula, designator, and signation may be easily shortened to tab, dez, and sig,
and we may define them thus:

A tab is that aspect of the unanalyzed visual complex called the sign whic
by proximity to a part of the signer's body, by position in space, or by config
uration of the non-moving hand signals position as contrasted with dez and sig.

A dez is the configuration of the hand or hands which make a sig in a tab.

A sig is the movement or change in configuration of the dez in an other-
wise signalled tab.

1.22. This order: tab, dez, sig, is used throughout this paper. Although
it corresponds to no certain time sequence in the occurrence of sign language
phenomena, the order adopted permits some nice economies of notation. Like the
hundreds, tens, and units of decimal numeration, the tab, dez, and sig places
permit the same symbol to have more than one denotation. Many of the configu-
rations of the tab hand are identical with those of the dez hand. A three
place notation permits the same symbol to be used to stand for either aspect
with immediate distinctness. Sig symbols likewise have a different value in
tab or dez place. One sig, for example, is the motion of turning the dez in
pronation. If a tab or dez differs from another only by the attitude of the
hand, a subscript (in this case the symbol for pronation) to the tab or dez
symbol will indicate that the configuration is thus presented.

1.3. A number of signs are marked positionally by contact with or proxim-
ity to a precise point on the signer's body. Forehead, temple, cheek, ear,
eyebrow, eyes, nose, lips, teeth, chin, and neck may be touched, pinched,
brushed, struck, or approached by the dez in the making of signs. However,
examination of many pairs of signs for minimal contrast indicates that some of
these markers are but allochers in complimentary distribution. For example,
the forefinger of the dez hand can easily brush the tip of the nose in passing
across the front of the face, but when the sig is motion outward from the same
region, particularly when the dez is such that the sign is interpreted as 'see'
the signer and viewer tend to think of the marker as the eyes. Since no sig-
nificance attaches to a contrast solely between nose and eyes as tab, these are
analyzed as allochers of the tab mid-face. Their selection is determined by
dez and sig.

Similar consideration of all the signs observed leads to the isolation of six tabs above the shoulders. The six with the writer's symbols: the whole face or head O , the upper face or brow ⌒ , mid-face o , lower face ∪ , cheek or side face) , and neck ⋈ .

The signer's trunk also figures as a tab, but large as this part of the body is relative to the face, it is not divided into smaller regions contrastively, that is cheremically. One or both hands as dez may touch the top of one shoulder with the fingertips (to make the sign 'responsible' or 'responsibility'). Yet both hands may be placed on the hips (suggesting the kazatsky dancer's attitude and signifying 'Russia'). These two signs use the extreme upper and lower allocheric limits of the tab <u>trunk</u>, but the contrast is all in the dez and sig, and not even the whole distance separating the shoulders from the hips is significant. The trunk tab symbol is [] .

The non-dez arm makes the tab for some signs. The upper arm is tab for 'hospital', 'Scotland', and the slang expression 'coke'. It's symbol is ⟍ . The writer has observed signers occasionally making one or other of these signs as low as the muscle of the forearm, but always in casual, informal circumstances where a colloquial or relaxed manner of speech would be equally congruent.

The arm from the elbow outward is used in a different group of signs--that is, with dez or sig different from those of the signs made on the upper arm. And it is used in three contrasting ways, upraised, prone, or supine. The symbol for the upraised forearm, the elbow making an acute angle, is ✓. The symbols for the last two of these tabs are the same as those used for the movement of dez in pronation, Ʋ , or supination, Ɑ. Again the aspect is all important. As tab, the symbol Ɑ denotes the forearm presented supine; as sig the same symbol denotes that the dez is rotated in supination.

In all these arm tabs the hand is ignored by the language; it may be open or closed, tense or relaxed depending on the signer's habit of signing, his state of mind, or muscle tone. But there are other signs with tabs signalled by the hand opposite to the dez hand in which configuration is the only important consideration. As configurations, these tabs differ not at all from dez configurations. The difference is in their use: when the hand having the configuration moves or changes, it is acting as dez; when it acts as point of

origin or termination of motion or otherwise marks position, it is acting as tab. Any of the configurations used as a tab may also be used as a dez, but not all dez configurations are used as tabs.

1.40. When the visual aspect of 'position', that is the tab chereme, is marked neither by a precise anatomical point nor by difference in attitude, the sole determinant of position is the hand's configuration. As stated in 1.1 nineteen configurations are used to represent letters in the American manual alphabet. All of these and more might be used as structure points in sign language, but actually only sixteen configurations are used contrastively. However, the number of distinct configurations (allochers) which may be observed is limited only by the criteria of difference the observer wishes to adopt.

The differentiating kind of analysis, analogous to phonetics, has never been attempted for sign language. But it is quite obvious that the phenomena of the language could be thus treated were there any need for doing so. The visible phenomena of sign language need be no more limited in variety than the phonetic phenomena of speech. The findings of clinical psychology would seem to indicate that the sense of sight can discriminate more differences than the sense of hearing. But the activity is language, not vision, and that economy noted in all cultural activity operates here. Moreover, for the sign language, analysis is only beginning, while vast amounts of data have been collected and extremely fine techniques of discrimination have been employed in phonetic analysis.

At this time an extensive description of the configurational data is not needed, for the operating principles of phonemic systems are well established. It is not the absolute value, the precise curvature or direction of a finger that determines the structure point, but the fact that each structure point is one of a set of such points treated as different from the others in the set by all users of the language.

The configurational structure points of the American sign language are parts of a primary symbol system which has linguistic structure and so are not equivalent to the configurations of the manual alphabet, a secondary graphemic system. Although both are made visually perceptible by the hand, their relationship has some features of the relationship of the phonemes of one language to the graphemes of the writing system of another language. If this non-congruence of configurational cheremes and alphabetic configurations is kept

in mind, we may for convenience still make use of letter symbols to represent the cheremes of the sign language.

1.401. In the American manual alphabet a, s, and t are all represented by a fist, the thumb respectively lying alongside the closed fingers, clasping them, or thrusting between the index and second finger. It is apparent that conditions of visibility must be good for these differences of configuration to be distinguished. The sign language, however, never makes a significant contrast solely on these differences. Instead the contrast is between any fist-like hand and all other (non-fist-like) configurations. Hands looking like a, s, and t will be observed to pattern, however, in allocheric ways. For example the tab and sig of 'sorry' select an s-hand as the usual dez allocher; but the tab and sig of 'other' select the a-allocher; and some signers may use t-allocher in 'try'. The one symbol 'A' would suffice for the fist chereme, but convenience of transcribing and reading suggests a closer notation here as in some other cases to indicate allochers in complementary distribution; therefore we label this chereme: A/S, using the S when the allocher of the fist-like chereme is closer to the s-hand of the manual alphabet. The symbol A_t may be used if it is desired to note the occurrence of the 't'-like allocher of the fist chereme.

1.402. The flat hand is the second chereme in our arbitrary ordering. It has allochers resembling the b-hand of the manual alphabet: the hand is a prolongation of the wrist or is slightly bent back to display the palm, the fingers together and parallel, and the thumb bent across the palm. The sign language hand may however appear more similar to the 4-hand of one system of manual numeration in conventional use: this is the same as b except that the four fingers are spread. It may be quite like the 5-hand, thumb and fingers spread tensely or loosely. And finally it may combine b and 5 by keeping the fingers closed, but the thumb extended. This we label the B/5 chereme, using B for its close, and 5 for its spread forms; also B for dez when the sig requires palmar contact, 5 for dez when sig calls for thumb contact.

