A DESCRIPTIVE STUDY OF THE SIGN LANGUAGE OF THE DEAF

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Submitted for the degree of Doctor of Philosophy to the University of Mysore.

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This is to certify that the study entitled **"A descriptive study of the sign language of the Deaf"** was carried out by **Mrs. Rajalakshmi K.,** at the **All India Institute of Speech and Hearing,** for the degree of Doctor of Philosophy in Speach and Hearing in the University of Mysore, Mysore.

PLACE : MYSORE
DATE : 29/9/93

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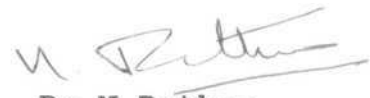
I hereby certify that the thesis on **A_ DESCRIPTIVE STUDY OF THE SIGN LANGUAGE OF THE DEAF** submitted by Rajalakshmi K for the degree of Ph.D., in the University of Mysore, was carried on in the **ALL INDIA INSTITUTE OF SPEECH AND HEARING, MYSORE** under my guidance.



Dr.N.Rathna
G U I D E

D E C L A R A T I O N

I, RAJALAKSHMI K, declare that this thesis entitled **A DESCRIPTIVE STUDY OF THE SIGN LANGUAGE OF THE DEAF** embodies results of bonafide research work done by me under the guidance of **Dr.N.Rathna, M.S. (Hunter), M.S. (Gallaudet), M.A.T., Ed.D (Indiana).** I further declare that this thesis or part thereof has not been the basis for the award of any degree or diploma.

kRajalakshmi

RAJALAKSHMI K

29/9/93

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CHAPTER I

INTRODUCTION

The explosion of research on the structural properties of signed languages has made it clear that these forms of gesturing have been forged into complex linguistic systems in the hands of deaf people across a few generations.

Current research has shown that signed languages like spoken languages display a dual pattern of both phonology (sign formational structure) and syntax. In spoken language the basic meaningful units are constructed from a small set of arbitrary and meaningless elements arranged in linear contrasts to form morphemes and words. The contrasting elements and the rules for combining them differ from language to language, but the division into a small set of meaningless elements that combine in rule governed ways to form a vast and open meaningful vocabulary is universal across languages.

Like the words of spoken languages signs of the signed languages are fractionated into sublexical elements known as 'cheremes' . The component parameters of signs are different from those of words; signs are constituted by configurations of the hand or hands; places of articulation, and movements (Stokoe, Casterline and

Croneberg, 1976). The number of possible configurations the hands physically assume, the number of possible places of articulation, and the number of possible kinds of movements are very large indeed. Further, as with spoken languages, there are systematic restrictions on the ways these components can combine (Klima and Bellugi, 1979).

There are observational, historical and experimental evidences to support the structural view of signs. The sub-lexical parameters constrain new signs as they enter the sign language as borrowings and account for their diminishing iconicity over time (Bellugi and Newkirk, 1980; Frishberg, 1975). The processing and rehearsal of signs in short-term memory is clearly in terms of the formational components (Bellugi and Siple, 1975; Poizneer, Bellugi and Tweney, 1981). Slips of the hand (analogous to slips of the tongue) involve substitutins of component elements of signs, and the resulting misordering of elements involves systematically predicted combinations of elements (Newkirk, et al. 1980). Signers are aware of the internal structure of signs; they substitute and make use of the component elements in plays using signs and in creating poetic sign form (using, for example, one hand-shape throughout a line of poetry as a kind of alliteration). Such deliberate manipulation of elements

of the linguistic system clearly reflects the intuitive awareness of linguistic form (Klima and Bellugi, 1976) .

The formational components and their combinational possibilities differ from one sign language to another. A comparison of two different sign languages with independent histories such as Chinese Sign Language and American Sign Language, shows parallelism with spoken languages, the two different sign languages have different inventories of components and even when the component elements are the same there are different restrictions on their combination into morphemes (Klima and Bellugi, 1979) . Studies of the formational components of other sign langauges (Ahlgren and Bergman, 1980; Frokjae and Jensen, 1980) confirm these findings.

All these results indicate that the formational parameters of signs have psychological as well as linguistic significance.

The study of language acquisition in deaf children brings into focus some fundamental questions about the human linguistic capacity. These data show powerfully how language, independent of its transmission mechanisms, emerge in the child in the rapid, patterned and linguistically driven manner.

With the advancement of modern linguistics, with new issues developing in descriptive, theoretical and applied linguistics sign languages have assumed a new prominence among language scientists.

The use of sign language has its impact educationally as a means of evading hearing deficit. It emphasizes a visual mode of language which unlike lipreading provides a linguistic signal which is easily perceived. No special equipment is required to converse in sign language.

There are very few studies on Indian Sign Language. Serious attempts to study Indian Sign Language began in 1977. A project was taken up by Gallaudet Research Division; All India Fedseration of the Deaf; Kendall scholl at Gallaudet college in Washington D.C.; and Sign Language Incorporation of Maryland to prepare a Dictionary of Indian Signs. This was the initial research on Indian Sign Language, primarily a comparative study of Indian and American Sign Language. In a subsequent study, Vasishta, Woodward and Wilson (1977) found that Indian Sign Language is not related to the French Sign Languages, which includes French, Spanish and American Sign Language among others.

Vasishta, Woodward and Wilson (1978) revealed that there is only one Indian Sign Language. The comparison of signs chosen from swadesh word list, modified for sign language research showed a very uniform pattern for cognates. There was no variation in basic signs across cities. In addition to the variation because of non-cognate signs Vasishta, Woodward and Wilson also observed systematic formational variation of signs. Formational variation in this case refers to hand positions used to produce specific signs. This variation does not impede communication.

There have been few attempts aiming at standardization of Indian Sign Language. A study by Prabha Ghate, Bhide and Vacha has provided for an Indian Manual Alphabet.

Rajalakshmi. (1984) studied "A Lexicon in Signed Language and its comprehensibility to Normals".

A project financed by UNICEF (United Nations International Children's Emergency Fund) was taken up at AYJNIHH (Ali Yavar Jung National Institute for the Hearing Handicapped) in 1987) to provide one signing system for

Indian Languages. The project has come out with a publication which indicates that the standardization may be possible only after it is put to field trial. It is also seen that the signs recommended are more prescriptive than descriptive.

Studies so far on Indian Sign Language have mainly concentrated on production of Dictionaries on Indian Sign Language. In this study an attempt is made at providing a descriptive study of the Sign Language used among a group of Deaf people whose language is Kannada.

Thirty male deaf signers studying in a local residential school, ranging in age from six years to eighteen years representing different academic standards served as subjects for this study. Signs were elicited from this group using a variety of linguistic items compiled from readily available Pictorial Glossary. Pictures, action pictures, objects, written words and sentences were used as stimuli for the elicitation of signs. A description of these signs under different linguistic catagories is provided.

A detailed description of some. signs are provided in the Appendix.

1) Due to the time constraints, acquisition of sign language of the deaf has not been taken up.
2) Only male signers have been used as there were no residential facilities for girls in the school and the two girls who were studying in the school had less exposure to sign language.
3) A brief description of signed language in an enviornment which has Kannada as the local language is provided here.

Descriptive studies of Signed languages of the Deaf will be useful in the following way:

1) they facilitate language acquisition through a visual channel,
2) provide a means for the education of the Deaf,
3) they can be used as an augmentative or alternate means of communication for people with disorders such as Aphasia, Cerebral palsy, Mental retardation where auditory-verbal language acquisition may not be feasible due to limitations imposed by the disorders, and
4) they can be used in Total Communication for the Deaf.

It is obvious that more studies in this area are warranted. The systems of sign language in India also provide a fertile field for linguistic and neurolinguistic research with respect to bilingual studies and spontaneous signing developed by people who are not exposed to education.

The present study is an effort at establishing a descriptive analysis of the sign language of the deaf in an Indian set-up. The description of signed language can be applied to evaluate the usefulness of sign language in total communication for the hard-of-hearing children and the systematic understanding of such a sign language it is hoped, will provides a means of improved communication for the deaf population and assist in the education of the deaf.

2.1

CHAPTER II

REVIEW OF LITERATURE

Gallaudet encyclopedia on deaf people and deafness has an excellent review on sign languages. The information about American Sign Language has been used profusely here. An Introduction to Indian Sign Language - a focus on Delhi has been used to get information on Indian Sign Language.

Most of the work to-date on deafness and deaf people has been placed on impaired hearing and its consequences rather than on the organization of deaf people's lives. As individuals deaf people fit well into a clinical frame-work. The concern of most educationists of the deaf has been the acquisition of spoken communication as the most acceptable means of communication which is usually not that of their parents. A majority of the community tends to ostracise them and may ascribe to them levels of competence well below those of the rest of the community. Deaf people are one such group set apart from the hearing community. It is perhaps not surprising that their language is only now coming into its own. A major reason for this is probably a growing international concern for and recognition of the rights of minority groups. The idea that deaf people can form such a group rather than be considered as educational failures within the mainstream is relatively new for educators and researchers alike.

The present study focuses on the communication of one such group of deaf people.

Language varieties in the deaf population.

Language acquisition research with deaf persons over the past twenty years may be characterized as a search for an appropriate metaphor. Some educators and researchers in the United States view instructions in English as remediation to ameliorate the effects of a pathological condition. Others see it as providing students from a sub-culture access to the academic and employment mainstream.

Imagine that you have always lived in a world without sound. In your silent world without speech and hearing, how might you accomplish the complex process of symbolizing and communicating that most of us, so readily associate with spoken language? Hundreds and thousands of people live in just such a silent world use systems of communication that fulfil the same intellectual, expressive and social functions as do the spoken languages. Instead of being based on signals produced by the voice and perceived by the ear, these systems are based on signals produced by the hands and perceived by the eyes. These gesture visual systems, so called sign

language will be of interest even if they are essentially-based on the language of the surrounding speaking community. But there are sign languages that are separate languages and have taken their own course of development in a different from that in which spoken languages have developed. These gestural - visual systems have offered radically new perspectives on the investigation of human capacity for language and the form that language takes.

Sign languages are gestural systems although gestural systems are not sign languages. A gestural system may simply pair gestures with meanings. If only the gestural system includes a system for constructing all kinds of sentences out of its signs, then it is a sign language.

The language varieties used by members of the deaf population include various manifestations **of** English (e.g. spoken and written) and of manual languages (e.g) pidgin sign English and American sign language. Since the present study is concerned about sign languages, the present chapter reviews definitions of sign languages and kinds of sign language grammars of different sign languages.

Definitions of sign language:

"Sign language is a full-fledged language in a medium which differs from that of the spoken language, not simply

pantomime and not to be confused with finger spelling, with stable, conventional signs conveying concepts (In 'A Dictionary of Sign Language" (Cohen, Lila Namir and I.M. Schlesinger).

Pieree (1931-1935) views signs as something which stands to somebody for something in some respects or capacity.

Eco (1977) defines sign as everything that on the grounds of previously established social convention, can be taken as something standing for something else.

Wundt (1973) defines sign language as a primitive form of ordinary language and as much it reveals something of the essential nature of natural languages.

Anthropologist Kendon has suggested the terms primary and alternate sign language to distinguish two kinds of sign languages. The primary sign languages are sign languages used as the first main or only language by members of a social group. The alternate sign languages are used by persons who have spoken language but cannot or do not use it for some reason.

Primary Sign Language

In a primary sign language, the signs only

occasionally correspond closely with the words or signs of some other language. These signs change form according to the rules of their sign languages sentence forming system. Primary sign languages have a word forming system, a sentence forming system. In this respect they are exactly like any other language whether spoken or signed. However, because the word forming material is gestural in sign languages and vocal in spoken language, the word forming system of a sign language must be quite different from that of the word forming system of spoken language (sign languages are soundless and the spoken languages are invisible). Despite the differences, the word forming systems as systems are alike, and both, as R. Battison has demonstrated, can be called phonological systems.

The system for putting words together to make sentences, known as syntax, likewise shows both similarity and difference when the vocal and the gestural modes of production are considered. To the user of any language, the process of understanding and being understood is of first importance. So not only word meanings, but also sentence meanings must be made clear. Besides ordering of words and form changes of words, spoken languages use vocal material to make sentences. Changes in tone of voice, pitch, stress and timing can be signals that mean, for instances, "I am asking a question that needs yes or no as an answer" or "this sounds like a question but I

don't really expect you to answer". In such cases and many others, the voice is producing sound signals that do not make words but do tell a listener what kind of sentence message is being expressed.

Sign languages similarly use gestural materials for more than making their (words) signs. Signers' eyes, faces, heads as well as their hands and arms are used to produce signals that similarly indicate questions and what kind of sentence is conveyed. For instance "This is what I will be talking about; or I will explain immediately". Question signals and topic markers like these have been explored by several linguists since the mid 1970's especially C Baker-Shenk, S Liddel and C Padden. Knowledge about sign language syntax is thus not very old, but to all indications, sign language syntax is thus not very old, but to all indications, sign language syntax and spoken language syntax are fundamentally the same thing, a function of the human brain, not peculiar to either the human vocal auditory or the human gestural - visual system used for making meaning bearing units longer than words.

Most of the systems that have been called, sign languages make more or less use of actions of the arms and hands. Primary sign languages, however, use these in combination with non-manual activity (movements of the face, head, eyes and torso), both to form the words of the

particular language and to make the signals needed for the sentence forming system to work.

Those unfamiliar with primarily sign languages are often sceptic, questioning how gestures can make enough contrasts to operate a genuine language system. Surprisingly, the potential for significant contrasts in body actions is much greater than the potential in human voices. A part of the reason for this is the nature of the vision itself, people can see heads, eyes, faces, arms hands and bodies all at once and comprehend a whole array of large or subtle differences. The other reason that sign language signals are so rich in possible contrasting elements is the complexity of the human facial, skeletal and muscular systems whose parts can act simultaneously. Hands and arms can be in one of the thousands of possible configurations while the face is showing one or more of the thousands of possible combinations of its actions.

Apart from the Hands

Fortunately for the observer of sign language, no sign language uses even a large part of this potential. What a language like American Sign Language does with them can be considered typical. First, eyes are not only the receptors of sign language but are also a major part of expression as well. Eye gaze direction is used to control interaction, to manage turn taking, and indicate dislike

or inattention to what another signer is saying. Eye gaze is also used in the pronominal sentence forming system, for example, a momentary gaze down or side ward can mark with or without signals, a major juncture such as joining of a dependent or independent clause. The facial actions which include eyebrow raising, pulling the brows together and raising the upper lids signal such important indications such as "Question being asked that requires a yes or no answer", "Question that asks for new information", "Question form that really does not expect any answer" or "this is the topic I will be telling you about". Similar phenomena are being found in Norwegian, Swedish, Danish, British and other sign languages.

Arms and Hands

The actions of arms and hands in sign languages have been the object of much attention since the eighteenth century. Some notice of hand signs (for words, letters or numbers) has been taken since the ancient times. Treating these actions as part of a primary language system is of recent date. There are so many ways of displaying hands that few if any descriptions are complete; but since 196O's linguists and choreographers have provided promising outlines in two different directions of notion.

If the hand from wrist to tips of the fingers is considered apart from the thumb, it may be 'closed' as linguists say, or "flexed" as kinesiologists put it. The hand may be flexed at the knuckle joints or extended at the two sets of distal joints; or this may be reversed - the outer joints flexed (hooked) but the knuckle joints held straight. Finally, the hand may be "open" (linguistics) or "extended" (anatomy). This describes four states of the hand (disregarding thumb). But the conditions "tense" and "lax" (from the phonetics of spoken languages) also give intermediate states. For example, a tense open hand is stiff or even recurved; and lax, it is a little concave", a lax hooked hand makes a curve at the end instead of a sharp angled hook. Thus, there are at least eight states, but the fingers may act independently the same way. One finger may assume these states off lexion-extension, and there are four fingers (4x8 = 32). Any two fingers may act in unison (6x8 = 48); three fingers (5x8 = 40) also. Thus, there are, not counting the thumb 88 states or configurations, in theory at least - actually more because the independent digits may do one thing while the rest of the hand is in any of its eight positions. Moreover, when two fingers are separated by their action from the rest, it is not necessary that both of them have the same degree of flexion.

In multiplying eight by eight by eight, the number of possible hand configurations becomes larger very quickly, but number of handshapes that do occur as structure points in a sign language's word forming system are far fewer - first because some of the configurations are possible only with long painful practice and second because there are so many other ways to make the needed contrasts.

One such way is the thumb position. Because of its joint structure the thumb not only can flex in two ways and extend, but also can oppose the hand or finger(s) and furthermore can make or not make contact with other hand parts. This variation, of course, multiplies potential hand configurations by several times.

Even all these hand configurations need not make all the necessary contrasts, simply because the hand is at the end of the whole upper limb. Changes at the shoulder, elbow, and wrist directly change the hand's position. For example, the active (usually right) hand in open configurations may be struck into the palm of the other hand in many ways. Three ways which clearly contrast, make the contact palm to palm (as in applauding), little finger edge to palm or back to palm. The contrast of these three pairs (a/b, a/c, b/c) was taken at one time to be a separate parameter of signs, and has been called variously, the hand's orientation, point of contact, or

grounding. Anatomically considered, however the hands posture is the inescapable result of states of the arm -hand system. The contrasts in this example are caused by phonation, neutral rotation and supination of the active forearm. Changing nothing else, if the elbow is flexed sharply, the hand must appear in front of its maker's face. Now the same three forearm states (prone, neutral, supine) present the (flat or open) hand, palm away, thumb (radial) edge toward signer and palm in.

Forearm rotation and elbow flexion provide many more possibilities for contrasting one stationary arm-hand configuration with another but the wrist can bend and straighten or even bend back, and the wrist can also adduct and abduct, that is, make an angle with the ulnar or radial edge of the forearm. Even more changes in the system can come from the shoulder because of the structure of thin joint; the upper arm may be at the side, lifted out to be side (adducted) or pulled in and a little way across the trunk (or adducted) . The upper arm may also flex (move forward) or extend (more back); and in addition, it can rotate in its socket; medially (to swing the horizontal forearm across the body) or laterally (to swing the horizontal plane), and remain between these two (so the horizontal forearm points forward).

When the number of potential handshapes calculated at well over one thousand, is multiplied by the number of other states that the arm system can assume, far more possibilities for contrast exist than any language could make use of. Some of these states (for example pronation, supination and no rotation of forearm) are used in many primary sign languages to make major contrasts, the kind of contrast that separates one word from another word. Others of these states are entailed; that is, they are changes that go along with other, major changes but do not themselves produce word changing differences.

But this description has not yet touched what some consider the most salient feature of a sign language watched by a non-signing observer. So far only some of the contrasts of the facial system and those of the stationary arm-hand have been looked at. Manual signs, however, are made of both stationary (hold) segments and active (move) segments.

The muscles acting on the joints that produce the so-called manual movements are the same muscles that produce the states of the stationary arm-hand/s). Various ways of describing these movements have been used. In the first linguistic treatment and the first dictionary to list signs of ASL other than as word translations, the actions were considered as abstract spatial changes (up, down,

forward, back, sideways, circular) and as interactions (touching, approaching, linking, and so on) . Subsequent essays in sign phonetics have distinguished path movement from non-path and have specified source and goal, while noting for circular movements which of three planes (horizontal, frontal, sagittal) is involved. In these descriptive projects, the interaction, point, and nature of contact are described in specifications of the active hand.

The preceding introduction to the types of body part configurations and movements that make up primary sign language reveals both their complexity and the scientists difficulty in describing them. The task is compounded by the fact that signers form these hand and arm , facial, head and eye configurations and movements quite rapidly and frequently simultaneously.

Origins

The origins of sign languages cannot be later than the origins of the human species. Some hold that it is language that distinguishes true humans from pre-human fossil ancestors; others say that culture is the distinguishing feature. Because culture can be inferred from solid evidence and because spoken language before the invention of writing leaves no direct traces, culture may

seem the stronger of the two. But such a belief and all other evidence of human culture imply just as strongly language and humanity as any one of these three implies the other two.

Whether the first languages were spoken, signed, or expressed by a combination of vocal and gestural signals may never be known, but there are several arguments for supposing the first languages to have been sign languages. First, evidence from careful studies of the earliest communication of infants, both hearing and deaf, shows that they do use body movements and voices to communicate. They make these gestures and vocalizations as their care-givers interact with them and later they turn them into actual symbols, respectively signs and words (signs and words are behaviors that refer symbolically, even if their referents are not present in the immediate context). The significant point is that the fully symbolic use of gestures as signs occurs earlier than the fully symbolic use of vocalizations as words. This finding suggests that what is true for developing infants may also be true for the species, that is, symbolic behaviour appeared first in signs, only later in words.

Another indication of priority comes from micro-analysis of communicative behavior, which shows that the communicator's speech and gesticulation (that is, body

movements accompanying speaking) work together synchronously to express a message. The significant point here is that an interruption serious enough for the speaking to stop often allows the gesticulatory behavior to go on uninterrupted. It also happens that a gesture for example, a head nod, smile or eye movement, may actually "say" first what a speaker is going to express in words a split second later. Here, as with interruption, the implication is that the uttering of the information by gestural means is an older, earlier, acquired method of signifying and communicating mastered in the evolution of the species before the uttering of information by vocal means, and perhaps operating through neural circuits less subjects to disruption than hearing and speaking.

Other arguments for thinking that sign languages as completed languages originated before spoken languages rest on syntax, or connected language, and not on the separate symbols as signs or words. Consider, for instance, an occurrence that must happen many times daily and be talked about in any imaginable culture: someone hands, gives or offers something to someone else. In the language of school grammars the elements needed to express this occurrence are a subject, a verb a direct object and an indirect object. In order terms, an actor gives an object to a beneficiary. But grammarians explain it whoever talks about it (in whatever language) has to make

the relations of three things to the verb perfectly clear - who is doing the giving, what is being given, and who is the recipient. Spoken languages make these relations clear by using a particular order of the four elements, by varying their forms or by a combination of both forms and order. For example, in English, "she gave him that" shows both order (subject-verb-indirect or direct object) and form ("she' vs "her" and "him" "he"). But however differently spoken languages manage the matter they are all alike in having to utter the four elements one at a time and one after another - there is one dimension and direction in their syntax. Sign languages are not so limited; they have a very different syntactic dimentionality. The direction of movement in producing a sign language sign for "give" "tell", "offer" and so on makes clear who is giver and who is receiver. Often because a signer has two hands as well as a head and eyes, some part of the signer's person visibly represents at the same time one or more of the elements in this relationships.

Here the argument for the origin of sign language in signs is being earlier over language in words depends on how the acts of symbolization and reference are more likely to have evolved. A sign language puts the parts of statement's structure into a four dimensional form; the visible changes of the person signing occupy different

places in three dimensional space the signer can reach and changes occur over time. A spoken language can only vary the audible behavior of the person speaking over time, but the spoken language represents abstractly (by form, by order or both) the relationship of giving to what is given, the relation of that to the actor, and all of that to the receiver. It seems much more likely that the moving picture presented to the eyes and brain by sign language has evolved into the abstract relationships a speaker presents to the ears and brain. It is difficult to imagine how human communicators could have started with all the relationships of the act to object to actor to recipient abstractly represented and arbitrarily symbolized in the stream of speech; it is even more difficult to imagine why at some later time all this highly abstract multi-level material would then be projected visually onto a moving spatial representation as it is in a sign language. Even with its iconic relation, the sign language expression works as a symbol, denoting not so much a specific event as a class of events.

Iconicity in the symbolism of sign language expression is inevitable, gesturing persons and persons doing things such as giving are bound to look and move similarly at times. There is no need and usually little possibility for spoken expression to show representative features of what it relates. It is easier to suppose that

over time human communicators using the iconic-symbolic mode evolved a symbolic mode without the iconicity that a visual system imparts.

The strongest argument, then for the priority of sign language depends on the existence of a full system not just signs as separate symbols, but syntax as well can describe an act of giving and multitudes of more and less complex relationships. When signs and words only have been compared, the iconicity of signs and the almost completely arbitrary symbolism of words have led theorists since the time of Ferdinand de Saussure (1857-1913) to take the latter as linguistic, true language and former as something less. But when the expression of prepositions (symbols with syntax) is examined, signed language not only takes on all the requisite symbolic functions of language but also appears as the likeliest precursor to spoken language.

Facial Expressions

Hearing people who observe deaf people signing often comment that the signers seem to use "a lot of facial expression". This difference in deaf signers' faces has been noted by various writers for well over 300 years. Some writers have reacted negatively decrying the use of such as "extreme grimaces" and "uncouth", distorted

expressions. While others have taken a more positive, inquisitive approach wondering what causes deaf signers' faces to show such intense animation.

Until 1970's most people thought that all these facial expressions were showing the emotions of the signer. Then careful studies of signers' facial behaviors began to reveal that, while deaf people do express their emotions with their emotions with their faces, they also use their faces as part of their language.

Unlike spoken languages that are built from only one "material" that is, sound, the signed language of deaf communities are built with movements of several different parts of the body - the hands and arms, the head, torso, eyes, and face. Whereas bounds must occur one at a time to form words and sentences, the different parts of the body can move at the same time to form signs and sentences.

The face is one of these moving parts that has several important roles in the language. Some facial expressions, often in combination with head movements, are themselves signs. For example, the sign "Yeah-I-Know - That" in American Sign Language (ASL) is made by twitching one side of the nose. The sign DON'T-KNOW in Swedish sign language is made by puffing out one cheek and letting the

air pop out. In Providence Island sign language (PROVISL), the sign TO -LIKE SOMETHING is made by raising the eyebrows, pursing thew lips, and sucking in air. Although many signed languages have signs that are made with facial expressions (without hand movements), the number of these signs is usually very small.

Much more often, facial expressions will occur at the same time as signs are made with the hands and arms. Sometimes these facial expressions are a part of the sign. For example, the signs SMALL-PIG, CAT and DOG in PROVISL are all made with identical hand movements but have different facial expressions. Most often these facial expressions are either modifiers or grammatical signals.

Modifiers

There appear to be at least 20 facial expressions like adverbs and adjectives which modify or add to the meaning of something else. For example, one of the modifiers adds the meaning "very close to a particular place". If this facial expression appear while the signer makes the manual (with the hands) sign. Now, it adds the meaning "very close to now" or "right now". If the facial expression appears with a sign like WRITE it means "write carelessly". Another modifier means "normally" or "regularly". If that modifier appears with a sign like

write, it means "write at a regular\expected pace". These kinds of modifiers appear frequently in signed languages. However, linguistic researchers are just beginning to study them to find out what they look like and what they mean.

How much do these modifiers differ from one language to another? Some modifiers seem to occur in several signed languages. For example, the "puffed cheeks" expression which generally means "large, a lot, of great magnitude", has been observed in the signing of Thai, Swedish, Roman and American signers. However, some of other modifiers which appear in American Sign Language do not seem to be a part of other signed languages.

Grammatical signals:

Facial expressions have another very important role in signed languages. They help to tell the receiver (the person watching) what kind of sentence he or she is seeing. Is it a question? If so, what kind of question? Is it a statement? A negative statement? A conditional statement? The parts of language that provide this kind of information are called grammatical signals.

Research has indicated that signers use specific facial expressions and head movements to distinguish at

least 13 different kinds of sentences in ASL, and each appears with a different grammatical signal. If the question is a yes-no question like - Is it you? The signer will have a facial expression with raised eyebrows and raised upper eyelids and head movement that tilts forward\downward.

If the signer wants to ask a wh question like "who went to the meeting?", the signer will use a different facial expression. In this expression, the eyebrows are lowered and drawn together. If the signer wants to ask a rhetorical question like "who went to the meeting? No body:", the facial expression and head movement will again be different from that of the first two types of questions.

People who try to "write" ASL sentences for the purpose of teaching often draw a line above the glasses (approximate English translations) for the signs in a sentence to show that a grammatical signal appears while those signals are being made. The letters above the line are a way of identifying which signal it is. For example, "q" means "yes-no question", "wh-q" means "wh question", and "rhet q" means "rhetorical questions". Thus, a signer can remake the sign WHO with two different grammatical signals - "wh q" and "rhet q".

Sometimes more than one grammatical signal will occur at the same time. For example, in ASL, there is a signal for "negation" that involves shaking the head and often appears with a brow "squint" and mouth "frown". One type of negative facial expressions is pictured here; "neg" stand for "negation" and mean that the signers' head is shaking side to side. If the signer asks question like "Aren't you going?", both the "neg" and "q" signals will appear.

Sometimes a facial expression modifier and a grammatical signal will appear at the same time. For example, if the signer is describing a meeting and comments that "many people were there", the signer might use the "puffed cheek" modifier. But suppose the receiver is surprised to hear that so many people were in attendance and asks, "many people were there"? This question might appear with both the "puffed cheeks" modifier and a "q" signal.

Facial expressions can also show the signer's emotion at the same time that it acts as part of the language (for example, as modifiers and grammatical signals). For example, if a signers eyebrows and upper eyelids are raised higher than is normal for yes no questions, it shows that the signer is also "surprised". So in this example, the signers' face can be showing three things at

the same time (1) that she is "surprised". (2) that she is asking a yes- no question, and (3) that she is focussing on the idea of "many".

Signers are able to express a lot of information on the face because the facial muscles are more complex. Alone these muscles can make over 1000 different expressions. Another reason why signers can express so much information on the faces is because the receiver normally looks directly at the signers' face (not hands) and thus sees this area of the signer's body most clearly.

Direct Address

Another way that signers use their faces is when they are quoting what someone said. This is called direct address. For example, by turning the body from facing forward (which is the normal position) to facing left or right, the signer can become another person. Then the signer will look that and act like that person while showing what the person said. To show a dialogue between two people, the signer can shift back and forth between two positions, each time changing facial expression to show both the feelings of that particular person and what that person said.

Some facial expressions are part of the vocabulary and grammar of the language, while others show the signer's feeling.

However, when signers are communicating in a pidgin sign language or the manual code for a spoken language like English, they generally do not use their faces in these ways-especially if they are speaking while they are signing.

Hearing signers tend to show less facial expression than deaf signers. This is because hearing signers generally do not know the signed language very well and because they are more influenced by their spoken language. Therefore, deaf people sometimes joke that a hearing person's signing is "monotonous"or "boring".

People sometimes wonder if deaf persons are more sensitive to "seeing" facial expressions than hearing people. Clinical tests of how well deaf people and hearing people recognize expressions that show emotions have not found any real difference between the two groups. However, if these tests were to focus on recognizing facial expressions used in sign languages like ASL, the results would probably be different. It is likely that deaf signers who use ASL would be better able to recognize

quickly these expressions because they need to be able to do so to communicate in ASL.

Hearing people sometimes wonder if deaf people facially express their emotions in the same way as hearing people. Research on hearing people all over the world has shown that they will spontaneously express emotions with their faces in the same ways. However, a person's culture may have rules that x dictate what emotions can be shown in public. For example, middle class white adult urban males in the United States are not supposed to show sadness or fear in most public places. Their female counterparts are not supposed to show anger and so when these women are angry they often try to smile (while gritting their teeth).

The culture of deaf people affects the way they use their faces. Part of deaf person's culture is sign language. As shown above, the language has rules that determine what kind of facial expression the signer should have at certain times. So, if the signer is feeling a particular emotions while signing. It is possible because of the language rules the emotion will not be shown in the usual way. For example, people who are angry usually lower their eyebrows and draw them together into a squint. But suppose a deaf person while angry asks a yes- no question in ASL (which is signalled by raising the

eyebrows) . Often the outcome is that the signer both raises and draws the eyebrows together. So, in this case the language rule will change the signer's expression from the expected brow squint into a raised brow squint.

Sometimes hearing people get confused because of these kinds of changes in deaf people's facial expression. They may think the deaf person is angry when the individual is simply asking a wh question or a negated question.

Although hearing people sometimes misunderstand deaf people's facial expressions, deaf people who use different sign languages seem to be able to understand each other's face fairly well. For example, if deaf people from Sweden, England and United States get together, they probably will not each other's signs, but they probably will know when the other person is asking a question or describing something that is "really big". This is because the signed languages in each of these countries use facial expressions in some similar ways. Comprehensive research has not yet been done to find out how alike signed languages of the world in their use of facial expression, but many similarities have already been observed.

Sign languages and culture

When attention is turned from how sign languages construct their sentences to the role of sign languages the focus changes from the structure of language to questions related to the use of sign language.

The typical user of a primary sign language are deaf people, people who cannot hear the sounds of language or if they have some ability to hear, cannot make myriads of distinctions between different incoming language sounds- quite naturally acquire a primary sign language.

Hearing children of deaf signing parents, especially the oldest siblings, who use primary sign languages for interaction with their parent's friends. They may choose to maintain their relationships with members of the deaf community as they get older, and continue to use sign language. Some hearing people learn and use a primary sign language as adults because their profession involves work with deaf people.

However, not all deaf people use primary sign language. And many "deaf" users of sign language are not functionally deaf; they may even have sufficient hearing to use telephone. Instead, the primary users of primary sign languages are what is called Deaf- where the capital

denotes participation in deaf culture, not degrees of hearing loss. Thus, the primary users of these sign languages are people with hearing loss who members of Deaf culture, sharing in its values, norms, tools and language. But this immediately poses another question. When 90 to 95 percents of deaf persons born deaf do not have deaf sign language using parents, how do they acquire sign language as primary or whatever? It seems possible to say that for congenitally deaf children to use gestures for interaction and communication innate; they do it naturally. Of course, it is also natural for hearing children to use body, facial and arm hand gestures themselves and to respond to such gestures of others as means of communication- and all this before they learn to concentrate their communicative signals in the vocal mode. Deaf children limited to interaction in hearing families develop a communicating system that works fairly well at home; the system is called home signs by users of ASL. It is also true that users of home signs, when, they begin to interact with less sheltered deaf people drop home signs and almost immediately learn a primary sign language.

"Sign language is a system of gestures principally centered on the hands and used for interpersonal communications. Signing is generally an autonomous gestural system with morphological and grammatical forms independent of spoken language of the society to which the

deaf signers belong. It is the use of finite, though complex, set of units and rules which allow the generation of unlimited variety of sentences". (Bonvillian, Nelson and Charrow, 1976) .

American Sign Language

The phonological base

The fact that all spoken languages combine meaningless symbols is regarded as one of the defining features of human language. Stokoe (1960) demonstrated that ASL signs may also be viewed as composition rather than holistic and thereby provided the first structural evidence that ASL should be regarded as a language rather than merely a gestural system. His pioneering work has had a profound effect on all subsequent research into ASL structure.

He proposed that a sign consists of three points which combine simultaneously; the tab (location of the sign) , the dez (handshape) , and the sig (the movement) . Influenced by the American structuralists, Stokoe referred to these three aspects of a sign as 'cheremes' . He regarded cheremes as meaningless elements which combined to form all the signs in the language, in a manner analogous to that of spoken language phonemes.

The Stokoe model has been adopted almost universally by sign language researchers. The most recent treatments of the model hold sings to be temporally unitary phenomena, composed of some number of simultaneously occurring gestural primes. According to this view of sign structure, the entire set of gestures comprising a sign is seen to be analogous to the set of articulatory primes that comprise a segment in spoken language. (Studdert-Kennedy and Lane, 1980; Klima & Bellugi 1979).

Differences among signs are described by the substitution of primes within the simultaneous bundle. Thus, the difference between the signs MOTHER (an open '5'handshape touches the chin twice with the thumb) and FATHER (an open '5' hand touches the forehead twice with the thumb) is described as a difference in location in the bundles of otherwise Identical primes. Analogously, the difference between (p) and (t) is commonly described as a difference in the place of articulation primes in bundles of otherwise identical primes. Because of this view, sign languages have been seen to be unusual in that meaning is attached to such simultaneous bundles rather than to sequences of such bundles as it is in spoken languages.

In this model of sign structure (as in the model of spoken language segment structure), however, the claim that signs are simultaneous bundles of primes is not a

claim that there are no sequential events within signs. It is a claim that within signs sequential organization is phonologically unimportant. Thus, while Stokoe and more recent workers recognize sequence within signs, they typically hold it to be phonologically insignificant (Stokoe 1960, Battison 1978). This is similar to the recognition that the onset -close sequence present in the stops (p) & (t) is phonologically insignificant.

Liddel (1984a) argues that an adequate description of many phenomena in ASL requires the recognition of sequences of primes, and demonstrates that such sequences are capable of signalling contrasts among signs. Below are described several descriptively important sequences of primes.

Handshapes

A significant number of signs in ASL lexicon are produced with an 5 handshape. For example, UNDERSTAND begins with an 5 handshape but ends with 1 handshape.

This handshape change is described by Stokoe et al. (1965) as a unitary movement they call an "opening movement' wherein a handshape changes from ' closed' handshape to an open handshape. The table below shows

sampling of signs which all begin with an 5 handshape, but end with different handshapes.

Table 2.1

Sign	Initial handshape	Final handshape
UNDERSTAND	5	1
THROW	5	H
TWELVE	5	V
SO-WHAT	5	0
FINGER- SPELL-TO	5	4
GAMBLE	5	5

Many other sequences of two handshapes occur in ASL signs. A smaller number of signs are produced with a sequence of three-handshapes. In SHOCKED the handshape sequence is S-C-S. In THINK -SAME-THOUGHT the sequence is S-l-S. In GOVERNMENT the sequence is 1-bentl-.

Locations

It is quite common for the hand to move from one location to another location during the production of a single sign. Such re-locations occur frequently in simple signs and are especially common in compound signs, almost all of which move from one location to another.

The sign PARENTS is such a compound sign, derived from the signs MOTHER and FATHER. It begins at the chin (the location for the sign MOTHER) and then moves to the forehead (the location for the sign FATHER) . The table below presents several examples of the hand changes.

Table -2.2

Sign	Initial location	Final location
SANTA-CLAUS	chin	chest
GOOD	chin	base hand
NAVY	left side of the the waist	right side of waist
KING	left side of the chest	right side of waist
INDIAN	nose	side of forehead
(C) SON	forehead	forearm
(c) PALE	chest	face
(c) BROTHER	forehead	basehand
(c) PROMISE	chin	basehand

Compounds are marked with a (C) . Because Stokoe's sign schema permits a sign to have only one location, his notations treat relations in simple signs as complexes of movements. Thus for example NAVY, might be said to be located at the left side of the waist and then to move to the right and make contact. The actual location at the right side of the right side of the make contact. The actual location at the right side of the waist would not

be specified. Compounds are treated as linked notations of complete signs, each of which has its own location.

Numerous verbs in ASL are marked for subject and object agreement and typically move from one location to another. Table below shows the locations involved with two verbs marked for agreement.

Table - 2.3

Verb	Subject	Object	Initial location	Final Location
TELL	-	1st person	Chin	Chest
TELL	-	3rd person(a)	Chin	Place(a)
GIVE	1st person	3rd person(b)	Chest	Place(b)
GIVE	3rd person	3rd person(b)	Place(a)	Place(b)
GIVE	3rd person	1st person	Place(b)	Chest

TELL always begins in contact with the chin and then moves to a location which reflects agreement with its object. GIVE agrees with both its subject and object. Its initial and final locations are determined by the subject and object agreement morphemes which are inserted into the verb stem.

Movements:

Stokoe's original observations demonstrated that some signs require movements to be carried out in

sequence. He describes CHICAGO as being made with a rightward movement followed by a downward movement; WHEN with a circular movement followed by a contacting movement, YEAR with a circular movement followed by a contacting movement, ALSO with a contact movement followed by a rightward movement and then another contacting movement.

Supalla and Newport (1978) demonstrate that very finely detailed differences in movement could distinguish some nouns from related verbs. Whereas Stokoe et al. (1965) reports the existence of a single sign meaning both 'sit 'and 'chair '. Supalla and Newport claim that SIT CHAIR are separate signs. They find that for more than hundred such noun-verb pairs, the pattern of movement of the noun differs in predictable ways from that of the verb. They distinguish these formational differences in terms of three manners of movement. They describe the movement of the sign SIT as a single, unidirectional movement with "restrained manner".