1.403. It will be disturbing at first for one familiar with the manual alphabet to see the c and o hands equated; but in signing, as distinguished from spelling, the recorded and observed data leaves no doubt that the sign language does not take the difference as cheremic. Both configurations make a curve, fingers joined and thumb opposed. Symbols: C, $C_{\#}$ (#, 'close'; see 1.54).

The allocheric forms of this configuration chereme might be described as the shapes the hand would assume in grasping balls of different sizes. Picking up a grapefruit would require a 'c'-like configuration. A smaller diameter sphere would let thumb and fingers meet as in spelling o.

1.404. The E chereme is used in relatively few signs, and might perhaps be treated as a tense, retracted allocher of 'C'. It's basic form is the tight closing of the fingers and thumb against the palm; in one form the nails of the aligned fingers rest on the edge of the first joint of the thumb, in another a space separates thumb and fingers, in still another the first two fingers rest on the thumb and the other two fingers are curled into the palm. It's use in such frequently occurring signs on the Gallaudet campus as 'Europe', 'streetcar', 'emperor' and the 'name-sign' for President Leonard M. Elstad give it the status of a chereme at least in the Gallaudet College dialect of the American sign language.

1.405. The chereme: 'F' is clear-cut and easy of isolation, not because it shows any lack of variant forms, but because none of those resemble allochers of other cheremes. 'F' is characterized by the joining of thumb and index finger at the tips or by crossing the thumb over the bent index, with the other three fingers extended.

1.406. The pointed index, as would be expected, is frequently used as tab and dez. The forms of this chereme may be close to the manual alphabet's g, index projecting from the fist; or to its d, index raised, second finger and thumb touching at tips; or to its l, thumb and index extended from the otherwise closed hand. The symbol adopted for this chereme is 'G', though occasionally in transcription 'D' may be used to show the allocher resembling the finger-spelled d.

1.407. The index and second fingers extended side by side and touching from the clasped hand also make a distinctive configuration which furnishes the manual alphabet three symbols u, n, and h; but here the difference in the two systems is immediately apparent. Variously presented, pointed up, down, and to the side, the alphabetic configuration is read as three different letter symbols. But sign language uses motion as well as configuration significantly, so that once the hand is moved, this three-way distinction is lost; the three different symbols become one dez, which has meaning only in association with a tab and sig used with it. The symbol 'H' is used for this chereme.

1.408. The little finger extended from the fist makes a configuration not easily mistaken for another, although when the thumb is lax or separated it may look like the manual alphabet y. This chereme, designated 'I', is used in many frequently occurring signs as dez and in a few as tab.

1.409. The configuration used for k in the manual alphabet actually resembles a Roman letter 'K' (when made on the left hand and viewed from the thumb side). The index finger forms the back, the second finger the upper limb and the thumb the lower. With the hand retracted in pronation the letter p is represented by the same configuration in finger-spelling. As with the 'H' described above, the cheremic use of this configuration is quite unlike its alphabetic, and the symbol 'K' is used for its cheremic employment.

1.410. The 'L' chereme formed by making a right angle with thumb and index finger, the other fingers closed, may have forms appearing identical with some allochers of 'G'. However the dez and sig (when 'L' is tab) make clear the essential features of the 'L' are the angle between thumb and finger, or its digital duality, while the essence of 'G' is its pointing, or its singularity.

1.411. The bent hand chereme is essentially a dihedral angle at the knuckles. Made with three or four fingers, with thumb folded, across palm, along hand, or extended, this group of configurations clearly contrasts both with the flat hand, 'B', with the curved hand, 'C', and with the two joined fingers of 'H' in its bent allocher. The allochers of the bent hand are all more or less similar to the various individual forms of the manual alphabet m; hence the symbol, 'M'.

1.412. The crossing of the first two fingers is a distinctive configuration permitting only the variations occasioned by the individual signer's bone and joint strictures. This is the r of the American manual alphabet (x in the Swedish system of finger-spelling, CGC) and since it serves as dez in only a few signs, and those obviously related to its alphabetic use (e.g. 'rule', 'reason', 'right', 'ready') it is likely to be a fairly recent addition to the dez list. The symbol for it is 'R'.

1.413. The v of the alphabet gives us the next configuration, which is the V-for-Victory made famous by Winston Churchill. But while the sign 'visit' is an obvious alphabetic coinage, unlike the 'R', this configuration, 'V',

figures in a great many signs with no alphabetic origins. It might be thought to represent the eyes or light rays as the dez in 'read' or 'see'; its use seems quite arbitrary in 'mean', 'purpose', and 'misunderstand'; the intersection of the fingers of this configuration is the point of origin when it is tab in 'begin'; but its obvious duality is apparent in the dez of 'double' or 'twice'.

1.414. The distinctive feature of the chereme 'W' is the extended spread of first, second, and third fingers. There is some overlapping of allochers of this and the chereme 'B'. Whether to assign the configuration made by the four spread fingers, the thumb folded across the palm, to 'W' or 'B' is a problem however only when one is viewing the overall chereme system. The distribution in an informant's sign idiolect is easy enough to determine.

1.415. The bent forefinger raised hookwise from the fist is one of the allochers of the 'X' chereme. Another, frequently seen, is formed by bringing the tips of the index finger and thumb together so that the loop thus formed projects from the fist. These two appear to be in free variation. There is another allocher in complementary distribution. When the sig calls for a flicked or snapped opening of this dez it is formed by momentarily trapping the thumb nail under the bent forefinger.

1.416. The last of the manual cheremes is 'Y', most commonly seen as thumb and little finger projected oppositely from the fist, but the three fingers between may also be loosely held or even barely bent. A very different looking allocher of 'Y' is formed when the spread hand has the middle finger bent in from the knuckle. See 'morphocheremic change' below.

Two other formations are observed to be used as allochers of 'Y'. The first described 'Y', with the index also extended, is seen along with statistically more normal 'Y' as dez of 'airplane' and 'fly in an airplane'. And a configuration not in the American manual alphabet, though it is the h in Australian finger-spelling, appears in some signs. This is formed by keeping the index and little fingers upright from the hand while the other fingers and thumb close.

1.42. One most important tab remains to be considered. When no overt signal of position is made, when the sig does not require the dez to move toward or away from any specific body part, when the dez is in a neutral position

in front of the signer's body, when the position is a natural or comfortable
one for holding and moving that dez, then the tab is 'neutral' or 'zero'. The
symbol used is Q ; but when the whole sign is written it is equally clear and
easier to show this tab of a great many very frequently used signs by leaving
the tab column blank.

1.5.   The motional aspect of the sign would present a bewildering maze of
movement were it not possible to apply to this visual system the clearly formu-
lated methods of modern structural linguistics. Operating for each user of the
language, in the midst of an almost infinite variety of movement, is the prin-
ciple of significant contrast.