Their manners of movement demonstrate a significant type of sequentiality in the formation of signs. The sign SIT begins with a motion toward the basehand and ends with two hands in contact, but not moving. A sign ending with hands immobile is said to have 'hold manner' at the end of the sign. In their view such emotionsless periods are as

important in providing contrast as are the periods of movement. They note that one of the possible implications of their findings is that signs may have sequential internal segments rather than a simultaneous bundle of features.

Local movements:

Local movements are small repeated movements of the fingers and wrist which accompany the major movements of the hand. For example, LONG-AGO is produced with a '5' hand configuration which moves backward to a hold at a point just over the shoulder. During the backward movement itself the fingers wiggle, but the final hold is produced without finger wiggling.

Thus LONG-AGO contains the sequence, local movement and no local movement. In other signs, such as JUMP-FOR-JOY the wiggling in restricted to the middle of the sign where the active hand does not contact the base hand. This produces the sequences no local movement, local movement, no local movement.

Non-manual signals

Many non-manual signals involve no sequentiality. For example, the combination of raised eyebrows and

backward head tilt which accompanies topics (Liddell, 1977) is purely configurational with no internal changes. Some non-manual signals, however, are produced by sequencing non-manual activities. Some such non-manual signals occur as part of lexical items and others occur as part of morphological processes. A lexical item which requires a sequence of non-manual activities is GIVE-IN. During the initial part of its production the lips are closed but during the final part of its production the lips are open. ALL-GONE, on the other hand, begins with the lips apart and the tongue slightly protruding and ends with the lips closed.

Sequences of non-manual activities are also important as part of morphological processes. Liddell (1984 b) describes a sequence of non-manual activities required as part of the inflections for unrealized inceptive aspect, when this inflection is applied to a verb specific, predictable changes occur in both the manual and non-manual portions of the sign. The sequence of non-manual behaviors associated with this inflection requires the signer to inhale through the mouth while rotating the trunk, and then to hold the resulting configuration during the final portion of the sign.

Contrast in ASL

It has been illustrated that several types of sequentiality in ASL signing including sequences of handshapes, locations, non-manual signals, local movements and movements and holds. The simultaneous model of sign structure is not able to represent these sequential details in effective way. This alone argues for a descriptive device which is able to represent important aspects in ASL sequence.

Specifically, given that signs have sequential structure that sequence can be shown to correspond to phonological segments responsible for sequential contrast of the sort found in spoken languages. The identification of physical sequence in the linguistic signal provides the evidence needed to argue that signs are composed of sequenced, abstract, linguistic segments. Support for the existence of such linguistic segments comes in part from a demonstration that ASL, like spoken languages contains pairs of signs distinguished only by differences in sign internal sequence. It has become traditional in treatments of ASL structure to illustrate 'minimal pairs' of signs as a demonstration of phonological contrast. However, because the simultaneous model of sign structure dictates that signs are composed of a single, simultaneous bundle of gestural features such pairs of signs are able

to demonstrate only simultaneous contrast of the sort found within segments in spoken languages. Thus, staying for the moment with the notions that signs are simultaneous, most 'minimal pairs' of signs identified in the literature on ASL exhibit contrasts analogous to the difference between /p/, /t/ and /b/. They are distinctions of one feature within a single, co-occurrent bundle of features.

By contrast in spoken language analysis, the notion of 'minimal pair' has typically been used to demonstrate sequential contrast. Thus, a minimal pair is usually considered to be two words, contrastive in meaning, which are identical in all segments except one, in which they differ by only one feature. THANK YOU and BULLSHIT are minimal pairs in this sense. Both begin with identical holds produced at the chin and move to holds produced at a location about six inches out and slightly below the chin. In both signs, the orientation of the hand remains constant, with the palm toward the face and wrist toward the ground. Thus, from the prospective movement, location and orientation the signs have identical sequences. They differ only in hand configuration sequence. Specifically during the production of the sign THANK YOU, the hand configuration begins and ends as a 'B'. In the sign BULLSHIT, however, it begins as a 'B' and ends as an '*S*'.

Although true minimal pairs such as these are not abundant in ASL, there are similar parts that demonstrate sequential contrast in each of the major descriptive parameters of signs. Together they demonstrate that segments function to signal contrast in ASL in much the same manner as in spoken languages, and suggest that the description of segments in central to an adequate phonological analysis of ASL signs. In additions, the value of a segmental description in the analysis of the phonological and morphological processes of ASL will become more apparent.

Phonetic transcription system for ASL

Stokoe's terminology 'Chereme' and 'Cherology' refer to details of sign language and its organization. Battison (1974) demonstrates that sign language descriptions contain a sub-lexical level of analysis that appears in certain ways to be organizationally and functionally equivalent to the level of phonology in spoken languages. He argues convincingly that standard phonological terminology refers appropriately to those levels. Analysis of the patterns of organization of sign languages signals yields levels of analysis quite similar to those known to exist in spoken languages.

It is a matter of historical accident that, during the period of development of modern linguistic terminology, all languages known to linguists were spoken languages. Even so, for the most part, phonological terminology refers to the patterns of organization of linguistic signals, rather than to the signals themselves. Thus, the vocal reference of the phone-stem in words such as phoneme is largely unnecessary. Phonological terminology is used referring to the organization of sign languages, with the understanding that the terminology here, as in studies of other languages refers to general principles of organization probably found in all languages rather than to specific vocal gestures of spoken languages.

Goals of transcription

A transcription system for a language or set of languages should meet the dual goals of at once providing for the accurate, representation of the detail of the 'facts' of a language and assuming that those representations are useful in characterizing the organization of the facts.

Attempts have been made to devise a system that provides a linkage between the abstract and concrete aspects of phonological systems without committing

overwhelmingly to either. Clearly an adequate system of transcription must have elements of both. On the concrete end, a transcription must account for all the linguistically interesting details of the production of the signal. Such phonetic transcriptions will be roughly equivalent in its concreteness to the 'systematic phonetic representations of standard generative phonology (Chomsky and Halle, 1968). While such representations must accounts for a great deal of details they exclude (a) linguistically non-distinctive differences such as the difference between apical and laminal (s) in English; (b) sequential detail with phonologically functional units, eg. elimination of onset and closure information from the description of English stop consonants; (c) detail stemming from universal physiological conditions; (d) detail stemming from individual physiological conditions eg. absolute voice pitch; and (e) traditional non-linguistic detail, such as rate, loudness, and affect marking features.

On the abstract end, an adequate notation system must provide descriptive devices that permit a plausible linkage between the surface (distinction representation and the underlying forms of the individual lexical items that are present in it. Thus, a single set of descriptive devices should at once be capable of characterizing each of the following: (a) the phonological shape (underlying

form) of lexical items; (b) the phonological aspects of the morphology; (c) phonological process; and (d) the surface forms of signs in running signed productions (at the level of concreteness specified above). To the extent that a system of notion succeeds in achieving this balance, it provides phonetic motivation for phonological features and phonetic plausibility for the abstract structures and processes of the phonological component.

That the system be usable is a second, more pragmatic goal which has influenced the current form of notation system. Thus, while sign notations will ultimately be reducible to matrices of binary phonological features, most of the notations presented here contain taxanomic entries is primarily a matter of clerical and typographical convenience, reducing the number of symbols required to transcribe a sign.

Over view of sign structure describing segments:

The segment is the central element in the view of the structure of signs. Thus, the representation of segments is the essential task of the notation system. In the system each segment is represented individually and signs (and discourse strings) are represented as strings of segments. One describes the posture of the hand as concerned with where it is, how it is oriented, how its own movable parts are configured and so on. The features

that describe these details are collectively called articulatory features. Combinations of articulatory features needed to specify a given posture of the hand is referred to as an "articulatory bundle".

The articulatory bundle contains four major clusters of features. The first represents the hand configuration, i.e., the state of the fingers and the thumb. The second cluster represents the point of contact, which specifies the primary location with respect to which the hand is located, the part of the hand that points to on contacts that location. The third cluster represents 'facing' which is composed of sets of features specifying a second location, and features indicating the part of the hand which faces that location. The fourth cluster of features in the articulatory bundle orientation, contains features specifying a plane toward which a part of the hand faces. Orientation features distinguish THING (a sequence of movements made with the palm up) from CHILDREN (like THING but with palm down). The four clusters, all taken together, describe the posture of the hand at particular points in the production of the sign. They do not describe the activity of the hand.

The features that specify the activity of the hand during production of the segment are grouped into a separate segmental feature bundle. They describe whether

or not the hand is moving, and if so, in what manner? The elemental work of this class of features is to distinguish movements from holds. Movements are defined as periods of time during which some aspect of the articulation is in transition. Holds are defined as periods of time during which all aspect of the articulation bundle are in steady state while the descriptive work of the segmental features is to detail the movement of the articulators they function within signed strings to divide the flow of gestures into segments. By definition, then, the features that distinguish movements from holds also define the segmental structure of larger units such as signs, which we represent as strings of juxtaposed segments. This is not unlike the manner in which the major class features of generative phonology function. In spoken language phonology, major class features specify phonetic details of segments such as spontaneous voicing, interruption of the airstream and syllabicity. These same feature values distinguish consonants from vowels and therefore also function to specify the manner in which the flow of speech is divided.

The remaining features in the segmental bundle specify the finer detail of segments such as contour of movement, simultaneous local movement of the fingers, and precise timing information such as length.

The articulatory features combine to describe postural states. By definition, movement segments are those during which there is a change in state in same complex of articulatory features and hold segments are those during which no such change occurs. Because they involve a steady state, a single matrix of features will be sufficient to describe holds. The matrix will contain both the segmental bundle of features including the specification of fine detail of the segment and the articulatory bundle of features describing the postural state present during the production of the hold segment.

Movement segments, however, present another problem. During a movement the hand changes from one posture to another. Thus, because the articulatory features represent states, this system requires the specification of an initial and final bundle of articulatory features to indicate the changes during the production of the segment. Movement segment contains one bundle of segmental features containing the specification of the segment type and the fine details of the movement and two bundles of articulatory features, the first of which specifies the postural state at the inception of the movement and the second of which specifies the postural state of the hand at the conclusion of the movement. Hold segments contain one articulatory bundle; movement segments contain two - articulatory bundles.

Both hold and movement segments may be represented by matrices of features, but following the discussion above the matrices will be different. The hold segment would correspond to be a straight forward and traditional feature matrix and movement segment will have one set of segmental specifications and two sets of articulatory specifications as shown below:

Table 2.4

Segmental features	Segmental features	
Articulatory features	Initial Articulatory Feature	Final Articulatory Feature
A hold matrix	A movement matrix	

An apparent alternative solution to the use of two kinds of matrices might be to use only hold matrices, let them define segmental structure, and have movement take place as a result of transitions from one state to the next. A more detailed description of signs will reveal why independent movement features are necessary. This is because the fine details of movement productions are features of the movement itself, not of either of the individual articulatory bundles. For example, when the hand moves on a path from one location to another that path may take any of three contours. It may move in a straight line, or an arc, or on an indirect path with a

sharp change of direction in the middle. These differences in path are contrastive and therefore must be recorded. They are not a feature of the initial articulatory posture nor of the final articulatory posture nor of both at once. They are a feature of the period of time during which the hand is changing from the initial posture to the final posture. Thus, they are details of the movement itself and must be specified independently of the articulatory information.

Non-manual behaviors

The segmental structure of signs also bears on the representation of the non-manual behaviors that have linguistic function in ASL. At times, non-manual behaviors clearly have functions that are independent of the segment. Examples of such non-manual behaviors are those that have syntactic function and those that have clear morphological status. Others appear to be tied to specific segments within specific signs (Liddell, 1984 a). In both cases, although possibly independent in function, the behaviors are timed to the production of segments, and need to be specified in the transcription system.

Describing sequences of segments

In the view of sign structure presented individual signs and larger constructions are all composed of

sequences of segments. Thus, a sign or a piece of discourse may be represented as a sequence of hold and movement matrices, each composed of the appropriate number of segmental and articulatory bundles. The sign GOOD, for example, is composed of three segments; a hold, a movement and a hold. The first hold occurs with the finger pads of a flat hand in contact with the chin. For convenience this complex of articulatory information may be called as 'posture a' . From this hold, the hand moves outward and downward to a final hold, which occurs in space about a foot in front of the sternum with the same flat hand configuration oriented so that the palm of the hand is facing (roughly) upward and the lips of the fingers are pointing outward at about a fortyfive degree angle. This complex of articulatory information may be called as 'posture b' . In the matrix format this sign can be represented as

Table 2.5

Hold	Movement		Hold
Posture a	Posture a	Posture b	Posture b

In the representation of GOOD the initial articulatory specification of the movement segment is the same as the articulatory specification of the first hold segment. Similarly, the final articulatory specification

of the movement segment is the same as the articulatory specification of the second hold segment. An initial posture of any segment in a string is identical to the final posture of the preceding segment. This is true by definition because a given line of transcription represents a sequence of behaviors of a single articulator, which can only start a gesture from the posture in which it terminated the preceding gesture. From this perspective it is necessary to record every articulatory bundle of information because (within signs) two articulatory bundles that share a common segmental boundary must be identical.

This observation stands as additional evidence for the independence of the articulatory features from the segmental features. It also recommends the use of an autosegmental representation **which** permits the attachment of single clusters of features of one sort to single clusters of features of another sort (Goldsmith, 1976; McCarthy 1979) as in Figure below:

Table 2.6

Movement

Hold	**Hold**
Posture	Posture
a	**b**

Autosegmental representations of the sort represented above in addition to enhancing clerical economy provide

additional support for the earlier suggestion that the articulatory bundle of features is autonomous in function from the segmental bundle of features. It is also likely that certain of the clusters of features within the articulatory bundle itself enjoy a similar kind off autonomy, particularly at the lower levels of the phonology where the independent postural and movement components must be finely timed to one another. Similarly, there may be more autonomous tiers of features clusters at the level of the phonology that controls the production of fast speech, in which muscular activities and postures are reinterpreted and produced as perceptually and productively similar (though linguistically different) muscular behaviors. Autosegmental analysis of these phenomena may prove to be worthwhile.

Table 2.7

COLOR		SIT		OUR		
/H/		/M/	/G/	/H/	/M/	/H/
/a/		/a/	/b/	/b/		/b/

WHEN		
/M/	/M/	/H/
/a/	/a/	/b/

Signs illustrating common segment combinations.

Describing signs requiring two hands:

Many signs make use of both hands as articulators. From a phonetic perspective, each hand is independent of the other. Moreover the hands may carry different phonetic information at a given moment. For example, one may be moving while the other is not. One may be in one location or orientation or hand configuration while the other hand is specified differently for one or more of these details. As one might expect, there appear to be fairly strong conditions on the nature and extent of the simultaneous articulation of two segments (Battison 1974, 1978), so the two hands are not completely independent phonologically while a notion system may ultimately be able to eliminate certain aspects of the information that is predictable from such constraints on simultaneous articulations, it is useful at early stages of analysis to be able to represent each hand in its full phonetic configuration.

From the perspective of the segmental notion system described above, there is no difference between the productions of one hand and those of the other. Given this and their phonetic independence, each hand must be represented as a separate string of segmental "notions, and the segments of one hand must be attached (for timing purposes) to the co-occurrent segments of the other hand.

The first difficulty encountered in the representation of the behaviors of both hands is that right and left are not absolute in signing. First, left-handed and right-handed signers sign mirror images of the same sign sequence with no changes in meaning. A notion system should describe both the left-handed, left-dominant and the right-handed, right-dominant versions identically. Secondly, certain constructions treat spatial locations on the right and the left as absolute. A notation system must be able to distinguish right from left under these conditions. Third, certain constructions allow a signer to meaningfully alternate between right-dominant and left-dominant signing. The notation system must be able to describe this sort of alternation.

Padden and Perlmutter (1984) introduce the terms 'strong' and 'weak' to describe the active hand, and the hand it acts upon. Adopting those terms for this notation system will permit signs to be specified in a single way although signed in mirror image by right- and left-handed signers. Vertically stacked strings of segments are used to indicate two-handed signs. The top line represents the strong hand and the bottom line represents the weak hand. In such cases, the strong hand is understood to be the dominant hand of the signer. Particular transcriptions of running sign will need to be marked for the dominance of the signer. When a signer shifts from expected dominance

signing to opposite-dominance signing the strong lable will be shifted to the bottom line and the weak to the top line. In those instances when each hand is actually operating independently, the top line will be right for right dominant signers or left for left handed signers.

It appears that the strong hand segments function as the central organizing elements for the timing of strings of co-occurrent segments. Therefore, the segments of the weak hand must be attached to those of the strong hand. Several combinations of strong and weak hands within signs and conventions for attaching them are represented below:

Table 2.7

Strong hand

/H/ /H/ /H/

1 1

/a/ /a/

Weak hand

/H/ /M/ /H/

1 1

/a/ /b/

LARGE, a two handed sign in which the two hands move independently, symmetrically and simultaneously.

Strong hand

/M/ /M/

/a/ /b/ /a/

/-/ /-/ /-/

MAY BE, a two handed sign in which the strong and weak hands perform independent movements but in temporal alternation.

Weak hand

/M/ /M/

/b/ /a/ /b/

/-/ /-/ /-/

Description of segmental bundles

Segmental feature bundles specify the detail of movements and holds. Each such cluster defines one segment in the string of gestures in the transcription of a running signed production. Ultimately, the segmental bundle will contain numerous binary features. At present it contain fine slots for the entry of taxonomic symbols representing clusters of features. The fine types of entries within the segmental bundle are laid out in Figure below:

Table 2.8

major class	**1**	**1**
contour	**1**	1
plane	1	1
quality	1	1
local movement	1	1

Organization of segmental features.

Major classes of segments

There are two major classes of segments in ASL; holds and movements. As described above, a movement (M) segment

is characterized by a change in one or more of its articulatory features and hold (H) segments are not. It should be noticed that all movement segments involve movement from one location to another. The change in articulatory specification may occur in the hand configuration (UNDERSTAND, the orientation (START), or other clusters of the specification. Such non-path movements do not appear to have a phonological status different from that of path movements (those in which there is a change in the point of contact specification) and so need not be distinguished by a special feature.

Contours of movement

Those movement segments that move on a path between two locations may do so on one of several contours. Straight (Str) movements traverse a direct, straight path between two points (GOOD). There are two types of indirect contour paths round (rnd) and seven (7) . The seven contour describes an indirect path that is sharply angled (CHICAGO). The round contour describes an indirect path that is smooth. Arcs (OUR) and circles (FACE) both describe round paths but are distinguished by the fact that are arc begins at one location and ends at another whereas circle begins at a point, travers, round a path, and ends at its beginning point.

Contour planes

When a path movement is not straight, it is necessary to specify an additional piece of information, which functions to orient path. The entries indicate the plane upon which the hand travels as it moves between points. Currently five planes have been recorded. The horizontal plane (HP) is the plane parallel to the floor (OUR) . The vertical plane (VP) is that plane parallel to the front of the torso (RAINBOW) . The surface plane (SP) is the plane parallel to the surface at a location on the body or hand (FACE). The middle plane (MP) is a plane that intersects the surface plane along the midsaggital line of the body (BLOOSE, SIGN), or the plane through the long midline of the bones of the arm or the hand (BASKET) . Oblique plane (OP) to represent the plane that is horizontal from side to side but angled up and away from the body.

Quality features

Quality features describe five details of a segment. Among these are the temporal qualities prolonged (long), shortened (short) and accelerating (acc) and the non-temporal qualities tense (tns), reduced path (sm) and enlarged path (lg) . The quality feature contacting (contact) indicates that the hand makes contact with the other hand or body location during the course of the

movement. It describes brushing movements, in which the hand travels between points on two sides of location, making brief contact with that location as it passes. It is also useful in describing the movement in which the hand moves to a location, makes brief contact, and rebounds to a point near that location.

Local movements

The major classes of segments (H) and (M) reflect activity of the hand taken as a whole. It is common for signs simultaneously to exhibit movement at the finger, wrist or elbow joints. Such movements are overlaid on the actual segmental activity, occurring together sometimes with H segments with H segments and sometimes with M segments. Thus, they are secondary, though linguistically significant activities. Each of the local movements is characterized by rapid, uncountable repetition. All may occur in H segments. Atleast wiggling, twisting, nodding and hooking may occur is on segments.

Wiggling (WG) represents repeated, sequentially alternating retraction at the first joint of all fingers extended at the first joint (COLOR) .

Hooking (hk) involves repeated, simultaneous retraction at the second and third joints of all fingers that are extended at the first joint and retracted at the second and third joints ('hooked' hand configurations) (WORM). Flattening (fl) is repeated, simultaneous retraction at the first joint of all fingers that are extended at the second and third joints and retracted at the first joint ('flat' hand configurations (STICKY). It may be that a single feature such as 'contracting' unifies both hooking and flattening.

Twisting (tw) describes repeated alternating rotations of the wrist (WHERE).

Nodding (nod) is a repeated retraction and extension of the wrist (YES). For certain hand configurations under certain discourse conditions it is possible to achieve twisting and nodding with the elbow joint rather than wrist joint. For example, the sign WHERE is typically performed by twisting the wrist but by changing hand configuration the one with a straight, rigid wrist the twisting can be transferred to the elbow. Similarly, YES which normally nods at the wrist may not at the elbow in its emphatic form.

Releasing (rel) involves rapid, repeated opening of fingers that have thumb restraint (SHRIK-RESPONSIBILITY).

Rubbing (rub) is repeated, back and forth rubbing of the thumb and the finger pads (DIRT).

Circling is a repeated uncountable local circling about a central point simultaneously with either a H or M. It requires the specification of a plane.

Description of articulatory bundles

Each articulatory bundle is composed of eight entries, each representing a complex of features. The entries cluster into four possibly autonomous groupings as hand configuration (HC), point of contact (POC), facing (FA) and orientation (OR). Articulatory bundles can be organized as indicated below:

Table 2.9

HC	1	1
Part of hand	1	1.
Proximity	1	1
Spatial relation	1	1
Location	1	1
FA part of hand	1	1
Location	l	1
OR part of hand	1	1
Plane	1	l

Hand configuration

It has been reported that more than 150 HC's in ASL lexical signs exist. Many more occur in the surface forms

of running sign. A system of thirteen mostly binary features.will distinguish all HC's known to exist in sign languages. The taxonomic symbols used as HC entries in the rotations are capable of describing all the HC's of ASL and many more. The translation into features will be in a very straight forward way.

While most HC use only one hand, others use the entire hand and forearm as a unit (ALL-DAY) . Following Stokoe (1960), the symbol/indicates the presence of such forearm involvement in the HC. If / is absent, the HC is assumed to use only the hand itself.

The HC description developed by Liddell and Johnson differs from most other approaches in that it notes finger configuration and thumb configuration separately. The portion of the HC notation concerned with finger configuration contains slots for three symbols. The first is handshape, which indicates the state of extension and retraction of the four fingers. Table below represents those combinations of open and closed fingers known to occur in ASL signing.

Table 2.10

Symbol	Configuration
A	Four fingers closed (pads contact palm)
S	Four fingers closed (tips contact palm)
1	All but index closed
1	All but middle closed
I	All but pinky closed
Y	All but pinky closed; pinky spread
	All but pinky and index closed; unspread
	All but pinky and index closed; pinky and index spread.
H	All but index and middle closed; unspread
V	All but index and middle closed; spread
K	Ring and pinky closed; index open; middle partly open
D	Index open; all others partly open
R	Ring and pinky closed, index and middle crossed.
r	Ring and pinky closed; middle open, index partly open and crossed under middle
W	All but pinky open and unspread
6	All but pinky open and spread
7	All but ring open and spread
8	All but middle open and spread
F	All but index open and unspread
9	All but index open and spread
B	All four fingers open and unspread
4	All four fingers open and spread
T	All fingers closed; thumb under index
N	All fingers closed; thumb under middle
M	All fingers closed; thumb under ring.

Symbols for taxonomic description of major finger combinations.

Each of the four fingers is independently capable of being is one of four basic configurations open (proximal joint (PJ) and distal joint (DJ) extended closed (PJ) and DJ flexed); hooked (PJ flexed DJ extended). The taxonomic symbols presented above function primarily to indicate which fingers are open and which are closed. The slot

labelled (2nd fing) in the schema contains diacritics for the hooking and flattening of those fingers ordinarily-extended in a given handshape. Hooked is indicated by (") ' flat tended is indicated by ( ) . Thus the symbol 1" indicates that the index is extended at the proximal joint and flexed at the distal joints and the symbol B^ indicates that all four fingers are flexed at the proximal joints and extended at th distal joints.

The diacritic for lax (~) indicates an additional modification to the finger configuration. It relaxes (slightly reverses) the prominent muscle action at both the proximal and distal joints. If the joint is extended, lax will flex it slightly, although not enough to be fully flexed. Similarly, if the joint is flexed lax will extend it slightly, although not enough to be perceived as fully extended. Thus, the effect laxing is that the finger remains as specified but not rigidly so. Lax tends to affect all four fingers but has no effect on the configuration of the thumb.

All details of thumb configuration are specified in the final cluster of symbols. The primary value for the thumb is thumb rotation. The proximal joint of the thumb (near the wrist) is capable of rotating about ninety degrees on its axis. When the thumb is relaxed and roughly adjacent to the plane created by the palm of the

hand, it is in its unopposed (u) rotation. When the thumb is unopposed, its frication pad faces across the palm, and is capable of contacting the radial side of the palm. Typically if the thumb is touching the palm, it is unopposed position.

The thumb may also be noted that its friction pad faces the palmar surface. This is its opposed (0) rotation, in which the tip of the thumb may easily contact the tip of any of the fingers. The opposed thumb typically cannot touch the palm of the hand except at the base of the little finger. It often contacts the finger at the tip, pad or nail, and if the fingers are closed may contact the back of the penultimate finger bones.

Both opposed and unopposed thumbs must also be specified for one of four values of secondary extension and flexion indicated in the (2nd thumb) slot. The proximal joint of the thumb is near the wrist and along with the two more distal joints operates to define the same four values of extension and flexion available to the fingers. Because the thumb features are descriptive rather than taxonomic, however, open and closed must be indicated. An open thumb is one in which the proximal and distal joints are both extended. Thus, the symbol Bu will indicate a handshape with all fingers extended and unspread and a thumb that is on the plane created by the

palm and extended at about ninety degrees outward from the radial side of the hand. The symbol Bo will designate the same finger configuration with the thumb extended at a ninety degree angle from the palmar surface. Leaving the PJ extended and flexing the DJ provides the hooked (") thumb configuration. In flat (^) thumb configurations the PJ is flexed and the DJ is extended. In the /^/ configuration the degree of flexion of the middle joint is typically adjusted to bring the thumb pad into contact with either a finger pad (for /o^/ thumbs) or the middle joint of the first finger flexed at the PJ (for /u^/ thumbs) . When the /U^/ thumb is not in contact with a finger it is in pad contact with the radial side of the palm. The closed /-/ configuration flexes both the PJ and the DJ. The symbol Bu- indicates the B fingers with the thumb flexed and in contact with the palm. Ho-indicates a hand configuration in which the index and middle fingers are extended and the thumb is closed + over the ring and little fingers.

In many hand configurations the thumb contacts one or more of the fingers. The specifications for this are the final entry in the hand configuration schema. There are four kinds of contact: tip contact (c) ; thumb pad contact (p), in which the thumb pad contacts either the finger pad or the radial side of finger; finger restrained contact (F) , in which the thumb pad contacts the finger nail; and

thumb restraint \t\ in which the finger paid contacts the thumb nail. These symbols combine to describe every hand configuration known to exist in ASL and is presented below:

Table 2.11

Handshape	Sign
10	LICENSE
lu	LAZY
lo	CORRECT
lu"	21
1"0"	SUNGLASSES
1"0"f	UNDERSTAND
l"u	DON'T-HAVE-TO
l"u"	RUN
l"u^c	WRITE
l^o	BLACK
l^o^p	BIRD
l^u	LATER
l"u^t	QUICKLY
l"u	BIG

Point of contact

The point of contact (POC) cluster contains slots for four symbols. These are: location, analogous in function to place of articulation in that it identifies a place on the passive articulator hand part, the part of the hand that is located there proximity, how rear the hand' part is to the location; and the spatial relationship between the hand part and the location.

Three different kinds of location specification may be entered in the location slot. Some signs are made with reference to a location on the body, some are made in the signing space surrounding the front of the head the torso and some are made at a specific place on the weak hand.

Body locations are those places where lexically distinctive sign may be made on the head, neck, torso upper legs or arms (exclusive of the hands). Some authors have found that the accurate description of ASL requires many more phonetically distinctive body locations than proposed in earlier treatments of sign notation. The entries describing body location are composed according to the following schema.

Table 2.12

% (i) location (t or b)

BH	Back of Head	CN	Chin
TH	Top of Head	NK	Neck
FH	Forehead	SH	Shoulder
SF	Side of Forehead	ST	Sternum
NS	Nose	CH	Chest
CK	Cheek	TR	Trunk
ER	Ear	UA	Upper arm
MO	Mouth	FA	Forearm
LP	Lip	AB	Abdomen
JW	Jaw	LG	Leg

The eighteen major body locations.

Diacritic symbols may be added to each of the major body location descriptions in order to specify other locations near them. The diacritic (%) indicates that the location specified is on the side of the body contralateral to the signing hand.

Most of the major locations specified above are surrounded by a set of corresponding locations that may be described by adding two diachitics to the basic location symbol. The first is ipsilateral (i), indicating that the hand is at a location slightly toward the outside of the body from the major location. The second indicates a location in the top (t) portion or bottom (b) portion of the major location.

Sign may be produced at locations in the signing space surrounding the front of the body and Head. Such spatial locations are described by a combination of a diacritic indicating a distance forward from the body on a perpendicular line, a symbol indicating the extent of ipsilateral offset from the midline and the symbol for a major central body location: Proximity - Ipsilateral offset - central location. Currently four degrees of forward distance of spatial locations are distinguished. Proximal /p/, indicating a location within a few inches of the body location, medial /m/, a position roughly an elbow's length from the body location; distal /d/, a

comfortable arm's length from the body; and extended /e/, a full arms length from the body location.

The side-to-side dimension appears to require two degrees of ipsilateral offset. The first of these is roughly in line with the breast and the second is roughly in line with the outside edge of the shoulder. In order to avoid confusion with the set of finer distinctions among ipsilateral offset for the body locations, ipsilateral offset for spatial signs are referred with the numbers /o/ (no offset), /l/ and /2/ respectively.

The last symbol indicates the height of the spatial location. It is chosen from among the major body location symbols that refer to points along the midline of the body (TH, FH, NS, MO, CN, N, ST, CH, TR, AB) . Thus, each spatial location is represented by Q complex of three symbols. For example, the symbol m-OTR describer a location about an elbow's length directly in front of the solarplexis. The symbol m-l-TR indicates a location at the same height and distance forward, but on the breast line. Similarly, the symbol d-2-FH describes a location about an arm's length forward and a shoulder's width to the ipsilateral side of the center of the forehead.

For many signs, the location of the strong hand is a point on the weak hand (FIRED) . The schema describing

weak hand locations is composed of two symbols; one indicating a major part of the hand (hand, fingers, forearm, thumb etc), and the other indicating a zone in that major hand part (inside, back, radial, edge, etc).

The hand part slot of the POC complex will contain a hand part specification constructed in the same way as those described above. An inventory of strong hand parts known to occur in ASL are presented in Appendix-E. Combining hand part and location in POC, it can be found that the first segment of the sign GOOD, for example, contacts the LP location with the finger pads of the strong hand. The POC of this segment will contain PDFI in the hand part slot and LP in the location slot. In the final segment of the sign STOP, the hand part is UL and the location is PA.

The proximity slot of the POC cluster specifies whether the hand part is in contact /c/ with the location or, if not in contact, than its distance from the location. It appears that three distance specifications (proximal /p/, medial /m/ and distal /d/ are sufficient.

The spatial relationship slot of the POC cluster describes the direction at which the hand part is offset from the location. In brushing signs the hand moves between points on two sides of a location, making brief

contact as it passes the location. For example in the sign FALSE, the hand part is RAFI of a 10- (index extended) hand configuration. The location is NS, the tip of the nose. The hand begins at a point proximal and to the ipsilateral side of the nose and moves to point proximal and to the contralateral side of the nose, briefly contacting as it passes.

Two sets of spatial relationship symbols are used one set refers to locations on the body or in space and the other set refers to locations on the weak hand. Those for body and spatial locations are the absolute directions over, under, behind (toward body from spatial location) ahead, contra, ipsi. Because the weak hand can move, the spatial relations specified with respect to weak hand locations are relative to parts of the hand. The set includes: tip ward (toti), baseward (toba), toward ulnar side (toul), toward radial side (tova), palm ward, (topa), and backward (tobk).

Hand orientation

The POC entries in the notation simple place a part of the hand at a location. At any location it is possible for the hand to assume countless orientations. The orientation of the hand is important in ASL signs, for both lexical contrast and morphological functioning. It

appears that signs make use of two dimensions functioning together to orient the hand. The first of these is facing which point a past of the hand at location. The second is orientation proper which usually indicates which part of the hand is pointing toward the ground. The facing cluster is composed of two entries: one for a hand part (other than that used in facing) and one for a plane (usually HP). The sign START exemplifies the interaction of facing and orientation. In citation form it is produced as a hold with the hand located near and in front of the shoulder with a Vo hand configuration. If the third person object is associated with the vector R , the tips of the fingers point directly forward 1 toward R and the base of the hand points toward the ground. 1 If the object is associated with the vector L , the hand 2 remains in front of the shoulder, and the base continues to point to the ground, but the tips point to the object agreement location, in this case mL_2 SH.

Morpheme structure constraints

Phonetic details of the segmental strings become predictable with the recording of a corpus of connected signs. For example, some details phonetic representations as consistent patterns in the lexicon. These may be stated as morpheme structure constraints (MSC) on the

combinations of features and segments permissible in novel lexical forms.

Battison (1974, 1978) identifies several MSC's in ASL based on the notations present in Stokoe et al. (1965). As a result, they are stated largely in terms of a simultaneous model of sign structure. Nonetheless, he identifies both simultaneous and sequential conditions on the structure of ASL signs. For example, he observes that the hand configuration R may contact locations in only relatively limited number of ways. This observation can be restated explicitly on a segmental MSC. If the hand configuration of a segment is specified on RO , then the hand-part specifications in POC will be one of the following TIFI (DONOT), PDFI (RESTRAURANT), BAFI (CIGAR) BA (ROCKET). Segmental MSC's such as this will constrain the inventory of segments that may be utilized in forming novel morphemes.

Similarly, Battison noted that in signs in which the hand configuration changes, only a limited number of sequences occur. One such sequential MSC states that if two segments of a sign contain different hand configuration specifications and the final hand configuration specifications and the final hand the final hand configuration will be 1" o-f (UNDERSTAND). Similar sequential constraints appear to pertain to the following

final/initial pairs of hand configuration. Ho /ho"-f (BEAT), Vo /Vo"-f (TWELVE). Such constraints describe the preferential structure of lexical items but do not operate as phonological processes across word boundaries. For example, in the clause EXTREMELY-FOND-OF- == NAME 'I am extremely fond of that name', the Ho hand configuration of the final sign NAME does not predict a H" of hand configuration for the preceding sign EXTREMELY-FOND-OF retains its so hand configuration, resulting in the sequence So-Ho-. The sequence H"o-f would be ungrammatical for this clause. Many other constraints such as these appear to exist in the lexicon, and will ultimately describe the extensive harmonic sequencing observable in ASL signs.

Battison also identifies another more unusual sort of MSC, which specifies co-occurrance relationship: between the two hands (1974). Spoken languages have little need for specifying the possibilities of co-occurance among the independent articulators, although constraints on the feature (round) and constraints describing co-articulated unplosives are probably similar in function. In ASL it is possible to have fully specified strong and weak hands performing identical activities (LARGE) or mirror image activities (MAY BE) , or completely different activities (FIRED). Moreover, there are minimal contrasts among one-handed and two-handed signs (LIKE, INTERESTING), so the

weak hand is not completely predictable, and must be specified.

Phonological Processes

The phonological strings contain still another sort of predictable detail, traceable to phonological processes, producing alternations among surface forms. These processes are typically described by a complex of phonological rules, each of which may alter some detail of the representation of a form or add non-lexical phonological information to a string. The combined action of these processes ultimately derives the surface representation of the string.

Movement epenthesis

Phonological processes properly influence the phonetic shape of phonological strings. Many of the phonological processes known to occur in spoken languages appear also in ASL. The most easily described is a process which inserts a movement between a concatenated segments, the second of which begins with an initial articulatory bundle different from the final articulatory bundle of the preceding segment. For the most part, this process applies at the boundary between signs and enjoys the relatively straight forward function of moving the

hand from the articulatory posture that ends one sign to the articulatory posture thatr begins the next.

Hold deletion

Hold deletion is that process, which, with cetain exceptions, eliminates hold segments occuring between movement segments. The surface form of the phrase GOOD =/ =/ IDEA 'good idea' demonstrates the application of the hold rule.

Because the sign GOOD ends with the a segment articulated in a different way from the initial segment of IDEA, the M epenthesis rule will insert a segmental bundle, specified a M, between the two signs. This has the effect of moving the hand from the area immediately in front of the chestto a location in contact with the side of the forehead and simultaneously changing the other articulatory specifications from those describing an open hand oriented with its back to the HP to those of a hand with only the little finger extended and oriented with the tip of the little finger upward.

Whereas the isolated signs GOOD and IDEA end and begin with substantial holds, when juxtaposed in this phrase the final H of GOOD and the initial H of IDEA are deleted. The critical enviornment for the application of

this rule seems be the M segments that surround each H segment.

Metathesis

A number of signs exchange an initial sequence of segments with a sequence of final segments in certain contexts that appear to be purely phonological. The sign DEAF is typically of such metathesizing signs.

In this form of the sign the index finger first moves to contact the cheek and then moves to contact the jaw. This form of the sign typicaally occurs immediately following signs produced in the higher facial areas. Thus, it would be likely to occur in the clause FATHER = = DEAF 'Father is deaf, since FATHER is produced with contact at iFH.

These observations carry two important implications for the general theory of the structure of signs proposed. The first is that there is some justification for treating signs with this segmental structure as having two lexical parts. Specifically it is proposed that the underlying form of such signs contains two unconnected MH sequences, which are subject to metathesis and which (whether or not metathesis has applied / are connected by Epenthesis rule).

Signs such as variations of WE has a unitary lexical form HMH, which may not be permuted by metathesis and in which the segmental information in the M must specified as an arc.

The second important implication of these observations suggests that a complete feature analysis of locations will provide insights into the nature of phonological processes. First it is probable that some feature or set of features unites the sets of locations between which metathesis may occur and distinguishes those which are saliently distant enough to prohibit metathesis. Moreover, the conditioning of the metathesis rule by prior signs in 11 depend on a feature analysis that rtecognizes that certain locations are more to the left or right or below or above certain other locations. Only features that carry this sort of information may condition the appropriate application of the Metathesis Rule. Such featural information will account for the fact that signs made on the stomach. The chest or the chin may all provide the condition that selects initial occurrence of the lower most sequence of DEAF.

Gemination

Although such occurrence are rather rate in ASL, it sometimes happens that the terminal segment of one sign is

identical to the initial segment of the following sign.

Assimilation

There are numerous instances of assimilation in ASL. For example, the hand configuration the sign ME typically assimilates to that of a contiguous predicate in the same clause.

Assimilation of the hand configuration of the weak hand to that of the strong hand in two handed signs is quite common. For most signers, it appears to be variable, probably controlled by formality and fast-signing constraints. Thus, it is common that is signs in which the strong and weak hand configurations are different in formal signing, the weak hand configuration will be fully assimilated to the strong hand configuration in casual or fast signing.

Numerous other examples of assimilation in ASL have been observed by many authors. Among these are the assimilation of orientation and facing features of the weak hand to those of the strong hand; assimilation of features specifying location in POC of an initial segment of one sign to the location features of the final segment of the preceding sign; assimilation of location features of the final segment of a sign to the location of the

initial segment of a following sign; two handed signs becoming one-handed as a result of assimilation to a one-handed sign in the same string; one handed signs assimilating to two-handed signs. These processes await more detailed description.