1.51.   Circular motion, for example, may be large or small, may lie in
any plane the signer's anatomical limitations permit, may be interrupted or
complete; but none of these variations is called upon to carry the primary
burden of significance. When a configuration of the non-dez hand is tab, the
dez circles it as center, the plane of that circle being vertical and perpen-
dicular to the frontal plane of the signer's body. When the tab is zero or
neutral, the circling movement is made in a plane convenient to the dez config-
uration. When the tab is some other part of the body, it serves as center for
the circular sig. But these are aspects of a more or less simultaneous action,
and it may be as illuminating to say that the center of the circle which the
dez describes serves to locate the tab. The symbol for the circular movement
sig is @ .

1.52.   Some of the other movements of sign language behavior can be reduced
to motion essentially vertical, side to side, and to and fro. The exactitude
with which these approximate directions coincide with the coordinates of three
dimensional space is immaterial. Polarity is important, and in some signs the
opposite direction of sig motion is used to make a pair of antonyms: 'borrow'
and 'lend' differ in sig only, the motion being respectively toward the signer
and away. But both directions may combine in the sig of other signs, as in
'explain' where the dez moves to and fro.

Each of the three ways of using the sig requires a symbol:

∧ up
∨ down   } vertical sig
∼ up and down

⋗ right
⋖ left   } lateral sig
ᴢ right and left

⟙ toward
⟘ away   } to and fro sig
Ⲭ to and fro

1.53.   A similar three-way use is characteristic of the rotation of the
forearm. Supination is symbolized by ɑ, pronation by ᴆ, and both, or 'twist-
ing', by ω .

These twelve symbols, or four kinds of contrastive motion, with the cir-
cle, constitute the grosser sig movements, those made with elbow or shoulder
as fulcrum.

1.54.   Two smaller movements using the wrist as fulcrum are the nod or
carpal motion, symbolized ŋ, and the open-close, or foral motion, in which the
hand spreads or contracts changing configuration. Symbols: ⌗, close; ⊓,
open.

A still smaller motion is digital, a wiggle of the fingers from the knuck-
les, which is symbolized ℓ .

1.55.   The sigs so far described are all motions of the dez seen as moving
freely, the nature of its movement determined by the muscles and joints in-
volved. A second class of sigs is characterized by interaction between dez and
tab. This includes approach, touching, crossing, entrance, joining, and graz-
ing, as well as action in some ways opposite: separation and interchange.
These are symbolized as follows:

)(approach
× touch
Ⲭ link, grasp
⧣ cross   } convergent
⊙ enter   } interagent sigs
↑→↘, etc.   graze

÷ separate   } divergent
(ʒ interchange

2. MORPHOCHEREMICS

2.0. If every sign of this sign language were simply composed of a tab, a dez, and a sig, the morpheme list of the language could be simply determined by the formula:

no. of tabs X no. of dez X no. of sigs = no. of morphemes.

But there are several different patterns of sign formation, not to mention compound signs and contractions; and the language in true linguistic fashion allows certain combinations of elements and not others. That is to say, the structure of morphemes in the system is not mathematical or mechanical but linguistic, and this level of organization truly constitutes the morphocheremics of the language.

2.1. When the tab is zero the dez is free to make any of the sigs except those of interaction with a tab. These signs cannot, however, be considered tab-less because every sig is defined as motion of some dez somewhere; and also by definition the 'somewhere', however signalled, is the tab. The zero tab is less precisely located than the others but it is still a place, that space in front of the signer's body, where the hand can freely and comfortably move.

2.2. The tabs signalled by parts of the body are more or less precisely located depending on whether the sig calls for contact by the dez or only motion in their vicinity (Some older informants and a 1911 motion picture of a sign language rendering of Lincoln's 'Gettysburg Address' indicate that body tabs were never actually touched in formal signing. CGC). With body tabs any dez may be used and the following single sigs: circle, approach, touch, graze. Sig clusters are also found: circle followed by touch; touch and motion up, down, or away; touch and wiggle; and touch and circle (rubbing). There are even some triple clusters: touch, right and wiggle as in 'dream'; and touch, close, and up, 'because'. One or two apparent quadruple sig clusters are perhaps better analyzed as compound signs.

2.21. Another most important morphocheremic feature of the language may be an example of shift. The practice of some signers, particularly those taken as paragons of usage by many, is to make the tab clearly visible in such a sig as 'see'. Both by approaching the mid-face (really eyes) closely, and by pausing perceptibly between this indication of the tab and the outward motion of the sig these signers achieve a 'classical', 'formal', or 'pure' style of

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signing much admired but not always followed by a younger generation of sign users. The informal or colloquial style of these latter signers, however, sometimes seems to indicate a structural more than a stylistic change.

The writer would analyze the 'classical' sign for 'see' as mid-face tab, V-dez, and (particularly the platform articulation of the sign) approach sig, followed by outward movement sig: in symbols, $aV^{x\perp}$. The much more frequently occurring, informal, or perhaps more recent, sign is composed of zero tab, V-dez, and outward sig: $\emptyset V^{\perp}$ or $V^{\perp}$. Apparently signs in very frequent use, sufficiently distinct in dez and sig from other signs, tend to shift from a body tab to zero tab. 'Know', to take another example, is formally, or in older signers' idiolects, upper face tab, flat hand dez, and touch sig: $^\frown B^x$; but a form often seen is flat hand dez, upward sig, in zero tab: $B_a^\wedge$.

2.3. With configuration of one hand as tab and the same or another configuration of the other hand as dez, the sigs are the interagent motions, or are clusters of sigs beginning with one of these, with separation, linear motion, or interchange as the terminal chereme.

2.4. At this point the aspects of the sign, tab, dez, and sig need to be more precisely defined. These aspects are but ways of looking at phenomena which to its users is unitary. A sign is the basic unit of the language to the signer, just as the word is the basic unit to the naive speaker. The original definitions of tab, dez, and sig permit such classifications of the structure of signs as the foregoing; but when two hands are in use, there may be difficulty in deciding whether one hand is tab and the other dez or both hands are a double dez in zero tab. This area of doubt can be narrowed by a decision to call one hand the tab when its motion is negligible or minor compared to that of the other hand; and to call both a double dez when they move parallel, symmetrically, or oppositely. The tab-dez analysis seems more likely when the configurations of the hands differ. The double dez is indicated when both are the same; but as some signers make it, the sign 'show' is of the latter kind: the flat hand, B, and the index hand, G, meet directly in front of the breastbone and move forward together, the fingertip pressed into the other palm: $BG^{x\perp}$. However, others hold up the B, palm outward, touch its palm with the other hand's G and press it forward. With respect to the touching sig the B is tab and G dez, but with respect to the outward sig the hands together become

dez, pushing forward. This might be written cheremically: $BG^{x(\perp)}$, with the parentheses to show that the hands in contact now act as dez performing the second sig.

The double dez, identically configured, in tab zero often requires another symbol, which though written in (second or third) sig place is a morphocheremic, not a cheremic symbol. This is the symbol, '$\sim$', for alternating movement of the hands of the double dez.

The F-hands held about six inches apart and moved downward, FF^v , make the sign which renders English 'decide' or 'decision'. The same double dez moved alternately up and down, $FF^{\sim\sim}$, makes the sign for 'if' or 'judge'; and again moved alternately to and fro, $FF^{x\sim}$, this double dez makes the sign translated 'explain'.