Reduction

Frishberg (1975) notes a number of historical trends in ASL which she identifies as 'displacement'. Each of these involves the diachronic relocation of certain signs to areas either less central to the face (and thereby less likely to obscure important facial signals) or to areas more central to the lower head and upper body regions of the signing space (and thereby more readily perceptible).

Although such forms appear to be lexicalized at their new locations, the phonological processes that originally must have moved them are still active in contemporary ASL. The rules which account for them appear to be variably selected by casual signing, and like vowel reduction rules in spoken languages, have the effect of neutralizing contrasts of location. Thus, many signs which are produced with contact at the SFH location in formal signing may be produced incasual signing at the CK location. Similarly, signs produced at the CK location

(including those moved from the SFH location) may be produced at the JW location.

These same signs also appear at times without contact in the area immediately in front of the INK location. The first segment of the sign KNOW-THAT is produced formally at the SFH location but may occur in casual signing at any of the other locations described above.

In a somewhat similar manner, signs produced at a location proximal to, but not in contact with FH or NS in citation form (KNOW-NOTHING, DOUBT) and signs produced with contact at the mouth (GLASS) may be produced at the CH location. Signs that do have underlying contact at the FH or NS are not subject to the effects of this rule (FATHER, BLIND). Similar rules exist to reduce peripheral locations on the torso to more centralized locations.

It appears also that there are rules that reduce the distance between the locations of two-location signs in casual signing. The MMHH sequence of the type isolated by the metathesis rule (CONGRESS, HOME) is commonly reduced, by such a rule, and it appears that many other segment sequences also undergo a similar reduction process (GOOD-GIVE etc) . Similarly, the size of the first (round) movement in MMH sequences such as YEAR , WHEN POLITICS, and QUESTION is often reduced in casual signing.

Perseveration and Anticipation

Typically, signed strings contain both one-handed and two-handed signs. When a one-handed sign follows a two-handed sign, although the weak hand is not required, in casual and fast signing it commonly either perseverates features of the former sign or anticipates features of the following sign, or both rather than returning to a resting position. Although those processes and other very late phonological processes such as reduction have the relatively trivial phonological function of speeding and smoothing the phonetic string; they apply very broadly. Thus, because they apply to most forms produced in comfortable signing, these processes commonly have a substantial impact on the underlying form of lexicalized compounds and other lexical entries that result from the lexicalization of productively produced forms.

Three dimensional morphology

At all levels, there are grammatical devices in ASL that are analogous in function to those of spoken languages (Klima and Bellugi, 1979; Lane and Grosjean, 1980; Liddell, 1980; Siple, 1978; Wilbur, 1979; Baker and Cokely, 1980; Bellugi and Klima, 1980; Bellugi and Studdert Kennedy, 1980; Bellugi, 1980a; Newport and Supalla, 1980) . American sign language is cleaarly or

fully expressive language, with grammatical structuring like that of spoken languages. But some of the formal devices that ASL has developed make use of possibilities either not available or not so used in the vocal auditory modality of spoken languages.

Like spoken languages, ASL has developed grammatical markers that function as inflectional and derivational morphemes, resulting in regular changes in form across syntactic class of lexical items that produce systematic changes in meaning. The elaborate system of formal inflectional devices, their widespread use to vary the form of signs, and the variety or fine distinctions they systematically convey suggest that ASL like say Russian and Nuvajo, is one of the inflective languages of the world.

Verb signs for instance, undergo obgligatory inflections for indexic reference that identify the arguments of the verb, for reciprocity (for example, 'to each other'), for several distinctions of grammatical number (for example),'to both' 'to more than two'), for distinctions of distributional aspect (for example,'to each' 'to any' 'to certain ones at different times; for distinctions of temporal aspect (for example, 'for a long time', 'over and over again', 'uninterruptedly' , 'regularly'): for distinctions of temporal focus (for

example, 'starting to', 'increasingly'' (resulting in), for distinctions of manner (for example, 'with ease', 'approximately'). Some are inflections for temporal aspect and forms and for distributional aspect, masking modulations of meaning such as recurrence of events overtime, distribution of actiona cross events. There is also a large number of derivational processes, such as those that form deverbal nouns, nominalization of verbs; derivation of preictes from nouns, and derivations for extended or figurative meaning. Each morphological process embeds a sign stem in a distinctive super-imposed dynamic spatial contour of movement, leaving other structural parameters (Handshape, target locus) intact.

In ASL inflectional processes can apply in combinations to root signs, creating different hierarchies of form and meaning. In these combinations the output of one inflectional process serves as the input for another and there are alternative orderings with different hierarchies of semantic structure as well. Such hierarchical organization and recursive application of rules to create complex expressions are also characteristic of spoken language structure. The proliferation of co-occurring components in spatial patterning brought into play at the morphological level and in the language in general is consistent with the view of the tendency of the language toward conflation toward

packaging a great deal of information systematically in coOoccurring layers of structure (Bellugi and Klima, 1980).

In some respects the morphology of ASL resembles that of semiotic languages. It may be instructive to examine some of their similarities and differences a semiotic language such as Hebrew, there are large sets of words related in form and meaning. These can be characterized as combinations of two types of elements: Consonantal roots and morphological patterns, the latter consisting of discontinuous vowel sequences and sometimes including one or more prefixes and\or suffixes. It has been argued that these are appropritely analyzed as multitiered structures (Mc Carthy, 1979) . The root is considered as one tier consisting of consonants, and inflectional and derivational morphemes as nother tier.

In a sign language like ASL, there are also large sets of forms that are retlated in form and meaning. Analysis of these morphological structures in ASL is appropriate in terms of multiple tiers. There is an underlying root, and overlaid concurrently with it are derivational and inflectional tiers. For some set of forms, certain properties of hand configuration and local movement are shared for example, those meaning 'ask me', 'ask you', 'ask each other', ask each of them, 'ask

regularly', 'ask all over', 'eask easily', ('doubt', 'puzzled', 'test', 'question', 'interrogate' 'interogation', 'inquiry', 'inquisition' etc. According to one view, the root of this family of forms is a /G/ handshape and a closing (local) movement of the index finger. Inflectional and derivational processes represent the interaction of this root with other features of movement in space (manners of movement, direction of movement, dynamics, and the like) . For example, the form ASK is a /G/ handshape closing while moving forward, the related verb TEST is a /G? handshape closing while moving downward with hold manner, the related noun TEST is a */G/* handshape closing while moving downward with restrained manner, duplicated. Unlike the examples from Hebrew, the surface forms of ASL inflectional and drivational patterns may retain their tiered structure in the final output, and yet the regularities that relate and morphologically complex forms the formal rules are similar in the two types of languages.

Syntactic spatial mechanism

Languages have different ways of marking grammatical relations among their lexical forms. In English,basic grammatical relations among verbs and their arguments are signaled largely by the order of items; in other languages these relations are signaled by case marking or verb

agreement morphology. All of these rely on linear ordering of words or segments. By contrast, in a visual spatial language like American Sign Language relations among signs are stipulated primarily by manipulation of sign forms in space. A horizontal plane in front of the signer's torso plays an important role in the structure of the language, not simply as an articulatory space for hand and arm movements comparable to the mouth cavity for the tongue, but also as a carrier of linguistic meaning (Padden, 1979, 1981, 1982). This emphasizes an essential difference betrween signed and spoken languages, the spatial domain figures prominently in many aspects of aSL structure.

Nominals introduced into the discourse are associated with specific points in a plane of signing space. Pointing to a specific locus later on the discourse clearly refers back to a specific nominal, even after many intervening signs. Such spatial indexing allows explicit coreference and reduces the possibility of ambiguity. The English sentence "He said he hit him and then he fell down" does not specify which, if any, of the pronoun instances are coreferential. In ASL such distinction are obligatory and are made by indexing different points in space.

The system of verb agreement in ASL, like the pronominal system, is essentially spatialized, verb signs move between abstract loci in signing space. Verbs like ASK, INFORM, GIVE are obligatorily maked for person)and number\via spatial indices. The indices dictate the verbs path (the initial and final points) from one indexic permits relative freedom of word order (in simple sentences, anyway) and yet provides clear specification of grammatical relations by spatial means.

Coreferential nominals must be indexed to the same locus point, as is evident in embedded structures. In complement structures with matrix verbs like FORCE, URGE, PERSUADE, the direct object of the matrix clause must be identical with the subject of the embedded clause. The unique kind of special organizations involved in ASL sentences may be have multiclausal embedding.

It should be noted that in these complex sentences the set of possible spatial points is severely constrained.

The space used by the signer is partitioned in very special ways. The specific horizontal plane in of the signer's torso is the locus for indices of definite reference, that is, when the speaker has a referrent in mind that he introduces into the discourse. Different

spaces can be used for contrasting event, for indicating reference to time prior to the utterence, hypotheticals and counter factuals. It is possible even to embedd smaller subspaces within one subspace, for example, as in embedding a conditional subspace within a past time context.

Clearly the use of space in all the different systems briefly mentioned here (pronominal reference, verb agreement coreferentiality, spatial contexts) is extremely complex and dynamic. In each subsystem there is a mediation between the visual-spatial mode in which the language has developed and the overlaid grammatical constraints in the language . The syntax of ASL relies heavily in manipulation of abstract points in space and of spatial representation. This difference in surface form of syntactic mechanisms may have important consequences for the neurobiological substrate of spoken and signed languages.

Morphological processes

Another sort of predictable detail originates in the morphology, where morphological processes create words. Across languages, words are formed by attaching lexical forms to one another and by moving reproducing deleting from, adding to, and altering the phonological information

carried by lexical forms. Although both morphological processes and phonological processes may add, delete, alter or move phonological details, they differ in that phonological processes do not account for meaning changes whereas morphological processe do.

Below are described a small selection of ASL morphological processes that illustrate the diverse phonological effects which result from their application. These processes are divided broadly into two categories. In the first, meaningful feature bundles (morphemes) are inserted into one or more segments of a root with incomplete articulatory feature bundles. This insertion results in a phonologically fully specified stem. In the second major category, the morphological processes operate on a completely formed stem either by removing some of its phonological features and inserting them in a segmental frame, by modifying them through reduplication, or rarely, by attaching an affix.

Processes that inset features in roots

For many ASL signs it can be posited that lexical forms of roots with empty spaces (or cells) in their underlying feature specifications. A number of ASL morphological processes 'fill out' such incompletely specified roots with morphomes which consist of small bits

of phonological information used to fill the empty cells in the root. FIRST-PLACE, SECOND PLACE, THIRD PLACE are three signs representative of a large class of such signs, built from roots specified for all their features except hand configuration.

These three signs are identical except for their hand configuration. FIRST PLACE is produced with a 10 hand configuration, SECOND PLACE has Vo-hand configuration and THIRD-PLACE has a Vu-hand configuration.

Signs meaning FOURTH-PLACE through NINTH-1 PLACE can be formed by using other hand configurations. In numerous other signs the same had configurations convey equivalent meanings of numerosity.

It can be said that these signs (and others with numeral hand configurations) contain at least two morphemes. The root morpheme, a numeral classifier which means place in a competition and the numeral morpheme.

Roots such as PLACE IN COMPETITION are referred to as "Incomplete S-morphs", since their phonological representation is segmental, but incomplete (Johnson and Liddell 1984). The numeral phoneme is reffered to as a "p-morph" since it only provides paradigmatic contrast (ie,it contains no segmental information). It can be

inserted into a root consisting of one Dr. More segments and its features simply spread according to autosegmental principles. Liddle,, Ramsey, Powel and Corina (1984) have identified more than thirty different incomplete S-morphs which, like PLACE IN COMPETITION, require the insertion of a numeral morpheme.

A second major category of incomplete S-morph contains verb roots with unspecified location information. The completed form of the verb stem of such signs contains location (vector) specifications received through the insertion of subject and\or object agreement morphemes. Two such verbs are ASK and TELL.

The initial location for TELL is the chin. Its final location, however, is determined by the insertion of an object agreement morpheme. In the illustration TELL agrees in location with the third person object already indexed on the signer's left.

In ASL discourse any nominal may be assigned a grammatical association with a spatial location or vector. The process of assigning this association has been called "indexing" and the location or vector associated with the nominal has been called ints "index", while ASL pronouns may take reference to a nominal by pointing at this index, verbs such as TELL and Ask agree with their subject and

object nominals through the insertion agreement morphemes. The agreement morphemes p-morphs, the phonological form of which is specification determined by the location of the index of a nominal. ASK is structured so as the allow both object agtreement and subject agreement morphemes to be inserted.

The subject agreement morphemes for ASK is determined by the person and location of the subject nominal, and is inserted into specific places in the two feature bundles. The object agreement morpheme is determined by the person and location of the object is similarly inserted into both articulatory bundles. Thus, the completed verb stem 3a-ASK-3b is composed of three morphemes. One root and two agreement morphemes.

In the examples of feature insertion discussed so far, the root contains only a small number of empty cells. Many other signs are built from roots that are specified only for segment type, and contain empty cells for all other segment features and all articulatory features. This calss of signs has been referred to as "classifier predicates" by Liddell (1977) and "verbs of motion and location" by Supalla (1978), who first proposed the idea of movement roots in the analysis of these signs. Morphological processes insert a number of morphemes in appropriate cells to derive a polysynthetic predicate

stem. The type of information which can be inserted into such movement roots has gbeen investigated in depth by Supalla (1978). This category of predicate is highly productive in ASL and is responsible for a significant number of the signs observed in ASL discourse.

There are certain processes which will operate fully on specified stems. Such stems can either come directly from the lexicon as completely specified s-morphs, or become fully specified through processes like those described above.

Frames

Many ASL inflections have an unusual characteristic. Regardless of the syllable structure of the uninflected form (the input to the process), the syllable structure of the inflected form (the output) is completely uniform. For example, Liddell (1984b) cescribes the verb inflection for unrealized inceptive aspect. The input to the inflection could be a verb with a single segment,two segments, or even three segments. In inflected verbs, however, uniformly have the shape MH.

In this analysis the inflected verb is not strictly a modification of the verb stem, but rather results from feeding a small piece of articulatory information from the

verb stem into a segmental structure referred to as an "inflectional frame".

For verb stems in the same verb class as TELL, the initial feature bundle of the stem is identical to the final fesature bundle of the unrealized inceptive form of the verb. Fuerther, all of their unrealized inceptive forms have the form MH, and all have the same location feaatures in the initial feature bundle. The inflectional frame is the phonological structure provided by the inflection itself. This frame is not prefixed or suffixed onto the stem, but rather, serves as the phonological frame work used to construct the inflected sign.

The frame has a partially specified initial feature bundle, but no final bundle of features. For verbs like TELL, which begin in contact with the body, the initial bundle of articulatory features is removed from the stem and inserlect into final position in the frame. The remainder of the phonological information from the verb stem does not appear in the inflected form. The resulting sign begins at the location specified by the inflectional frame and move to what was the original location specified in the stem.

Reduplication

Reduplication is common in ASL. Habitual aspect and iterative aspect are each marked in ASL by a different type of reduplication. LOOK is an example for reduplication with its habitual and iterative forms.

After the subject and object morphemes are inserted, the phonological structure of the stem is incomplete. Habitual aspect is then marked for the verb ASK through the application of a reduplication rule.

The rule produces four copies of the verb stem and shortens each of the movements (srt). The actual number of repetitions can vary. The application of this rule creates the environment for the M-epenthesis rule described under phonological processes.

The circle M's are inserted between the final H of one repetition and the initial H of the vent by M-epenthesis rule. Because none of those H's are attached to articulatory bundles specified for body contact, the H-deletion rule applies. It deletes every H except for the first and the last. The epenthetic M's and the feature bundles produces for ASL, a relatively long word consisting of nine segments.

A different and slightly more complicated reduplication rule could have been applied, producing the iterative aspect.

This rule if applied to ASK, the M-epenthesis rule will not apply because the reduplication rule itself has already inserted a particular type of M (with the feature 'arc) between each repetition of the stem. The rule has also marked some of the H's with the feature (long) which prohibits the application of the H-deletion rule. The H-deletion rule may apply to unlengthened H"s, however.

The application of the iterative rule also produces a rather long ASL sign, though its structure is significantly different from that produced by the Habitual Aspect Rule.

It can be summarized here about the morphological and phonological processes which interacted to form these two forms of ASK. Each began a phonologically incomplete stem. The stem was made complete through a morphological rule which inserts agreement morphemes into the stem. The completed stem then underwent one of the reduplication rules, which produced an aspectual inflection. The application of either of the reduplicative rules creates the environment for the reduplicative rules creates the environment for the application of one or more

phonological rules. The phonological rules then apply to produce the correct surface form.

It has been common practice in the past to refer to signs which have undergone a reduplication process as being marked by the phonological feature (+redupl). Fischeer and Gough, 1978; Supalla and Newport, 1978; Klima and Bellugi, 19791; Padden and Perlmattar, 1984). It should be clear from the two reduplication rules that is been examined here, that such an approach is not adequate. The two reduplicated forms do not differ from their stems by the single phonological features (+/ reduplication). They have undergone a reduplicative process which copies phonological segments,adds phonological features and triggers the application of phonological rules.

Affixation

Across spoken languages, one of the most common phonological means for marking the application of a morphological process is the affixation of one or more segments to a stem. This also occur in ASL, but it is uncommon. The one clear case is the nominalizing suffix having the structure MH. When suffixed to the verb TEACH, it produces a word meaning "teacher", and when suffixed to the noun LAW, it produces "Lawyer". This is the only ASL morpheme known of which clearly has the status of an

affix. Most ASL morphological activity involves filling in cells is in phonologically incomplete setments, or operations on phonologically complete stemps, which either modify them through the use of frames, or through some type of reduplicative process.

The acquisition of sign language by deaf children:

The study of language acquisition in deaf children brings into focus some fundamental questions about the human linguistic capacity.

Bellugi and Klima in their research, have specified the ways in which the formal properties of languages are shaped by their modalities of expression, sifting properties peculiar to a particular language mode from more general properties common to all languages, and then reflective of biological determinants of linguistic form. In their research publications they have described similarities in principles of organization between spoken and sign languages. However, their studies also show that at all structural levels, the surface forms of a sign language are deeply influenced by the modality in which it develops -in the co-occurring layers of lexical, derivational and inflectional structure, and in the pervasive use of spatially organized syntax. Ijn sign language, one can clearly observe the child's acquisition

of the spatial mechanisms of the language and the separate structural systems they embody and these observations can give a unique viewpoint on the acquisition process across modalities.

The system of person Deixis in ASL gives rise to a particularly striking issue in the connection betrween transparency and grammatical system in the acquisition of language. Deivis in spoken languagers is considered a verbal surrogate for pointing: in ASL, instead, it is pointing. The grammatical category of person is defined withrespect to participant rules in discourse. First person is used by a speaker to refer to himself or herself; in ASL, the signer points to his or her own torso; second person refers to the addressee, and in ASL, it is realized by pointing toward the torso of the person being addresssed. These pronominal signs in ASL are, in fact the same as the pointing gestures that hearing people sometimes use to supplement their words nonverbally. What is paralinguistic with respect to a spoken language, then, is a lexical item within the context of this fully developed gestural language. It is in fact part of the indexical system involved with verb agreement. If these so-called pronouns are really just pointing this should make the use, understanding and acquisition of these forms very straight forward and cause them to appear early and error free in young deaf children of deaf parents. The

problems that young hearing children have with the acquisition of such terms as I and you in spoken languages like English are well known and have been documented. Such deictic terms all involve shifting reference, which is very different from names or nouns. Having agreed to call persons by name, every one uses the same name. But with terms like I and you, the terrm does not apply to the person, but rather with a person's turn as speaker or as addressee. These "shifters", as Jakobson (1979) called them, present problems for young children learning spoken languages. Clark (1977) suggests that a child begins by using first, often in alternation with the child's own name; problems may arise when children begin to use the contrasting form, you. Clark posits that some children form the hypothesis that I used by an adult speaker is an alternative to themselves. Clark cit4s examples of such observations from a number of different studies and in a variety of languages. Several other studies recently have focused on this issue (Charney, 1980; Chaiat, 1981; 1982; Deutsch and Pechmann, 1978). The child's "incorrect hypothesis" is generally corrected within a few months. By the age of 2; 6 to 3;0 most hearing children have mastered such shifting pronominal terms.

In ASL, the pronoun signs are exactly the same as pointing gestures; if I sign "you" and you sign "ME". We are both (pointing/indicating the same person. With such

obvious gestures, directness of reference would seem inescapable. It is been revealed by the easily videotapes analysis (Bellugi and Klima that mothers tended to use names rather than pronoun signs with their children, and that the children did the same, and when parents told that the children's misunderstanding of pronominal reference had motivated their switch to using name signs. Authors were surprised to observe thse children's unequivocal pronoun errors produced spontaneously. Researchers could not imagine that deaf children would make mistakes in person reference by pointing.

Petito (1983a, 1983b) study on the acquisition of pronominal reference in deaf signing children concluded that for the signing child, this is not an error - free area at all.

Petito has developed a series of tests for comprehension production of pronouns for self and addressee. It is evident from the data that errors are evident in comprehension and are prevalent (as well as uncorrectable) in production. Petito found in one deaf child the distinct periods making the transition from gesture to sign.

Deaf children learning ASL and not late in this type of development. Their errors and their resolutions occur

exactly on target with those observed in children learning spoken languages, neither early nor late. Thus, the directness of the relation in form between a pointing gesture and a pronominal, sign does not prevent the child from taking certain garden paths on the way to the acquisition of spoken languages.

Occurrence of reversed forms in ASL learns suggest very strongly that the same strategies are being employed by deaf by hearing children.

The spatial marking for verb agreement

Many spoken languages have verb agreement systems whereby the form of the verb reflects certain grammatical categories of its arguments. There is a system of verb agreement in ASL too. Like the pronominal reference system in ASL, it is essentially spatialized; both utilize referential points in spacxe as one of their morphological components. Vergbs thus are not frozen, immutable forms, but undergo regular inflectional variation to mark person and number of their arguments. In function this system operates like verb agreement in spoken languages. However, in its form marking connections between spatial points verb agreement in ASL bears the in print of the mode in which the language evoled.

The members of a large class of ASL verbs obligatorily "agree with' (or index) the locations of either one or two noun arguments. Such locations can be points in the signing space corresponding either to the location of the referent of an argument of a verb, or to an abstract location in space which the signer has established for the argument. Verb agreement in ASL has been described as pantomime in some earlier writings and it is clear why it was so considered.

Recently Meier (1981, 1982) has examined the role of iconicity in the acquisition of verb agreement. If the iconic properties of ASL signs are accesible to first language learners two and three years old; iconicity of agreeing verbs should be highly accessible . Meier developed three models that make specific predictions about. What agreing forms the children acquire early and what error types they produce. Two of the models make predictions based on iconicity: the third model makes predictions based on morphological complexity. Meier's analysis of the acquisition of vebr agreement in three deaf children of deaf parents ranging in age from 1:6 to 3:9 reveals that verb argument is acquired by children within a narrow age range.

Children's acquisition of first inflection could be described in two periods, the meanings of his or her

signs; and the influence of such iconicity could very easily appear in the child's early signing.

Within the verb system in ASL there are several classes of verbs that behave differently with respect to agreement. Not all verbs mark agreement, of those that do, not all are marked in the same way. Verbs also differ with respect to which argument is marked. However, the general mechanism for agreement on verbs is the same for all those that are indexable.

1. Signing children around age two do not make use of the inflectional apparatus of ASL - including verb agreement -during the two and three sign stage. The same phenomenon has been observed by Fischer (1973); Hoffmeister (1978) and Newport and Ashbrook (1977). Even when young children imitate prodigiously, their imitations tend not to preserve featural markings of the morphologically complex forms of parental utterances. For conveying something as direct as "you give me", two year old children, instead of using the required agreeing form sign the verb GIVE in its uninflected form which resembles the mimed act of its opposite - "I give you", and they sometimes add the separate pronoun sign (ME) . Children use uninflected forms in contexts in which the agreeing form is required with a variety of verbs (eg. PUT, TELL, LOOK,

GIVE, LEAVE, TAKE) . The signing child first uses the uninflected form, even in contexts in which agreement clearly is required. The child does not enter the agreement system by exploiting the mimetic potential available within a visual-gestural language; he or she also fails to provide the grammatical markers required in the adult language.

2. Between the ages of two and three, the deaf children under study began to produce various inflected forms of the verb (dual and aspectual inflection) , but, first and most consistently, the forms showed verb agreement in contents in which the referent is present. By around three, in series of deaf children, verb agreement is mastered in required contexts and used consistently. The forms that children use and the errors they make enroute to mastering the system support a morphological model of acquisition rather than either an iconic model based on mimed actions or one based on an analogy with spatial displacement, for example, Meier (1981, 1982) finds that it is the morphologically more complex double agreement form (even those are more transparent mimetically) that are slowers to be mastered.

Kliama and Bellugi (1982) have observed a variety of over generalizations as the children begin producing

inflected forms in earnest. Children provide agreeing forms for verbs that are indenable in the adult language, such as SPELL, SAY and LIKE among others. These forms are not mimetic or spatial analogic. The child inflects the verb SPELL for object (SPELL (x:2 to 13), meaning spell to me), although speell is not an agreeing verb. The child intending to sign "I say to you" inflects SAY (x:l to 13), which is not permitted in the adult language. The verb LIKE is overmarked for object LIKE (X:l to 3) - for the meaning "I like that". Furthermore childrn extend verbs like DRINK and EAT to agree with the subject, when in fact these verbs are not indexable in the verb agreement system. Thus, deaf children as they are working out the system for indexing verbs, over generalize the non-indexable verbs in a way that is quite analogous to English speaking children's provision of good and holded for past tense. These sorts of errors can be explained in the most straight forward way by a morphological model.

During this period, there are also errors in which the movement of the verb form is toward the wrong argument. For example, children inflect the verb (x:GIVE toward the object to be given (eg. GIVE to plate HIM) for the intended meaning of GIVE the 'Plate to him', instead of toward the recipient (GIVE s:"to him"). These form are both ungrammatic and counter-iconic; but they are, nonetheless, consistent with a morphological models; it is

one of the grammatical arguments of the verb that is being marked but simply the wrong argument.

Thus the weight of the evidence is entirely consistent with early morphological analysis on the part of the signing child and fits best with a morphological (not a mimetic or iconic) model of the acquisition process. The child does not make use of the iconic potential provided by the visual spatial mode to enter the grammatical system. Rather he or she begins with uninflected signs and then systematically analyzes the morphologically complex forms, as well as, analyzing which verbs do and do not undergo agreement, what arguments are marked, and whether the markers are optional or obligatory. All of these aspects are worked out by signing children around the age of three; by then the ASL system for marking verb agreement is stablized and mastered. In the acquisition of a grammatical subsystem of ASL in which one could expect a profound influence of iconicity and present authors found that iconicity had no facilitating effect.

The question, however of the mapping between meaning and form in sign language and its role in the acquisition process is by no means fully resolved at this point (Brown, 1980; Launer, 1982; Meier, 1981; 1982; Newport and Supalla, 1980; Schwamm, 1980; and Slobin, 1980) offer a

range of views). Other issues with respect to acquisition and transparency of morphological and syntactic forms remain to be addressed. The present focus is on the acquisition of other inflectional processes across the series of children under study. The next inflectional form to appeaar in children's signing after the marker for verb agreement is dual inflection of verbs. In one of its forms, the dual is marked by a simultaneous doubling of hands - certainly a direct and vivid expression of duality. This morphological marker, doubling of hands - certainly a direct and vivid expression of duality. This morphological marker, doubling of bands occurs in the grammar of ASL in a variety of inflectional forms other than in the dual inflection; reciprocal has the two hands directed toward each other; characteristic aspect is made with two hands inalternating circles distributional aspect has two hands directed to alternating, nonseriated points. The semantic effect of these various forms that involve doubling of the hands ranges from 'to each other' to 'prone to' to 'action distributed across time', there is no simple semantic common demonstrator (Klima and Bellugi, 1979).

As deaf children begin to provide the dual inflection in contexts that require it, they over-generalize in interesting ways. For example, they do not limit the dual marker to verbs but sometimes over-extend it to mark nouns

and other categories as well, using two hands to indicate duqlity. They sign DUCK (N:dual) to indicate two ducks or BED (N:oval) to indicate two beds, and even FUN (N:Dual) to indicate "two people having fun". These child errors are decidedly not options in the adult language, they are simply ungrammatical. One might consider that the child at this stage may be assigning some kind of transparent (admittedly iconic) semantic function (twoness) to a grammatical marker in the language (doubling of the hands) and over using it for a brief period.

Not only does ASL have or rich variety of inflectional marking, it also has a wide array if derivational processes all of which are marked by movement distinctions in the language. There are derivational processes that form deverbal nouns (a form meaning "comparison" from the vergb COMPARE), derivation of predictes from nouns (a form meaning "business" like and a different one meaning "proper" from the sign BUSINESS); nominalizations from verbs (a form meaning "the activity of measuring" from MEASURE); sentence adverbials from basic signs (a form meaning "instead" from DIGREES), characteristic predicates froma djectives (a form meaning "vain" from PRETTY); and derivations for extended or figurative meaning (a form meaning "horny" from HUNERY); and so forth.

Recognition of the derivational processes in ASL dates back only to about 1978 or so when these processes were first described (Klima and Bellugi, 1979; Supalla and Newport, 1978) . Dictionary of American Sign Language (Stokoe, Casterline and Cronerberg, 1965) has signs listed according to their forms, and then specified for their use in the sentences. Thus, there is a single sign from listed as a verb meaning "to set" as well as a noun meaning "chair", another sign form is listed as a verb meaning "to bicycle" as well as a noun meaning "bicycle", and so on for a vast number of signs. The implication was that like that English word "drink" which is used both as a noun and as a verb, the same sign form in ASL is used in both nominal and predicate contexts. This was also the received view for many years of studies. However, starting late in life to become attended to movement distinctions that might differentiate meanings ina visual spatial language and finally a difference in the way a sign was made depending on its use as a noun or verb in a sentence. The first impression was that a noun from sometimes seemed "smaller" than the related verb form. Supalla, a native ASL signer who was then a researcher in Bellugi's laboratory, investigated pairs of noun-verb signs and found systematic differences between them. His and New ports' study formed the basis for a new understanding of the layer of grammatical processes in ASL, the kinds of movement feature distinctions required,

and the kinds of rules that relate surface form and abstract underlying roots (Supalla and Newport, 1978) .

Thus, ASL signs (once thought to be single sign forms used in different contexts, much as words in an isolating language like Chinese are used without morphological markings for grammatical category) turn out to be split apart into whole paradigms of differentiated sign forms. The forms all share the same handshape, the same place of articulation, and the same movement shape (eg. circular, directional, wrist twist, nod, and so forth) but are differentiated from one another by other features of movement; features such as frequency, end manner, rate, tension and displacement and others (Klima and Bellugi, 1979). Verbs and their formationally related nouns are distinguished from one another, in part by a manner differentiation verbs end in hold or continuous manner nouns have restrained manner of articulation. Thus, there is a consistent differentiation in ciration from between what is glossed as SIT-DOWN and CHAIR, RIDE-BICYCLE and BICYCLE; TELL STORY and STORY; TO TYPE and TYPEWRITER and countless others. The noun is differentiated from the verb only in that it has restrained manner.

The prototypical cases of such noun verb distinctions in the language are concrete nouns and associated action verbs. No surprisingly, many verbs in thdse pairs have an

image base of action of the hands on or with an object (eg. TO TYPE and TYPEWRITER) . However, such distinctions in the language are not restricted to concrete nouns and associated action verbs (eg. DERIVE-DERIVATION; MODULATE-MODUI.ATION; SEARCH-EXAMINATION; GET-ACQUISITION; ANALYZE-ANALYSIS); and the image basis for a pair is often obscured.

Still, the directness of representation might influence the course of acquisition. In terms of the morphological markers themselves, it could be argued that the verb markers are motivated and the noun markers are not. There is some relation between aspectual meaning and formal marking for verbs;in general single movement in the verb sign corresponds to single, punctual, or perfective action. Repeated movements in verbs refer to durative or iterative activity, made of repeated punctual actions (Supalla, and Newport, 1978). The noun marker is always repeated, restrained and small; not an obvious formal marker for static objects: Furthermore, the noun marker often diminishes the iconicity of the image base, in that the sign movement no longer resembles the action. It is been noticed that in general grammatical processes in the adult language operate without reference to any iconic properties of the signs themselves (Klima and Bellugi, 1979) . Thus, the verb OPEN-BOOK has an image base of hands opening a book (single movement) , the noun sign

book has a restrained repeated movement that seems quite unrelated to what one would do with a book, thus obscuring its image.

Indian Sign Language

Sign language is an integral part of the deaf communities in India. It is estimated that Indian Sign Language (ISL) is used over 1,00,000 deaf adults and by approximately 500, 000 deaf children less than five percent of whom attend special schools for deaf students. While there are more than twenty official languages in India and over two hundred different dilaects among them, there is only one Indian Sign Language. Over seventy-five (75%) percent of signs from all regions are cognates (having a common root). There are four major regional dialects centered in major urban areas: Delhi(north), Calcutta(east), Bangalore-Madras(south) and Bombay(west). These dialects are not tied to schools for the deaf, since ISL is not used for "academic" instructional purposes. For political reasons the Delhi variety of ISL has the largest sphere of influence . For example, in Jamshedpur, 1000 miles away from Delhi but within 200 miles of Calcutta, Signing resembles the Delhi variety much more than the Calcutta variety.

History

Formal linguistic research on ISL began in 1977. Theoritically, the study of ISL will enhance the understanding of universal and unique characteristics of sign languages. The interaction of deaf individuals who form a minority group, superimposed on the majority culture, could also provide important new perspectives on the nature of language in society. Burlings(1970) views that India often has been studied because of the complex interaction of great linguistic and social variation. The theoritical information further can be used to explore the educational potential of the ISL in determining the most effective mode of class room instruction for Deaf students.

There have been comments from Hearing people from India and United States who have said that Indian Sign Language does not have a grammer and is merely a collection of gestures. There have even been some Americans who came to India to try to impose some from of signing used in United States on Indian Deaf people because these Americans felt that there was no Indian Sign Language. Many of the Indian people felt that Indian Sign Language is not grammatical. People quoting this were American proponents of total communication who had never formally studied Indian Sign Language.

A project was taken up by Gallaudet college research division; All India Federation of the Deaf; Kendall School at Gallaudet college in Washington D.C; and Sign language Research Inc. of Maryland to prepare a dictionary of Indian signs. As a first step in this project, a questionnnaire was sent out by Vasishta to the principals of 117 schools of the deaf in India. The responses suggested that there was agreat interest among educators of the deaf in implementing a study of Indian Sign Language varieties. Encouraged by this initial study and with the help from Galluadet Research division and the All India Federation of the Deaf, Vasishta, Woodward and Kirk Wilson from the Boston university program in psycholinguistics travelled to India in 1977 to collect data for initial research. This research centered on a comparision of Indian and American signs by Vasishta and Woodward and some syntactic description of fee conversation transcribed by Vasishta and analysed by Wilson.

Vasishta, Woodward and Wilson (1978), found that Indian Sign Language is not related to the French Sign languages groups which includes French,Spanish, American sign language among others. While there is some influence British sign language in the fingerspelling system used with ISL and in few of the individual signs, such as

"good"and "bad"in Delhi, the vast majority of Indian Signs are not related to European Sign Languages.

Vasishta, Woodward and Wilson's(1978) study revealed that there is only one Indian Sign Language. The comparision of signs chosen from swdesh word list, modified for sign language research showed a very uniform pattern for cognates. There was no variation in basic signs across cities. In addition to the variation because of non-cognate sign Vasishta, Woodward and Wilson also observed systematic formational variation of signs. Formational variation in this case refers to hand positions used to produce specific signs. This variation does not impede communication.

Vasishta, Woodward and Wilson (1978) summarised that

1) "varieties of Indian signing are not related to European Sign Languages,
2) that varieties of Indian signing constitute one language,
3) that there is systematic variation in and between regions in India,and
4) that the amount of differences in signing should allow communication among cities without any major problems in language standardisation and planning that are faced by the oral language communities(in India)".

Indian Sign Language apparently developed indegeneously in India. Contrary to popular opinion among hearing people,ISL has no relationship to hand gestures used in Classical Indian Dance forms. The use of ISL extends into some parts of Pakistan and Bangladesh, and might extend into other areas as well.

Status of Indian Sign Language

Indian sign language is autonomous from oral languages in India and is used primarily by deaf people to converse with other deaf people. Deaf people with good oral skills sometimes may approach oral language structures in their signing but the majority of deaf people use ISL in its pure forms. There is no diglottic situation between ISL and any other signed varieties in India, since ISL is not used in academic education and since very few people in India can sign.

Hearing people seem to view ISL quite negatively, hearing people often say that ISL does not have a grammer and is merely a collection of gestures. Furthermore, some Americans have tried to impose their signing systems on Indian deaf people, believing that there was no indegenous Indian sign Language.

The outside influences have resulted in some sociolinguistic problems for the Indian deaf community. For example, the deaf community in Bombay is becoming polarised between two groups. A majority who want to use ISL and see it is used in academic enviornments, and a small but influential group who value American Manual English and have tried to adopt it. However, the manual English used by these Indians in Bombay has undergone so many changes that American signers cannot understand it very well.

Indian deaf students suffer from sign language discrimination. Unlike hearing children, deaf children in India usually are exposed to oral English alone. Some schools use a smattering of artificial American Manual English signs along with oral English instructions. However, most teachers are not fluent in any form of signing. Most Indian schools do not have teachers skilled in ISL, and few schools have any deaf staff members. Those staff members who are deaf are either dormitory staff or vocatoional teachers; None teachers are in academic programs.

Instruction in vocational programs, in contrast to academic programs, often is given in ISL. This could be attributed to the presence of deaf teachers in these programs.

Phonology

Indian Sign Language has all of the simple handshapes that are found in all other reaserched sign languages. These handshapes are B, 5, G, A, S, C, bO, 0 and F. Indian Sign Language also has some more complex handshapes (which are also found in some other sign languages); H, V, Y, I, 3, X, and 8. It does not have certain other complex handshapes that are found in only a few sign languages. For example, ISL does not have K, R, J, E, 7, D, M, and N handshapes.

The analysis of locations in ISL is not complete, but ISL has signs made in the lower and upper arm areas: high, center, and low trunk and shoulder areas: forehead, eyes, nose, mouth, chin, throat, cheek and ear areas: hand and zero areas.

Movement and orientation in ISL have not been systematically analysed.

Fingerspelling

Indian deaf people use the British two-handed alphabet to spell English words and Indian languages according to the traditional Indian Romanization principles. In Bombay, deaf people use the British two-

handed system for consonants and a one-handed system for vowels. Some hearing people have attempteed to develop fingerspelling systems which look like the printed characters: however, these systems have been unpopular and have not been adopted by the deaf community. There are very few initialized signs in ISL.

Syntax

Data on ISL syntax were collected on film in both structured and unstructured settings. A preliminary analysis of ISL syntax indicates that its grammer is highly complex. Some of the basic findings are summarised as follows:

These few examples illustrate a definite set of grammatical rules in ISL. ISL syntax does not parallel the syntax of the spoken languages with which various deaf communities have contact.

1. Whenever there is a sentence containing a subject and a verb, the subject always preceeds the verb.

   MAN CRIED

   The man cried.

2. For sentences containing a subject, verb, and object, 95% of the sentences have a subject-object-verb word order. WOMAN PRONOUN (right) MAN PRONOUN (left)

LOOK(directional from woman to man). The woman looked at the man.

3. Negatives are placed after the verb.

MAN CRY NOT.

The man did not cry.

4. Past tense in ISL is expressed by apast marker at the end of the sentence.

MAN CRY PAST

The man cried.

5. Most adjectives occur after nouns. However, colour adjectives often precede the noun.

MAN GOOD WOMAN LOOK.

The good man looked at the woman.

MAN WHITE BALL LOOOK.

The man looked at the white ball.

Rajalakshmi(1984) studied A lexicon in signed language of the deaf and its comprehensibility to normals. It was observed that some of the lexical items such as concrete nouns and adjectives were highly comprehendable by a group of normal hearing children studying in a local school.