The double dez hands may operate first as if they were tab and dez with an interagent sig, then move. Such a sign is 'habit', the tab zero, dez (double) the fist, first sig cross, second sig downward, AA^{+v} . Another example is 'slavery', AA^{+z} . A sign similar in structure shows the use of another morphocheremic symbol, the dot, to indicate repetition of a sig or sigs. With the same double dez the sign 'work' repeats its sig so that the wrists touch twice, $AA^{+\cdot}$. Some signers are careful to touch the insides of the wrists together. This formation of the sign would be written: $A_aA^{+\cdot}$. It is not necessary to show that the second A is prone, as knuckles-upward is the normal way of holding the cheremic fist.

2.51. The common structuring of physical behavior of many kinds by the left-right opposition is completely superseded by the tab-dez and other contrasts of the sign language. Generally the right-handed person will use his right hand for dez, left for tab, when a hand tab is required; but he may reverse this at will. Fatigue, visibility determined by relative positions of signer and viewer or by direction of light source, and as yet undiscovered factors may occasion the right handed person's use of left hand as dez. Since, however, there is no morphocheremic significance attached to right handedness, some signers utilize the right-left opposition for rhetorical purposes. The allocation of right and left hand to two characters in a signed anecdote, for instance, may be most effective, not only for the separation which English pronouns cannot easily accomplish but also more graphically. One may imagine the right hand dez as one person of the story and its sig as his action. If

the sign is 'hit' the left hand tab may be imagined momentarily to symbolize the other person as object, suffering the action; the action of the right fist in striking the left palm thus gains graphic physical force and effect in addition to its arbitrary linguistic denotation.

In the writing system employed in this study the dez symbol will be read as right hand, and the tab, if it is a configuration of the hand, as left. In transcribing signs as they are observed, a reversal of hands that seems important will be indicated thus: ꓤꝊＡ^{a} . This would be 'other' made with the left hand, the fist rotated in supination, but, because it is left-handed, the motion to the signer's left.

2.52. Just as body-tab signs in frequent use may become zero-tab signs, two handed or double dez signs in zero tab may become one-handed. Three such signs in very frequent use are examples of three different kinds: 'what?' is made with a (left) hand tab; 'why?' with a body tab; and 'how?' in zero tab, with double dez. The formal or standard forms of these are written: Ｂ Ｇ^{ᵛ} , ⌒Ｙ^{xⳇ} , and ＭＭ^{xa}. But in colloquial use they may appear thus: 'what?' Ｇ^{ȧ} (with the dot above the sig symbol to indicate a staccato movement); 'why?' Ｙ^{ᵛ} or Ｙ^{ᵚ} (the 'wiggle' sig shows that the allocher of 'Y' is the one with which a wiggle is possible, the spread hand with one or more of the medial fingers bent inward); and 'how?' Ｍ^{a} .

The one-handed forms of signs of which 'how' and 'what' are representative examples may be selected for other reasons than those which determine whether a situation is formal or informal. One of the signer's hands may be occupied in a way that has nothing to do with the act of communication except that it will be apparent to both parties that two handed signing is impossible or inconvenient, and therefore allowance made. The signs used as examples above are questions, so that it may happen that the signer's other hand will be extended beyond the zero tab space even to the limits of interpersonal distance and there as an index be admonishing or fixing the person questioned, or by grasping a lapel, wrist, or arm be imploring or extorting; that is, one hand may be paralinguistically (to sign language) or kinesically used while the other makes the strictly linguistic symbol.

Again, the signer may have a rhetorical use for the non-signing hand. The left hand may hold a dez used in a sign for naming a person or object while the

right hand alone 'says something' perhaps about what another person did to the first. Some of the signs in this recital will be one-handed anyway and some will have body tabs. In this context a sign or two which should have a hand tab or a double dez will be understood perfectly, though the left hand is still marking an element of previous discourse.

There is still another factor to be considered in the occurrence of one-handed signs which were formerly, or are formally, made with two hands. Economy of effort as a principle of language change will always be checked by need for ready intelligibility. As was noted above in connection with shift from body tab to zero tab, the dez and sig may be sufficient to distinguish a sign from others; but it is quite possible that signers without being aware of doing so tend to drop some of the distinguishing features of a sign when its context alone, or syntactic distribution, would suffice or almost suffice to determine it. This is not simply the counterpart of the '*** **** **, said I' of Tristram Shandy although both are cases of visible symbols; but it has the features of the processes by which languages come to tolerate numbers of homonyms which formerly were distinct phonemically.

2.6. Although the typical signer, like a speaker of any language, may appear to be quite conservative about neologisms, there is evidence of rapid and widespread change in the two hundred years since the sign language was recognized, used in teaching, and partially recorded. The difference between the methodical signs in Sicard's Théorie (1808) and the signs now in use in the United States is large, but still apparently evolutionary. But even in the sign data observed in this study there is evidence of structural change. This is nowhere more apparent than in the language's treatment of signs which may be termed compounds and contractions.

The principle of the methodical or consciously invented sign, as noted in the Introduction is multiple signalling of structural and semantic information. A base sign for the lexical meaning would be followed by signals for designating the part of speech, number, gender, degree, etc. Detailed historical studies are so far only in the planning stage, but it seems reasonable to suppose that the methodical signs underwent considerable change as they moved from the text-book and the systematic course in French grammar into the colloquial language. There are many signs now in use which show this kind of origin and

presumably many more not obviously so derived will be found to have come from the same source. A direct link between the French methodical signs and the signs used in the United States is the preservation in manuals by Long, Higgins, and others of traditional etymologies. In addition the American sign language has or had until recently a large toleration for compound or complex signs—which all the methodical signs had to be.

2.61. As described and illustrated in the manuals, 'brother' is signed 'man-same'; that is, the signer makes the sign for 'man' and immediately follows it with the sign for 'alike' or 'same': $\curvearrowright M^{x\#\perp}$ / $G_\perp G_\perp^x$. 'Son' is signed, according to the same sources, as 'man-baby': $\curvearrowright M^{x\#\perp}$ / $a a^{z z}$ (the supine arms are laid together and the mimed baby is rocked). 'Father' is 'man-generation before': $\curvearrowright M^{x\#\perp}$ / $B_a B_a^{\wedge <}$. 'Lady', according to the manuals, is 'woman-polite': $) A^{\downarrow}$ / $[]5^x$.

All these signs are true compounds in the terminology of this paper. Each one is not only treated syntactically as a single sign but is often accompanied in simultaneous utterance by speaking the single English word equivalent in meaning. Although each element of the compound is complete with tab, dez, and sig of its own, the elements form a syntactic and semantic unit. But these are 'classical' signs, their form defined, their etymology recorded, and their meaning translated in one or more manuals. They are also to be observed still in use by some signers, particularly in lectures, sermons and prayers, or from chair and floor in formal meetings. In colloquial use they have changed. The first, 'brother', is least changed; the tab of the second element may appear in readiness even as the first element is signed. The others show more clearly the process of contraction. 'Son' becomes $\curvearrowright M^{\#\vee a}$; that is the right hand dez closes thumb to fingers at the brow and turns in supination as it descends. All this is done by the hand in a continuous, smooth motion; the supination and descent component of the motion are all that remain of the sign 'baby'.

The sign for 'father' is still more changed in contraction. The tab is still upper face, but the dez may be the spread hand, '5', or a loosely held fist, 'A', which opens to the '5'. The sigs then are touch and wiggle or touch and open: $\curvearrowright 5^{x \ell}$, or $\curvearrowright A^{x \square}$ (the point of contact in both cases being the thumb). This and an analogous contraction, 'mother', $\smile A^{x \square}$, or $\smile 5^{x \ell}$, in turn give a new (colloquial) compound, 'parents': $\curvearrowright A^{x \square}$ / $\smile A^{x \square}$.

Another contraction is the colloquial 'lady', which incidentally seems to have the same kind of distribution with 'woman' in class dialects as do the two words in English. The sign for 'lady' as it is usually seen is written in our symbols: $\smile []5^{\downarrow x}$; the thumb of the spread hand brushes the chin as it moves downward to touch the breastbone or collarbone. Here we have a different kind of sign from the other contractions. In 'son', colloquial, the sigs of the contraction combine parts of the sigs of both elements, while tab and dez remain those of the first element. In 'father' and 'mother' the dez is either from the second element, the spread hand, or from the first element of 'mother', the thumb-up 'A'. The tab comes from the first, although the chin, not the cheek is actually grazed in 'mother', and the sig is a new motion which suggests or combines in a way both original sigs. In 'lady', however, there are actually two tabs. While some signers may make the sign so as to miss grazing the chin with the thumb, the tab is still there for the user of the language; and this sign with its downward motion from the face region will still contrast with 'fine' or 'polite' in which the 5-dez moves directly, and often from below, to its point of contact on the breastbone. Whether the graze on the chin is real or apparent, the first tab is definitely signalled and $\smile []5^{\downarrow x}$ or $\smile []5^{\vee x}$ are correct transcriptions, not $[]5^{\vee x}$.

2.62. Another example of compounding and contraction will illustrate the morphocheremic change the Y-dez may undergo. The sign for the color yellow* is the same in colloquial and formal signing. The y configuration of the right hand is given a twisting shake in zero tab: Y^ω . 'Gold', for which the traditional etymology is 'earring-yellow', is formally a pinch on the ear lobe followed by the sign for yellow: $) X^{\mathcal{I}}$: Y^ω . This sign also has the metonymic meaning 'California', and the most frequently observed form of it is a contraction in which the chereme Y has a configuration quite unlike y in appearance. 'California' colloquially is signed: $) Y^{x \perp \omega}$. Although shown with three symbols, the sig motion is continuous because the dez configuration

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*The principle of forming some color signs by shaking or twisting the configuration for the initial letter of the color's name is older than the American sign language. Pelissier (1856) shows these equivalents: vert, v shaken; jaune, j, i.e. i shaken. But rouge and present 'red' is $\smile G^{\downarrow}$ (finger brushes lips); noir, 'black', is $\curvearrowright B_b^{\rightarrow}$ (edge of hand moves across brows); and brun, 'brown' is $) B^{x \oslash}$ (edge of hand, palm out, rubs cheek).

permits the touch even as the hand is moving forward and twisting. The Y-dez in this sign and many others has the allocheric configuration of spread hand with only the middle finger bent. The tip of the middle finger can thus be used for contact sigs in a way the more nearly y-like allocher cannot.

2.7. The choice to analyze the phenomena just discussed as the result of compounding and contractive tendencies or processes to some extent rules out the treatment of such partials as the touched or grazed upper face and lower face tabs as prefix morphemes which simply add the notion 'male' or 'female' respectively to a base morpheme. The treatment of the cheremes in the compound-contractions already examined is too various, and there are not anywhere near enough other evidences of a prefix-base structure.

However, the contrast between brow and lower cheek, tabs for so many signs which have 'man' and 'woman' as part of their semantic content, is enough to make two distinct signs for 'cousin' in the language. The dez is C, the hand a little more in pronation than for spelling c. The sig is @, a small circular motion, with or without slight contact with tab. This dez and sig at the brow and at the cheek or jaw make respectively 'male-cousin' and 'female-cousin'. 'Nephew' and 'niece' use the same sig and the same two tabs, but their dez is H_v, the n of the manual alphabet.

2.8. Before discussing the fairly large class of initial-dez signs, of which the foregoing are examples, a few remarks may be made in summary. Morphophonemic change such as the English word 'knife' shows, the final phoneme appearing as /f/ or /v/ according to morphemic structuring, has a counterpart in sign language; the M-dez of 'man' and 'brother' becoming the 5-dez of 'father' and 'grandfather'. Likewise the)-tab of 'woman' becomes the ᴗ-tab of 'lady'. Prefix morphemes are not a fixture of the morpheme pattern, but compounding and contraction with concomitant morphocheremic change of several kinds are. Only one true suffix appears to operate; it is almost precisely analogous to the agentive suffix /-ər/ in English.

The sign for 'body' is made by dropping the flat or bent hands down along the sides of the body: tab [] , double dez BB or MM, and sig ᵛ or ᵛ . The signs for 'individual' and 'person' are similar: BB^v, and KK^v or KK^7; made a little out from the body, they may be taken as zero tab signs. The suffix sign which will make 'teacher' of 'teach', 'student' of 'learn', 'cook', n. of

'cook', v., etc. is perhaps more nearly the zero-tab, BB^v, but rapid signing and individual differences (allocheric as well as stylistic) make it hard to determine whether the suffix signed alone would be the sign for 'individual' or 'body'. Some of the manuals describe the agent-noun as signed by base sign plus 'body sign'. It seems likely that this sign, of French origin, may have developed into two by exploiting the trunk-zero tab contrast. For what it is worth, the jesting comment of an informant may be added. He chided the writer for being introverted because he made the suffix sign with M-dez instead of B.

2.9. The use of a configuration for the initial letter of the word which most often translates the sign is a clear indication of a borrowing by the sign language from another language, but it cannot be taken as an indication of date. As noted (2.62) the French sign vocabulary of the nineteenth century used this principle for color signs, and l'Épée's and Sicard's methods, using both 'natural' signs and hand alphabet led to other 'initialed-signs'. Sometimes the change from a French to an English environment brought a systematic revision: V-dez to G-dez for 'green', etc. However, the dez of the sign now in use may preserve a forgotten French borrowing: 'stupid', $⌒A^x$, perhaps for 'asine'.

The important points about this kind of sign formation, borrowing, or coinage are 1) that it does not argue a simple subordination of the one language to the other as the hand alphabet is subordinate to the graphemic system; 2) that a sign formed in this way may often be one of a group with related meanings and similar structure, as with 'cousin', 'nephew', 'uncle', 'aunt', or 'law', 'rule', and 'principle': BL^x, BR^x , BK_v^x ; and 3) that although as old as l'Épée, it is still a living principle of formation. Additions to the lexicon of the language by this means are not a fair indication of its use, as local groups of signers find it most useful for making place and personal names into signs, but only some of these achieve general currency, for example $C^{⌒@}$, 'Chicago'; $K^{⌒@}$, 'Philadelphia',⌐   (the ⌒@ to show an abrupt arc, a ?-shaped movement).