Studies of the sign languages of the normal as well as the deaf have been undertaken in many countries. Sign language for specific cultural background has been

standardised in several countries and are used at least as a supplementary mode. Studies so far done on Indian Sign Language have aimed at identifying the signs employed by the deaf. They have also attempted to catologue the signs, and to some extent standardisation. However, these studies generally aim at Sign-object/action correspondance. These have not focussed on the manner in which signs are linked with one another in a sign sentence or on the process by which additions, deletions and changes and other transformations that take place within the sign lexicon. These studies have not also focussed on the relationship between concatenation of signs with the syntax of the normal language. There have not been many attempts to study the manner of acquisition of signs by the deaf population.

The present study, a descriptive study of the sign language of the deaf, aims at a descriptive analysis of the Sign language of the deaf through a collection of data from a selected deaf population with Kannada as the language of the enviornment, using several tools, recording of spontaneous conversation through structural observation techniques and use of questionnaires administered to parents and teachers. An analysis of the data will be presented.

CHAPTER III

METHODOLOGY

The present study aimed at providing a descriptive analysis of the Sign Language of the Deaf used in an Indian Language context (Kannada).

The study was conducted in two phases. In the first phase of the study a pilot study was taken up to study the vocabulary and syntax of the Sign Language of the Deaf. Following the results arrived at, a few modifications were incorporated in the strategies used in elicitation of signs in the main study.

Pilot study

The pilot study was carried out with eight deaf signers studying in 3rd, 4th, and 5th standards in the local Deaf School (Mysore). Table-3.1 shows the distribution of age, type of hearing loss and academic standards of the subjects for the pilot study.

Table 3.1 indicates distribution of subjects

Educational standards	Type of hearing loss			No. of students with different ages
	BPS	BPM	BSS	
3rd	1	1		8 - 1
4th	1	1	2	9 - 4
5th			2	10 - 1
				11 - 1

BPS - Bilateral profound sensori-neural hearing loss
BPM - Bilateral profound mixed hearing loss
BSS - Bilateral severe sensori-neural hearing loss.

The pilot study was intended to help in the selection of vocabulary items and to provid guidelines for elicitation strategies to be employed in the main study.

Materials:

(a) Vocabulary - In order to elicit the signed vocabulary, A Pictorial Glossary in Kannada, (Mallikarjuna, 1985) published by the Central Institute of Indian Languages was used. It was proposed by Pattanayak (1985) that these Pictorial Glossories in Indian Languages were meant as supplementary aids in the learning of Indian languages, primarily as second language by the adult and child learners. These could also be made use of by the mother tongue learners in lower primary.classes

and also by the adult neoliterates in learning the vocabulary.

The pictorial glossary consists of 1284 pictures. Of these 264 pictures could be used for testing purposes. However, all the 1284 pictures were included in the pilot study for vocabulary items to pick up familiar words whichwas to facilitate easy elicitation.

b) Story charts - Three story charts with action pictures were used to elicit sign strings. This included the stories of - i) The Lion and the Mouse (4)
ii) The Fox and the Grapes, (5) and
iii) The thirsty Crow (4).

Method: Two tasks were provided for the signers.
I. Expression task
II. Reception task.

Expression task - Signs were elicited for vocabulary and syntax. Signers were presented written Kannada words of the 1284 pictures available in the pictorial glossary. The children were asked to sign. When the children did not readily sign, they were goaded by querries such as :

What is this\that? Who is this/that? What do you see here?

When this did not elicit signs, pictures of the actions or objects were shown.

Eg. Picture of a bird\house\animal etc.

Action pictures such as drinking, writing and playing.

For the signed string elicitation signers were provided with story charts.

In most of the situations signs were elicited in individual sessions.

II. Reception Task

Matching tasks were provided for the reception task. When one signer was signing the other signer matched the sign with the picture or with the written word.

Recording: The tester recorded the written descriptions for the signs as they were signed. Whenever doubts arose, the signer was requested to produce the sign a second time

to facilitate the writing of description of how a sign was made. A brief description was recorded which was later transcribed into descriptive systems that are adopted for sign language studies. It would have been useful if photographs and videos of the signing were available. But due to constraints of time and money it was not possible.

Analyses: Analyses of the pilot study indicated that 650 words were readily signed by seven of the signers and one child signed 748 items. Hence the 650 words easily signed were retained for the main study as the most familiar story.

Of the three story charts used for elicitation of sign strings, the story of the "thirsty crow" was narrated by five of the signers correctly. This story was retained for the main study.

Main study

Subjects: Thirty deaf signers used in this study were mainly male signers ranging in age from 6 years to 18 years, representing different academic standards from 1st standard to 10th standard. Only male signers were used as there were no resedential facilities for the girls in the local deaf school (MYSORE). Two of the girls studying in

the school were not exposed to sign language at the time this study was carried out.

Subjects were chosen to represent different types and degrees of hearing impairment ranging from severe to profound degrees of hearing impairment in both the mixed and sensori-neural hearing loss groups. Subjects were selected such that they represented different academic standards from first standard to tenth standard.

The eight subjects who were used in the pilot study were also included in the main study, Table 3.2 shows the distribution of subjects of the main study.

Educational standards	Type of hearing loss			No. of students with ages
	BSS	BPS	BPM	
1st		2		6 - 2
2nd		2	1	7 - 2
				8 - 1
3rd		1	1	8 - 1
				9 - 1
4th	2	1	1	9 - 4
5th	3	1		10 - 3
				11 - 1
6th		2	1	12 - 2
				13 - 1
7th	1	2	1	13 - 1
				14 - 2
				15 - 1
8th		1		15 - 1
9th		5		16 - 2
				17 - 2
				18 - 1
10th		2		18 - 2
TOTAL	6	19	5	30

All the thirty students had one year of pre-schooling and thus the standards in which they were studying indicated the number of years of exposure to the school and thus perhaps to the signing community.

Materials

The vocabulary list used for the main study consisted of 650 words which were selected after the pilot study. These 650 words represented words

i) relating to man such as body parts;
ii) relating to man's dress and clothing;
iii) relating to man's immediate environment;
iv) relating to man's food items;
v) relating to man's education,
vi) relating to man's profession;
vii) relating to common animals/birds etc.
viii) relating to the physical world such as earth, sky, etc.

Vocabulary relating to verbs were presented in an associational order such as the verbs of action relating to body parts, cooking, sports and games, education, profession, etc.

For the elicitation of sign syntax, a picture chart containing the story of the thirty crow was used.

Apart from this, spontaneous signing among deaf students themselves was observed, to obtain more information realting to syntax of the sign language in an unstructured situation.

3.9

Strategies for sign elicitation:

Based on the experience of the pilot study, a few modifications were incorporated in the main study:

1. A few of the words were not signed readily on presentation of the word. Then words of contrastive pairs were presented as in the case of (close) (open) The pair (open) and (close) was used which help to elicit close.
2. Some of the words needed additional clues such as pairing the noun with the verb to elicit signs for the verb. The verb-noun pair of was used to elicit the sign for
3. Whenever signs were not elicited readily on presentation of the written words, miming of the use of the object or the action indicated in the word or a picture was resorted to.

Method

In most of the situations the signers were tested individually. Two signers were used for the reception task, where a matching task was given. As in the pilot study, the main study included two types of tasks. Expression task and reception task.

Expression task included the production of signs for the vocabulary items and sign story telling for syntax.

Spontaneous signing apart from sign story telling was also observed. Two or three signers conversed among themselves which was observed to obtain syntactic data in an unstructured situation. In this task, no topic was given. Signers carried on a converstion on whatever topic they were interested in. Generally, this conversation consisted of topics relating to friends, school and education and about their visit to their home-towns.

Reception task:

On this task one signer signed and the other signer recognized.

Recording

The examiner recorded the written descriptions simultaneously as signs were elicited. Whenever the movements of the signs were not clear for description, the signers had to produce the sign a second time to facilitate the writing of how a sign was made. The Speech Therapist, of the school, helped in transcribing the signed information during spontaneous signing session.

Analysis:

The descriptive method used by reserchers for sign description was adopted for this study. The data obtained was descriptively analyzed under the following headings:

1. A study of the vocabulary of the sign language of the deaf ;
2. A study of the phonology of the sign language of the deaf ;
3. A brief study of the syntax of the sign language of the deaf; and
4. A comparative study of sign language at different levels. To facilitate analyses further interviews were held with the speech therapist and teachers of the school to find their reactions and views about the sign language of the deaf.

A description of the signed vocabulary and syntax are provided int he following chapter. An appendix also provides description of the signs. The findings of this study are compared with earlier studies on sign language. Syntax of the sign language is compared with the syntax of the language of the environment (Kannada).

CHAPTER IV

RESULTS AND DISCUSSION

Signs for this study were elicited from thirty deaf male signers to collect signed vocabulary and syntax of the sign language of the deaf with Kannada as the language of the environment.

The results of the study are presented as below:

1) Vocabulary analysis of the sign language used by the deaf;
2) Phonological analysis of the sign language used by the deaf;
3) Syntactic analysis of the sign language used by the deaf; and
4) A comparative analysis of the sign language at different levels.

For the purposes of convenience, the signs elicited in this study are referred to as MSL (Mysore variety sign Language).

4.1 Vocabulary Analysis of MSL

1) Most of the signers readily recognized the vocabulary items presented in writing and signed without any hesitation. However, some of the signers needed additional help for signing.

The correctness of the signing, was ascertained (by its acceptance) when a majority of the signers produced the same sign. If any deviations were there in signing, later its meaning/correctness was checked with the help of other signers and the Speech therapist who has been working there for the last 21 years.

Signing was indirect when written words were presented, because the signer had to read the word, recognize its meaning and then sign.

Most of the signs provided by the thirty subjects were of iconic nature. Iconicity was found more frequently in the signs referring to concrete objects and actions such as ಬಕೆಟ(bucket), ಪುಸ್ತಕ (book), ಒದೆ (kick) and ತಿನ್ನು(eat).

These signs are described in the Appendix.

2) There were a few vocabulary items which were not recognized readily in writing, by some children. These words, required additional clues as pictures or manual actions or explanations of the object or action. When such additional clues were provided the signers could produce signs. Signing here was direct, because the signers associated the concept with the picture or the manual action or with the explanation directly. Examples of signs are, ಸೇಬು (apple), ರಾಜ(king) and ಜೋರಾಗಿ(loud).

3) Some of the signers were not able to sign the word

ಏಳು (verb meaning rise). They provided the sign for the number seven. In Kannada, the spelling for rise and number seven is the same. On providing an alternate construction ಏದ್ದೇಳು (verb meaning rise and get up) the signers signed appropriately.

It is possible that these signers had maintained some distinction through conventional usage for such words and acquired one form-one sign for a majority of the signs. It can be said that when such distinctions are required, they need additional clues to produce such signs.

Similarly, some of the signers did not sign the word ಬರೆ (write) and ಆಟ (play) . On presenting the alternate ಬರಿ (write)and ಚಿಟ ಚಿಡು (playing)they could sign. This leads us to the conclusion that they know the signs but need additional linguistic information.

Some of the signers were unable to recognize the meaning of ಗುಡಿಸು (sweep)when presented in writing.They were able recognize the meaning and sign when miming of the sweeping action was shown of when it was paired with the noun ಕಸ (dirt) was given.

When other transitive verbs similar to ಗುಡಿಸು such as ತಿನ್ನಿಸು (feed) ಕುಡಿ (drink) and ಓದಿಸು (study) were given, they could sign appropriately. It is apparent that

these children had acquired the sign and the transitive concept much before they acquired the written form and hence failed to recognize the written word.

4. A few of the vocabulary items needed presentation of contrastive pairs before signs were elicited. When signers were given the word ಮುಚ್ಚು (close) most of the signers could not sign. But when a contrasting word ತೆರೆ (open) was given, they were able to sign (close). It was also found that some signers were able to sign ಮುಚ್ಚು (close) appropriately when it was paired with the noun ಬಾಗಿಲು (door) or ಪುಸ್ತಕ (book). Here, ಬಾಗಿಲು and ಪುಸ್ತಕ were used as linguistic qualifiers.

This contrastive/associative pair technique was used by the signers frequently spontaneously. For example when girl was presented it was associated with boy.

5. When ಚಂದಿರ (noun form for moon) was presented, some of the signers did not sign. This failure could be due to the spelling error, because ಚಂದ್ರ is the most common form used in writing.

6.. There was confusion between ಬಟ್ಟೆ and ಬೆಟ್ಟ and (clothes and hill) in the younger children because of their similarity of the forms in writing. This error is similar to the errors found in normal children.

7. ಖಾಲಿ and ಗಾಳಿ (representing empty and air) were not signed. But when these were presented with associated concepts, such as filling the glass and emptying it and switching on the fan and indicating "what is there when a fan is switched on?" signs were produced.

Apart from the 650 signs elicited with the vocabulary items, there were certain other signs in MSL which were observed during spontaneous signing and story telling. These include signs ಆದಾಯ (income) ಹೆಲಿಕಾಪ್ಟರ್ (helicopter) ಅಂಗಡಿಯಾತ (shopkeeper) ಸಂಜ್ಞಾಭಾಷೆ (sign language) ರೂಢಿ (habit) ಸಂಶಯ (doubt) ಪರಿಣಾಮ (result) ಕಾರಣ (reason) ಗೆಲುವು (success) ಸೋಲು (failure) ಉಪಾಯ (idea) and ತೊಂದರೆ (problem).

The elicited signs were compared with signs of American Sign Language (in Manual communication Christopher, 1976) and signs of Indian Sign Language (in Introduction to Indian sign language Vasishta et al, 1980).

It was found that some of the signs of MSL were similar to the signs of ASL such as ಹೆಸರು (name), ಕೊಡು (give), ತಿನ್ನು (eat), ಪ್ರೀತಿಸು (love), ಕಾಫಿ (coffee), ವಿಮಾನ (aeroplane), ಆಟ (play) ನಿಲ್ಲು .(stand). Most of the signs of MSL were similar to the signs provided in

the dictionary of Indian Sign Language (Vasishta et al, 1980).

A few such examples signs are ತಲೆ (head), ಮುಖ (face), ಗಲ್ಲ (chin), ಗಡ್ಡ (beard), ಹೃದಯ (heart), ಬರೆ (write), ಮಾವಿನಹಣ್ಣು (mango), ಮೇಲೆ(above), ನಟ (actor), ಸೇಬು (apple), ಮಗು (baby), ಬಾಳೇಹಣ್ಣು (banana), ಬೊಗಳು>(bark), ಗಂಟೆ (bell), ದೊಡ್ಡ (big), ಬಕೆಟ್ (bucket), ಕರೆ (call), ನಗು (laugh), ಹಸಿವು (hungry), ಮಗ (son), ಸೋಪು(soap), ದೂರವಾಣಿ telephone), ದೇವಸ್ಥಾನ (temple), ಸಮಯ(time), ವಾಂತಿಮಾಡು(vomit).

The descriptions of MSL signs are provided in the Appendix. There were minor differences in the signs.

4.2 Phonological Analysis of MSL

4.2.1 Handshapes

A significant number of MSL signs are produced with '5' handshape (daughter, son, house, floor, roof, husband, able, arm, bald, big, bird, dark, curtain and decorate).

'1' handshape is found in signs such as above, age, body, brinjal, charge, duty, exchange, girl, god, hear, high ......

There are certain other handshapes found in MSL which are not reported by Vasishta et al. These handshapes are 'L', 'D', 'N', 'W' and 'K'.

'L' handshape is found in signs such as photograph, yellow, picture, blackboard, map and cheap.

'D' handshape is found in signs Deepavali, day, December and Delhi.

'N' handshape is found in the sign November.

'W' handshape is found in the sign worry.

'K' handshape is found in signs for kilogram and kilometer.

The handshapes described refer to handshapes in American Manual Alphabet.

The least marked handshapes 'B', '5', 'G', 'A', 'S', 'C', 'bo', 'o' and 'F' (Stokoe et al. 1965) are found in MSL. The complex handshapes reported earlier (Vasishta et al,1980) such as 'H', 'V', 'Y', 'I', '3' and 'X' are also found in MSL signs.

In MSL signs, where two hands are used, 3 conditions that constrain the formation of signs may be observed. The first condition is symmetry (Battison, 1974) . For these signs, handshape and movement specifications are identical and symmetrical. The second condition, dominance (Battison, 1974) states that when two handshapes of a two-hand sign differ, one hand generally the dominant one, will move. The third condition is concerned with the movement and point of contact with the body (Frishberg,

1976). The movement involved, requires two points of contact with the body for some signs. The possible body contact combinations can be eight of the sixteen possible combinations if the body is divided into four major areas (head, trunk, arm and hand). These constraints of signing provide redundancy in sign language, as similar constraints provide redundancy in spoken language. In the following section a few examples of two-handed signs are provided which satisfy the constraints discussed above.

In ಶರೀರ (body), a two handed sign the hand configuration is horizontal 'D' . The symmetrical and identical hands are kept in front of the body at chest level and the movement is downwards simultaneously.

In ಪೂರ್ತಿ (complete) two handed sign, the hand configuration are different (F and 5).

In ಕುದಿ (boil), a two handed sign, the two hand configurations (cupped hand) are the same and the (position) body location is different, and the movement is upwards and downwards alternatingly. In this, the point of contact and movement are different.

In a two handed sign like ಕುರುಡ (blind), the hand configuration and the location of the articulator in space are different V handshape initially at the eyes and 5 hand

shape finally and both the hands move with the palm facing downwards sideways at the abdomen level.

It is possible for one of the hands to be passive while the other is active, in a two handed sign, (doctor) , is produced by two hands one dominant and the other passive. The dominant hand moves and touches the wrist of the passive hand as if testing pulse rate. In this sign the hand configurations are different. The passive hand has the cupped hand configuration and palm facing upwards; the dominant hand has a hand configuration where all the fingers are held close and palm is facing downwards.

4.2.2 Locations

It is very common for the hand to move from one location to another location during the production of a single sign. Such relocations are common in MSL. Table 4.1 shows two locations for some of the signs of MSL.

Sign	Initial location	Final location
DAUGHTER	nose	side of belly
BOY	base of nose	shoulder level
GROW (PLANTS)	abdomen	shoulder
DROP	shoulder level	chest level
SODA	abdomen	chest level
BAD	shoulder	chest
MAN	base of nose	side of the head

Body location for MSL - These include head, neck, torso, arms, back of the head, top of the head, forehead, side of forehead, nose, cheek, ear, mouth, lip, jaw, chin, shoulder, chest, trunk, abdomen and leg.

4.2.3 Sequences of handshapes

There are sequences of two handshapes in MSL.

A few of the signs in MSL are produced with two hands. For example, cat, computer, boil, blood, cow, enemy, fight, floor, frock, helicopter, house, winter, etc. There are sequences of two handshapes in MSL. For example ಮಗ (son) and ಮಗಳು (daughter) are produced by two handshapes the initial handshape 1 and the final handshape '5'.Similarly, in ಹೆಂಗಸು (woman),the initial handshape is '*l*' and the final handshape is 'C' .

A very small number of signs in MSL are produced with three handshapes. ಎಚ್ಚರಿಸು (warn) is produced by placing the right fist near the ear and moved from there to the arm level with the index extended and to elbow level with index extended and other fingers held close.

Similarly ಕ್ರಿಸ್‌ಮಸ್ (Christmas) is produced with three handshapes (1) cross index of both hands in front of chest and number 2 5 is signed individually (twenty and 5 handshape) ಕ್ಷ-ಕಿರಣ (x-ray) is also produced with three

handshapes; cross index of both hands at chest, palm of second hand is held facing upwards and first hand is placed on the palm such that tips of fingers touch the palm and, the first hand is moved to the shoulder level with the fingers held close.

4.2.4 Movements

During the production of some signs, movements are carried out. It is observed that MSL also requires sequences of movements for the production of some signs. For example, ಮೆಟ್ಟಿಲು (Stairs) is produced by alternate movements of the hands at indicating the ascending of stairs.

ಸ್ಟೌವ್ (stove) is produced by placing the cupped palm at waist level and then the palm is moved from and to waist level to indicate the pumping of a stove.

ಗಡಿಯಾರ (clock) is produced by tapping wrist with the index finger and cupped hand moves sideways away from the body at shoulder level, indicates wall clock.