Such signs, especially those using zero tab, might be considered as abbreviations of the finger-spelled word. As a matter of fact that way of analyzing them will be as good as the cheremic when they are being considered as units in utterance. As has been remarked the sign language sentence is about equally tolerant of finger-spelled words and signs proper. The difference in analysis

is important, though, when the sign or word itself is being examined, and the difference in motion--in signs significant, in spelling not so--is enough to show a different order of structure. Signing and spelling are also distinguished by their treatment of space or position. Although finger-spelling may be said to occur in the region we call zero tab, only j and z are structurally like signs. And while some initial signs have zero as tab, others may have a body or configuration tab. In other words they structure exactly like signs.

3. MORPHEMICS

3.0. Once the outlines of the cheremic system have been established and the patterning of cheremes into signs has been explored, a way is open to morphology proper, including syntax. Having described a sign cheremically or morphocheremically, the investigator may go to stretches of unanalyzed utterance and look for recurrent patterns. One of the first features to emerge from such investigation is that on the syntactic level other signals than the aspectual cheremes are operating. The analogy with the superfixes and intonation patterns of English (Trager and Smith, 1951) is not necessarily exact; but there is a clear indication that here in sign language a different level of structure has been reached.

3.1. A striking example of similarity with a significant difference is to be found in an extensive conversation (several hundred frames of 16 mm film taken at a film speed of 48 fps) among the project's filmed data. The two informants are discussing a trip taken a year before. Their faces and bodily attitudes, though relaxed, show much interest and animation in recollecting various details of the experience. The general pattern of the conversation is that one signer recalls an episode and begins or concludes his narrative with the sign 'remember'. The other replies with 'remember', and goes on to relate something he connects with the episode, perhaps concluding also with 'remember' And so back to the first for several such exchanges.

The form of the sign 'remember' both use is not the formal or isolated one a teacher-informant might give: $\cap B^{\times \# \vee} : A A^{\times}$, which is a compound sign made from 'know' and 'seal'. Instead they use the colloquial sign $A\ A^{\vee \times}$. (The right fist moves downward in an arc, finishing with the ball of the thumb pressed on the nail of the left thumb. Most likely the arc-downward sig, which may actually cross in front of the face, is a vestige of the first element of the compound.) But while both informants in the filmed sequence use this colloquial form of the sign, both use it in ways which visibly contrast, and the order of the sign in each utterance is not the determining factor. To clarify the discussion, let us make an anticipatory jump and say that one of the two uses is equivalent to the English sentence, $^{2}Re^{3}m\acute{e}m\,ber^{5}||$; and the other to $^{3}\hat{1}\ ^{2}re^{3}m\acute{e}m\,ber^{1}\#$. The double-cross terminated form is always used in a response-like way, at the beginning of a signer's utterance; but the double-bar form, question-like, may occur at the beginning or the end.

Differentiating these appearances of the sign $A\,A^{\vee\times}$ is a kind of activity which would be termed kinesic, if it accompanied speech, but here it must be linguistic in a strict sense because it operates to distinguish morphemes which are identical cheremically, yet syntactically in sharp contrast.

The sign 'remember' is signed with the hands identically by both informants, but the portion of the utterance equivalent to 'Remember?' or ^{2}Remember^3‖ is a combination of the sign with a distinctive 'look'. The signer looks directly at the person asked and slightly opens his face, that is, his eyebrows raise as his chin lowers. There may also be a slight jerk of the head backward.

The portion of the utterance, however, which equates with: 'Yes, I remember'; or 'I remember'; or ... ^{2}remember^3#, consists of the sign accompanied by or even slightly preceeded by a slight lowering of the eyes, or a tiny nod downward, or both these minute eye and head movements.

The slightness of these movements cannot be over-emphasized. They are small and quickly done and stubbornly remained outside the writer's conscious observation until attention was focussed on them by the problem of the two 'remembers'. Of kinesic behavior Birdwhistell (1952) notes that the time for signal and for response may be of the order of 1/10 second; and in conversation with the writer (1957) hazarded a guess that the deaf, communicating entirely through vision, might actually signal and respond in this fashion with a speed and prolixity beyond the ability of the untrained hearing person.

3.2. The writer is aware that the deaf are sometimes popularly supposed or even seriously said to exaggerate facial expression. Here is Tomkins trying to make status for the Indian sign language by disparaging the users of the sign language which may have supplied a large part of the other system's lexicon: 'The deaf use a great deal of facial contortion and grimace' (1958, p.8). This is not even as accurate as a charge an Italian might make that 'the English use a great many consonant clusters and splutter'. The latter statement contains a partial truth about the phonological structure of a language, but any truth the former has is confined to observation of the style of 'speech' of atypical users of the language. Attempts to teach articulation in the past sometimes led to strange or contorted facial movements, but speech therapists of today are as careful to teach 'normal' appearance as right pronunciation to

their deaf pupils. The filmed data as well as all the communication behavior observed at Gallaudet College confirms the conclusion that the kinesic behavior of the educated deaf in American culture is nowhere sharply separated from the cultural norms. Indeed the dramatic productions of the college (presented entirely in sign language with a spoken translation read in approximate synchronization for the non-deaf) have shown large audiences that the appearance made by signers is not only 'normal' and pleasing but intensely and effectively dramatic as might be expected when both dialogue and action are visibly expressed in the body of the actor.

3.3. In this visual language system, facial activity need not all be employed on one level. The eye lowering and head dip that signify the response, not the question, function of 'remember' are on the order of 'suprasegmental' signals. But in one or two occurrences of the response use there is a smile visible for about the same time that the dip and the sig require. This smile which clearly indicates that the signer's memory is pleasant, even ecstatic, would seem to be paralinguistic with respect to the sign language. Its presence is not called for each time the sign itself is used response-wise, so that it has not the linguistic status of the head-eye dip; but its physical structure keeps it much closer to the visual linguistic activity than kinesic activity is to speech. However, considered by itself this level of visual behavior would seem to be very like kinesics in structure and 'meaning', as it is perhaps the closest communicative link between the deaf and the hearing.

This part of the communication of the deaf, that is both the dip and the smile kind of activity, needs much more investigation; for it is the key to syntactical structure. Moreover, it is perhaps a very large part of what the earlier students termed 'the natural sign language'. Thomas Hopkins Gallaudet (Annals, 1847) writes of an experiment in this vein. Without using hands at all he 'signed' a story to a class in The American School. One may suppose that this successful communication is the close counterpart of the game that the linguistically curious play by applying stress, pitch, and juncture to a continuous and unvarying vocalization, a hum say, even carrying on fairly intelligible conversations in this way.

3.4. Having found that some of this visible activity has patterned syntactical uses, the writer looked back over much of the data and in retrospect reexamined many remembered sign language utterances. Many questions besides

'Remember?' were signed simply by the 'questioning look' with a sign. Another way of asking a question also appears, which is more formal and less frequent; that is 'making a question mark': the index hand draws the shape of the punctuation mark, or the finger crooks and straightens with a thrust, $G^{(?)}$, or, $G^{\#\acute{n}}$. This question mark sign permits an English question sentence order, and indeed that order and sign are most often observed in simultaneous English-Sign use, especially in lecture or faculty meeting situations. The facially signalled question will often have a genuine sign language word order.

For example an informant on film signs:

$${}_{0}F^{x>x} \quad \underline{\text{f-o-r-d}} \quad \smile M^{\#\wedge} \quad AA^{\wedge\sim}$$

Word-for-sign this is

'pontiac' 'ford' 'better' 'which'.

He makes it a question by the 'look' that means question to anyone in our culture. If we show that look symbolically by 2, the sign sentence may be written:

$${}_{0}F^{x>x} \quad \underline{\text{f-o-r-d}} \quad \smile M^{\#\wedge} \quad AA^{\wedge\sim}{}_{2}$$

and translated now:

Which do you like better, Pontiac or Ford?

The translation is still approximate because one cannot be sure whether 'like better' and 'be better' are distinct in this teen-age signer's thinking.

The same kind of checking for patterned occurrences of the eye-head dip shows that it not only marks a response as in the 'remember' use but also serves as a much more frequent way to signal first person singular than the sign 'I'. A student to whom the figurative use of the word backlog was unfamiliar suddenly interrupted the explanation, signing in a split second:

$$[]B^{\dagger} \quad AA^{\top x}$$

That is, 'have' and 'behind'. But the head-eye dip beginning at the same time as the first sign indicated he was saying what might be translated as

I have [something] behind; or

I'm keeping [something] in reserve.

Even with only these two signals, the 'dip' and the 'query-look', a beginning can be made in defining verbals in the language. Those signs which pattern with both appear to be verbal; those with the dip may be; those with the query-look may be, but are also likely to be query signs like 'how', 'why', 'what', and 'who', which do not pattern with the dip.

Another signal functioning on the syntactic level is the negative head shake. This movement is for the deaf as well as the hearing in our culture sufficient answer alone to some questions, and with other kinesic signals may range from a decisive denial or refusal to a confidential assent. But the head shake as a kinesic signal is a grosser movement than the movement which in a sign sentence signals negation. The sign $X^{\prime\prime\cdot}$, 'should' is also 'should not' when this minute head shake accompanies it. So small is this non-kinesic, syntactical head shake that the writer and his associates scanning and transcribing a filmed conversation missed it until the self contradiction of the informant's utterance without a negative sent us back to look beyond the tab, dez, and sig signals.

This shake, symbolized 3, patterns with many of the signs which the dip, symbolized 1, makes into first person singular verbals, but with 3 they become first person singular negative verbals. Some examples:

The illogical but often heard 'I don't think it's a good idea', has a close equivalent in signs:

$${}_{3}\frown G^{x\circledcirc} \quad B_{a}B_{a}{}^{v x} \quad \frown I^{x}_{\,\hat{\imath}}$$

'I don't have it', is but one sign with the negation signals: ${}_{3}[]B^{\top}$.

A signer asked, 'How was the movie?' might reply either:

$$[]B^{x\circledcirc}{}_{1} \quad \text{'I enjoyed it.'}$$

or: ${}_{3}[]B^{x i} \quad$ 'I didn't enjoy it.'

Here it will be noted that the sig of 'enjoy' also differs in the two replies. The change from rubbing the heart region with a small circular motion to approaching it and moving the hand sharply away two inches may be occasioned simply by physiology. Like patting the stomach and rubbing the head, the head shake and circular rubbing may be difficult for some persons to do. Or the change may be to shorten sig duration so the head shake will be seen. Or it may be more symbolic; just as the sign $G_{\wedge}G^{x}$, 'to', contrasts directionally

with the sign $G_\Lambda X^{x \div}$, 'from', so the sig of 'not-enjoy' may be an approxima-
tion of a directional opposite of the 'enjoy' sign's sig, the rubbing motion
being opposed by the quick, checked retreat of hand from chest.

3.5. The isolation and description of the sign language sentence as a
syntactic unit await further study, but it seems likely at this point that the
patterning of the aspectual cheremic elements with the head and eye kind of
supra-aspectual elements will furnish the clues to the syntactic structure.
For instance, a kind of 'terminal juncture' in signing is to be seen perhaps
in a general relaxation at the end of an utterance of one sort. It may be
taken as similar to the 'dropping' of the voice, but the dropping of the hand
or hands that made the last sign is more a feature of the general somatic change
than it is a separate signal. Similarly, the utterance which is followed by a
reply, which seeks perhaps an opinion on what has just been signed, ends with
a kind of upward or outward 'focus': eyes, face, hands may join in passing the
conversational ball to the viewer.

Much more remains to be done also in establishing exactly what are the
structural principles of the sign language sentence, the overall pattern, and
how dialect and idiolect patterns utilize one or another part of the total
possible pattern. For it is apparent now that just as any speaker's variety
and complexity of syntactical patterns will vary according to his age, intel-
lectual habits, and education, to name a few factors, and the extent of his
vocabulary will be similarly determined, so the sign language user will differ
in his employment of the resources of the language. But there is another way
that signers may show difference in selection from the overall structural pat-
terns. Presumably his language habits will be more or less affected by the
extent to which English is his second language. The bilingual person may only
in an occasional 'slip of the tongue' superimpose the patterns of one language
on another; but two languages which can be used simultaneously may be more
strongly drawn into syntactical conformity.

Again, more study is needed. Some informants, members of the college
faculty, whose sign sentences may often be translated into idiomatic English
sentences by a word-for-sign rendering without change in order, say frankly
that they sign 'differently' in other situations. The difference may be anal-
ogous to the writer's different ways of speaking with superiors, subordinates,
family, children, intimate friends, and others; but there is also the strong

possibility that along with the usual stylistic differences there is a greater
or less similarity to English syntax in these different situational levels of
sign use.

3.6. While the cheremic analysis of the sign language seems to be com-
plete enough to make a number of observations about the formation and use of
signs, the writer is aware that the period of the study is all too short to
have arrived at a complete and exhaustive analysis. Other ways of analyzing
cheremes are likely and possible; and judging by the list of symbols, more may
still be done to establish the true isolates or structure points of the lan-
guage.

The other kinds of signals, such as the head dip or 'questioning look' are
only beginning to be analyzed, and a number of pre-linguistic, paralinguistic,
and to coin still one more term, dualinguistic data remain to be considered.

Nevertheless, the work so far accomplished seems to us to substantiate
the claim that the communicative activity of persons using this language is
truly linguistic and susceptible of micro-linguistic analysis of the most rig-
orous kind. And the cheremic and morphocheremic analysis at its present stage
will make possible the preparation of a lexicon, now in progress, which can be
more than an English-Sign language word-list. The lexicon will arrange entries
according to the sign language elements, or cheremes, and will give some indi-
cation of morpheme class and function class, as well as etymologies based on
structural and historical principles and approximate translations.

Moreover, the analysis here presented seems to offer a sound basis, what-
ever its faults and inconsistencies, for further analysis and description of
the structure of this unique, most useful, and linguistically interesting lan-
guage. Perhaps it is not futile to hope that this work and what it will lead
to may eventually make necessary the change of a famous definition to read:
'A language is a system of arbitrary symbols by means of which persons in a
culture carry on the total activity of that culture.' Important as speech and
hearing are in human culture, the symbol using capacity in man is anterior, as
this symbol system of those deprived of hearing demonstrates.

4.1. GLOSSARY OF TERMS

ALLOCHER, any one of that set of configurations, movements, or
positions, i.e. cheremes, which signal identically in
the language.

ASPECT, a structural division (analogous to 'segment') of sign lan-
guage activity, into constituents of position, config-
uration, and motion (analogous to 'vowels' and 'conso-
nants').

ASPECTUAL CHEREME, a tab, dez, or sig (see below).

CHEREME, that set of positions, configurations, or motions which
function identically in the language; the structure point
of sign language (analogous to 'phoneme').

CHEROLOGY, the structure, and its analysis, of the isolates or
units of the phenomenon level of the sign language of
the deaf.

DEZ, designator; that configuration of the hand or hands which makes
a significant motion in a significant position.

FINGER SPELLING, communication activity involving perception of or
presentation of successive hand configurations represent-
ing the letters (and ampersand) of English orthography.

GESTURE, unanalyzed communicative movement.

MANUAL ALPHABET, a set of 19 configurations, three orientations,
and two movements which give 27 visible symbols for the
alphabet and ampersand, used for communication by deaf,
and by deaf-blind persons who have a knowledge of a lan-
guage and its writing system.

SIG, signation; the motion component or aspect of sign language
activity; specifically motion of a significant configura-
tion (dez) in a significant position (tab).

SIGN, the smallest unit of sign language to which lexical meaning
attaches (analogous to 'word'); one of the two kinds of

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morphemes out of which sign language utterances are
constructed (the other being the finger-spelled English
word).

SIMULTANEOUS METHOD, a communicative activity, the official teach-
ing medium at Gallaudet College, in which the speaker at
the same time speaks (with or without audible voice) and
signs utterances which are a translation of each other.

TAB, tabula; the position marking aspect of sign language activity;
specifically the position in which a significant config-
uration (dez) makes a significant movement (sig).

4.2. TABLE OF SYMBOLS

4.21. Symbols for cheremes of position, TAB, only:

Name	Symbol	Description
Zero tab	⊘ (or blank leftmost space)	the space in front of signer's body where hand movement is easy and natural; allochers--regions within the whole space
Face	O	the head itself and space around it
Brow	⌒	the upper face from brows to hair line including temples
Mid-face	ᴏ	the eyes, nose, or any point between ⌒ and ⌣ contrasting with them
Lower face	⌣	the chin, mouth, or lips
Side face	)	the cheek, ear, or jaw
Neck	⪄	the space between chin and chest
Body or trunk	[]	the space from shoulders to hips inclusive
Upper arm	\	the region of the biceps
Elbow	∫	the distal side of forearm, or elbow itself
Supine arm	a	the proximal side of forearm or wrist
Prone arm	D	the distal side of wrist or back of hand

4.22. Symbols for cheremes of configuration, DEZ (including some TAB):

Name	Symbol	Description
Fist	A, A/S, A_t	the hand clasped with thumb in a, s or t, Fig.1
Flat hand	B, 5	the open or spread hand, thumb out or as in b, Fig.1
Curved hand	C, C♯	the c and o of Fig.1
Retracted hand	E	the fingers clenched to palm; e, Fig.1
F-hand	F	thumb and forefinger touch, other fingers spread; f, Fig.1

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Name	Symbol	Description
Index	G	allocheric forms: g, d, l of Fig.1
H-hand	H	the h, u, n of Fig.1; first two fingers extended and joined
Pinkie or I-hand	I	the little finger projects from closed hand; i, Fig.1
K-hand	K	the index, 2nd, and thumb make k, Fig.1
L-hand	L	the thumb and index make right angle; l, Fig.1
Bent-hand	M	the hand makes a dihedral angle, one allocher is the m of Fig.1
R-hand	R	the first two fingers crossed; r, Fig.1
V-hand	V	the index and 2nd extended and spread; v, Fig.1
W-hand	W	the first three fingers extended and spread
Y-hand	Y	the thumb and little finger are spread out from fist; allocheric forms: middle finger bent in from spread flat hand; index and pinkie up from closed hand

4.23. Symbols for cheremes of motion, SIGS:

Name	Symbol	Description
Vertical motion	∧	upward motion
	∨	downward motion
	⋏	up and down motion
Lateral motion	>	rightward motion
	<	leftward motion
	⋛	right and left motion
To and fro motion	⊤	toward signer
	⊥	away from signer
	Ⲑ	to and fro

Name	Symbol	Description
Twisting motion	a	supinative movement
	ꝺ	pronative movement
	ω	oscillating twist
Carpal motion	η	nodding or shaking motion, pivoting at wrist; may be proximal, distal, or both
Foral motion	⊐	opening motion of a configuration
	⧣	closing motion of a configuration
Approach	)(	dez approaches tab*
Touch	X	dez touches tab*
Graze	↑,→, or ↘	dez brushes or slides across tab*
Link	𝕏	double dez clasp, hook, etc., or dez grasps tab
Enter	⊘ or ⊗	dez is inserted or thrust through tab
Cross	⧦	double dez cross, one over other
Separate	÷	linked, crossed, inserted, or adjacent dez moves away
Interchange	ʿʾ	double dez or tab and dez hands reverse relative positions

*If double dez the interaction is mutual.

4.24. Diacritical marks used with sig symbols:

Name	Symbol	Description
Repeat	·	sig motion is performed again (dot to right of sig symbol)
---	·	when dot is placed over sig symbol, sharp, staccato movement is indicated
Alternate	⌣	indicates that sig motion is performed in alternation by double dez
Reverse	Я	indicates that left hand is dez, right is tab, etc.

4.25. Symbols for gestures with syntactic significance:

Name	Symbol	Description
Affirm	*1*	head bends very slightly forward and returns, or eyes lower and raise, or both together (written before symbols for sign nearest it in time)
Query	*2*	face 'opens', eyebrows raise, eyes open wide, chin or mouth lowers (written after symbols for sign nearest it or at the end of a stretch of signing)
Negate	*3*	head shakes (written before symbols for sign nearest its occurrence or at the beginning of a stretch of signing)

4.26. Conventions of sign language notation:

4.261. Signs are written left to right.

2. Left place symbol is tab.

3. Middle place symbol is dez.

4. Right place symbol or symbols are sigs.

5. Sig symbol to the right of another indicates successive motions.

6. Sig symbol under another indicates simultaneous motions.

7. Sig symbols as subscripts to tab or dez symbols indicate orientation of the configuration. Example: G_v indicates the Index hand pointing down.

8. Separation or juncture of compound signs is shown by slant bar or colon, / or : .

9. A bar used with a tab symbol indicates relative position of tab and dez. Ex.: $B_v^{\downarrow} B_a^{\div}$, 'open', begins with the flat hands, palm down, in contact along the index fingers, and its sig is a separation accompanied by rotation outward from the elbow (supination). $\overline{B}_\perp B_\perp{}^x$, 'window', is signed by twice touching the little finger edge of the right hand (dez) against the index finger edge of the tab. $A/A^{\div}$, 'follow', begins with the right hand half of the double dez behind and to the right of the left; then keeping same spacing both move away from body to the left. A dot used with a tab symbol indicates point of contact dez makes. Ex.: $[\cdot] G^{x\cdot}$, 'conscience'.

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