4.2.5 Local movements

Local movements are movements of the fingers and wrist which accompany the major movements of the hand.

For example,  (fruit)in MSL is signed by placing cupped hand near the mouth and the hand is then moved from mouth in V handshape wiggling the handshape a little.

MINUTE is signed by moving the finger of the hand on the wrist of the other hand in three semicircular movements.

4.2.6 Non-manual signals:

Non-manual signals do not follow sequentiality in MSL. Raised eyebrow accompanies question signs, exclamation. Facial expressions accompany most of the signs in MSL. Happiness is indicated while signing by accompanying a happy face and sadness while signing is indicated by a sad face. FEAR is signed with a facial expression of fear.

4.2.7 Orientation

Orientation, a fourth parameter is often used for the complete description of ASL signs (Battison, 1974; Friedman, 1975; Frishberg, 1975). Similarly, the concept of orientation of the hand can be applied to the description of MSL signs. This leads us to various orientations of palm in signing space such as palm oriented upwards, palm oriented downwards, palm oriented side wards, palm oriented towards the body, palm oriented

away from the body. A few examples of MSL signs, where palm orientation differences are seen are described below:

In a sign like ಸೇಬು (apple), the orientation of the palm is upwards; in a sign ಕೆಟ್ಟ (bad) the palm orientation is downwards, in ಬೆನಗ್ಳು (bark) the palm is oriented away from the body; in ಪುಸ್ತಕ (book) the palm orientation is towards the body; in ದೊಡ್ಡ (big) palms are oriented sidewards.

Borrowed signs

A few of the signs in MSL are borrowed signs from ASL. The handshape in MSL has remained the same as in ASL but in some cases like in ತಿನ್ನು (eat)and ಹೆಸರು (name), repeated movements are absent. In a few of the occasions the handshapes are altered by minute changes in the handshape.

Numerals such as twenty five are indicated in MSL by two number signs. For example. twenty-five is indicated by a number sign twenty and a number sign five in sequence.

4.3. Syntactic analysis of MSL:

Grammar of a language provides a set of mechanisms that can be used to convey the semantic relations among lexical units in an utterance necessary for the

understanding of that utterance. In signed languages, the change in language modality and the availability of three dimensional space provides many opportunities for the syntactic mechanisms that are not available to spoken languages.

Analyses of a few aspects of the syntax studied in the present study are presented in parallel with the syntax of the language of the environment (Kannada).

"The basic word order in Kannada sentence is subject-object-verb. Generally, the verb occurs in the last part of the sentence. Due to stylistic variations other orders may be found. Sometimes in colloquial speech, the verb may be followed either by the subject or the object. This is called 'after thought' word order, since the speaker may not have thought out the sentence well and wants to add something afterwords. The subject of a sentence is usually a noun or noun phrase and is structurally important because it plays a crucial role in grammatical processes of the language. Normally the subject occurs in the initial portion of a sentence and is always in agreement with verb for person, number and gender" (Harold Schiffman, 1979).

I. (a) Subject-object-verb order in Kannada

Usually a simple sentence in Kannada has the order,

(subject) (predicate)

avanu paata odda

(object) (verb)

he lesson studied.

nai bekkana nodtu

dog cat saw

'the dog saw the cat'

Sometimes the marker may be absent and there is no ambiguity because of markers of the verb or because of semantics. Markers help to maintain the syntactic and semantic relationship.

Examples of 'after thought' word order in Kannada,

tinde idli

ate idli

tinde naanu

ate I

The construction the speaker finally comes out could be

tinde idli naanu

ate idli I

'I ate idli'

I.b. Subject-object-verb-order in MSL -

For a MSL sentence with subject-object and verb, the order was subject object verb. These sign language constructions are truly in accordance with the basic word order for Kannada sentences. Examples from MSL are given below.

huduga pusthaka oodu
boy book read
(The boy is reading a book)

Kaage kallu ta
crow stone bring
(The crow is bringing stone)

Kaage neeru kudi
crow water drink
(The crow is drinking water)

naanu dussera nodu
I dussera see
(I saw the dussera procession)

It was observed that deaf children were not using markers in sign strings. However, in some situations they use location as the marker to indicate subject object relationship. They use an invariant word order to provide for the lack of markers. In the present study, when space was used as markers, signers did not change the word order. Locations in space provided clues for the

subject object verb order. For example, in

avanu nange hodeda.

he me hit

(he hit me) the locations in space provided clues as to who hit whom.

II Subject-verb, subject-noun order in Kannada

In Kannada, the predicate of a sentence may consist of a noun phrase only (with no obvious verb present in the surface level). In such cases, the sentence consists of two noun phrases, one is the subject and the other as the predicate. These are called 'equational sentences' Examples are,

avaru mestru 'He is a teacher'

he teacher

naanu huduga *"I* am a boy'

I boy

The predicate may also have a verb only;

avanu hogtane 'He goes'(somewhere)

he goes

naanu bande 'I came'

II b Subject-verb, subject-noun order in

In MSL also, whenever a sentence contained a subject and a verb or subject and a noun the subject always

preceded the noun or the verb. The following examples from MSL provide evidence.

Ramesha	huduga	'Ramesh is a boy'
Ramesh	boy	
adu	shaale	'that is a school'
that	school	
huduga	kudi	'boy is drinking'
boy	drink	
kaage	haaru	'The crow is flying'
crow	fly	

The above examples prove that the word order for MSL is similar to the word order for spoken Kannada.

III (a) Negatives in Kannada

Negative forms in Kannada have been classified as 'synthetic' and 'analytic' (Andronov 1959/60). The 'analytic' forms have been found to be more prevalent in colloquial speech while the 'synthetic' forms are more common in literary Kannada. In spoken Kannada, synthetic forms occur in limited cases. In such cases negative particle or morphemes are difficult to isolate. The analytic forms by contrast, are more transparent and obvious and usually a negative particle often (illa/alla) marks negation. Negation in spoken Kannada has not been studied thoroughly.

More commonly the analytical negative is used. It is formed by adding the negative markers illa/alla to the verb; illa negates propositions whereas alla negates identity statements (Amritavalli, 1979)

Examples are,

avaru mestru alla 'he is not a teacher'
he teacher no

idu hosadu alla 'This is not a new one'
this new no

avanu urge hogilla 'He did not go to the town'
he town not go

III(b) Negatives in MSL

Negatives are placed postverbally in MSL. In MSL the analytic negative marker illa/alla is used to mark negation.

Examples are

hudugi nagu illa
girl smile not
'The girl is not smiling'.

kaage neeru kudi illa
crow water drink not
'The crow did not drink water'.

huduga shaale illa
boy school no
'The boy does not go to school'.

naanu odu illa

I read no

' I did not read'

adu kathe alla

that story no

"That is not the story'.

adu kempu ball alla

that red ball no

'That is not the red ball'.

Beda is the other negative form found in MSL.

avanu aata beda

he play not

'He does not want play'.

avalu maatu beda

she speak not

'She does not want to speak'.

idu pusthaka beda

this book not

'This is not the book wanted'.

There are three negative forms in MSL, illa, alla and beda. The handshape is different for the negatives used in MSL.

IV (a) Adjectives in Kannada

In Kannada syntactically there seem to be some constituents which act like adjectives. These seem to be

usually derived from other constituents such as verbs or nouns.

A small number of items are 'true' adjectives. Adjectives occur before nouns in the sentence and do not vary in form according to the gender or case of the noun modified.

Some of the 'true' adjectives in Kannada are

ಚಿಕ್ಕ	'small'	ಹೊಸ	'new'
ಪುಟ್ಟ	'small'	ಹಳೆಯ	'old'
ಪುಟ್ಟ	'tiny'	ಕಿರಿಯ	'younger'
ದೊಡ್ಡ	'big'	ಹಿರಿಯ	'older'
ಬಿಸಿಯ	'hot'	ಒಳ್ಳೆಯ	'good'.

Adjectives derived from verbs are;

ಬರುವ ವರ್ಷ	'coming year'
ಕಳೆದ ವಾರ	'past week'
ಕೆಟ್ಟ ಹಣ್ಣು	'bad fruit'
ಓದಿದ ಪುಸ್ತಕ	'the book that was read'.

Color adjectives are;

ಬಣ್ಣ	'color'
ನೀಲಿ	'blue'
ಹಳದಿ	'yellow'
ಬಿಳಿ	'white'
ಕೆಂಪು	'red'
ಕಪ್ಪು	'black'
ಹಸಿರು	'green'.

Nominalized adjectives are,-

ದೊಡ್ಡವನು	'a big man'
ಬಂದವನು	'a man who came'
ಸುಂದರವಾದವರು	'beautiful people'
ಬಿಳಿಯದ್ದು	'white thing'

When they are used to refer to people;

ಒಬ್ಬನು	'one man'
ಒಬ್ಬಳು	'one woman'

Demonstrative adjectives are used to distinguish between proximate and remote and to ask questions about particular things; they are;

ಈ ಮನೆ	'this house'
ಆ ಮನೆ	'that book'
ಯಾವ ಕಡೆ	'which side'

Comparative adjectives are;

ನಾನು ನಿನಗಿಂತ ದೊಡ್ಡವನು	'I am bigger than you'
ಅವಳು ನನಗಿಂತ ಸುಂದರವಾಗಿದ್ದಾಳೆ	.'She is more beautiful than I'
ಇದು ಅದಕ್ಕಿಂತ ಹೊಸದು.	'This newer than that'

Superlative adjectives are;

ಇದು ಎಲ್ಲಕ್ಕಿಂತ ಹೊಸ ಕಾರು.	'This is the newest car of all'
ಅವನು ಎಲ್ಲರಿಗಿಂತ ಬುದ್ಧಿವಂತ	'He is the smartest of all'

Quantifier adjectives are;

ತುಂಬಾ	'much/many'
ಎಲ್ಲ	'all'
ಕೆಲವು	'some/few'
ತುಂಬಾ ಜಾಸ್ತಿ	'very/too much'
ವಿಪರೀತ	'excessive'

ಕೆಲವು 'some'

ಸ್ವಲ್ಪ 'little'

ತುಂಬಾ ಜಾಸ್ತಿ 'too much'

IV (b) Adjectives in MSL

In MSL, the true adjectives ಚಿಕ್ಕ (small), ಹೊಸ (new), ದೊಡ್ಡ (big), ಬಿಸಿಯು(hot), ಹಳೆಯ(old), ಒಳ್ಳೆಯ(good) were found. Adjectives in MSL occur as individual signs. Examples are;

ಚಿಕ್ಕ ಮನೆ 'small house'

ಬಿಸಿ ಕಾಫಿ 'hot coffee'

ಹಳೆ ಬಟ್ಟೆ 'old clothes'

Color adjectives are found in MSL as signs for individual color. Color adjectives occur before the noun and after the noun in certain constructions.

ಕೆಂಪು ಹಣ್ಣು 'red fruit'

ಕಪ್ಪು ಕೂದಲು 'black hair'

ಕಾಗೆ ಕಪ್ಪು 'crow .black'

ಬಾಲ್ ಕೆಂಪು 'ball red'.

Quantifier adjectives occur as single signs in MSL. They are

ಕೆಲವು 'some'

ತುಂಬಾ 'very'

ಎಲ್ಲಾ 'all'.

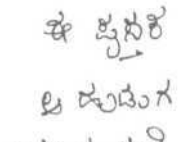
Examples are;

ಸ್ವಲ್ಪ ಹಣ 'little money'

ತುಂಬಾ ಹಸಿವು 'very hungry'

ಎಲ್ಲಾ ಹುಡುಗ 'all boys'

Demonstrative adjectives are found in MSL as single signs. Examples are;



'this book'

'that boy'

'which place'.

Nominalized adjectives, comparative adjectives, superlative adjectives were not found in MSL. In contrast to the general rule that adjectives usually occur before nouns (in spoken Kannada), adjectives occur before and after the nouns (in MSL).

V Past tense markers

Grammars of Kannada generally state that the past tense marker is -id (Spencer, 1950/88).

The group of deaf people studied were not found to use the past tense marker spontaneously. But on insisting, they came out with a sign referring to some time ago.

VI Numerals

Cardinal numbers from one to ten occur as single handshape signs. But from eleven onwards, numbers are signed as two number signs adding the particular number to tens, hundreds or thousands.

For example, twenty five is signed as sign for number twenty and sign for number five in sequence.

The ordinal numbers found in MSL were first, second and third.

VII Prepositions in **MSL**

Most of the prepositions in MSL were ಮೇಲೆ (above), ಕೆಳಗೆ (below), ಒಳಗೆ (in) ಹೊರಗೆ (out) ಮಧ್ಯ (between), ಎಡಗಡೆ (left) ಬಲಗಡೆ (right) and ನಮ್ಮಲ್ಲಿ (among).

Prepositions in MSL occur as individual signs. In spoken language, the prepositions are usually indicated by marker morphemes.

VIII Adverbs in **MSL**

A very few adverbial constructions were observed in MSL. The adverbs seen were ಜೋರಾಗಿ (fast) and ಚೆನ್ನಾಗಿ- (well).

Examples are;

naanu joragi odide.
I fast ran
'I ran fast'

naanu chennagi tinde
I well ate
'I ate well'

kaage joragi haaritu
crow fast fly
The crow flew fast'.

Person markers in MSL

First person marker ನಂಗೆ (to me) and second person marker ನಿಂಗೆ (to you) were observed in MSL.

ನಂಗೆ (to me) is signed by the handshape for 'I' and movement is towards the body of the person.

ನಿಂಗೆ (to you) is signed by indicating you in space and movement of the hand is towards points in space which refer to 'you'.

Nominal reference in MSL is done by the noun signs. Pronominal reference is indicated by specific points in space in front of the body of the signer indicating the pronouns involved in the particular context.

Complex sentences in MSL

In general, there were three sign sentences. Sometimes some of the children did produce four sign sentences. Occasionally, the four sign, more complex sentences consisted of adjectives or adverbs along with the subject or the verb.

Examples are;

naanu tumba olleya huduga
I very good boy
'I am a very good boy'

kaage tumba mele haaritu
crow very high fly
'The crow flew very high'.

If two sign strings had to be joined by a conjunction mark, signers used the two sentences as two different sentences, keeping continuity between sentences as far as possible. No conjunctions were used.

The fact that most of the signers were unable to use complex sentences in their communication may reflect the poor academic standards in the school. Moreover, the teachers in the school are not very competent in signing nor is the sign language used for instructional purposes. Writing is often resorted to as the way of teaching academics in the school. Whenever a new teacher comes to the school, he/she learns signing from the deaf children. Hence the opportunity for the deaf children for learning sign language systematically is highly limited.

Fingerspelling

No fingerspelling was observed in signing by the deaf students of the school during the present study.

Handshapes were related to the written fingerspelling in English for some of the words like 'worry', 'Deepavali' 'Delhi' and 'November'. Kilogram and Kilometer were two initialized signs observed in MSL. The K handshape of ASL was used.

4.4 A comparative study of the sign language of the deaf at different levels

A few observations were recorded regarding the use and learning of signing by the deaf at different levels during the school years.

It was revealed by the teachers that many of the signers had no sign input when they entered the school. Their communication consisted of gestures in the early stages which were modified later into signs in the school environment.

The comparative analysis revealed the following;

1) At the entry level, most of the expressions used by the students are gestural. After a few years in the school, their gestural systems keep on expanding and by the time the child comes to 2nd or 3rd standards his vocabulary of signs becomes greater. These children become more competent in signing after they interact with children of higher ages and educational

standards. At the entry level most of the students were not exposed to the sign language. It is only-after they are admitted to the school, that they learn to pick up signs as a means of communication.

2) During the years of schooling, their signed vocabulary keeps on growing. They learn to operate a few of the grammatical processes. These students pick the correct form of signing and correct the younger ones. Their interaction is not limited to their peers but, they are more interested in communicating with the younger as well as the older groups of children in the school. When they interact, they make use of the newly learnt signs in their communication.

3) At the exit level, the sign language is similar to the adult deaf signing. These children use signing more often to convey their views and ideas. These students are more competent in signing. They communicate with the school teachers and peers and youngsters.

The interview with the Speech Therapist and the school teachers has revealed that the sign language used by the deaf students of the deaf school, Mysore is efficient and intelligible. The teachers are very keen on implementing the sign language used by the deaf for instructional purposes and they often communicate with the

children in sign language though their sign input is limited. The students have separate signs for the teachers in the school. Sometimes the signers invent some signs. Over generations these gestures become signs.

It is indicated that the sign language used by.the deaf students in Mysore, is a language with its own grammar. It is syntactically and grammatically complete. More research on the composition, linguistic properties and structure of MSL are warranted.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of the present study was to descriptively analyse the sign language of the deaf in an Indian language context (Kannada).

Thirty male deaf signers with different degrees and types of hearing loss, representing academic standards from first to tenth standard were studied to collect information on vocabulary, phonology, and syntax of the sign language of the deaf. 650 words were used to elicit signed vocabulary.

Descriptions of signs are provided in Appendix 3. Signs were elicited using different strategies. Following the results arrived, a few conclusions are drawn;

1) It was observed that the vocabulary of the sign language of the deaf studied contained more than 650 words. There was an increase in the vocabulary with difference in academic standards. Increase in academic standard resulted in increase in signed vocabulary.
2) A few of the handshapes found in MSL were similar to the handshapes found elsewhere (ASL and ISL}. .
3) Phonology of the MSL was similar to the phonology of the researched sign languages.

4) Two handed signs were found in MSL.
5) A very few of the signs in MSL required three handshapes.
6) MSL syntax paralleled the syntax of the spoken language(Kannada) for the word order.
7) Syntactic markers were absent in MSL. But on some instances space was used as the marker.for pronominal references.
8) The results of the study indicate that MSL is a language with its own grammer.

LIMITATIONS AND RECOMMENDATIONS

1) For convienience, the signing has been referred to as MSL. This is a first investigation to the descriptive analysis of sign language. It does not purport to give a comprehensive listing of MSL. Obviously, more studieswhich use tests developed to test specific items will be useful. Grammatical processes related to signing need to be studied.

2) Students with higher academic achievement and adult deaf need to be studied.
3) Discourse analysis of spontaneuos signing may provide more insight into grammatical structure of sign language.
4) Bilingual signing may provide data which would be of

psycholinguistic importance.

5) Use of sign language for all syatemic training purposes in the school, might provide for better academic achievement.

6) It is important that hearing people learn signing so that they can help as interpretors.

7) Pragmatics of the sign language has to be studied for more understanding of the sign language.

8) The results of this study indicate that MSL is a language with its own grammer. This is in agreement with Vasishta's statement. More in depth studies of MSL and comparative studies of MSL has to be carried out before confirming that MSL is a pan Indian Sign Language.

BIBLIOGRAPHY

Bellugi, U. (1976) Attitudes towards sign language. Is there a need for change? Brit. Deaf News,10(11), 333-337.

Bellugi, U.,Studdert-Kennedy, M. (Eds) (1980) Signed and spoken language. Biological constraints on linguistic form; Dahlem Konferenzen, Weinheim/Deerfield Beach; Verlag Chemie.

Bellugi, U., and New Kirk, D.(1981) Formal devices creating new signs in American sign language. Sign. Lang. Stud., 30,. 1-5.

Bellugi, U., and Klima, E.S.(1982) The acquisition of three morphological systems in American sign language, in Education of the hearing-impaired child by Powel et. al. (1985) 23-56.

Bonvillian,J.D. (1981) Sign language and autism. J.Autism Developm. Dis.,11(1),125-137.

Bornstein, H.,Saulnier, K.L.,and Hamilton, L.B. (1980) Signed English: A first evaluation. Amer. Ann. Deaf, 125(4),460-481.

Bornstein, H.and Saulnier K.L. (1981) Signed English: A brief follow-up to the first evaluation. Amer. Ann. Deaf, 126(1), 69-72.

Burke,D.J.N. (1979). Sign language issues; Instructor training, Accredition, certification, Proffessionalism. deaf American,31(11),9-13.

Carr, E.G., Bingoff, J.A., Kologinsky, E., and Eddy. (1978). Acquisition of sign language in Autistic children. I expressive labelling. journal of Applied Behavior Analysis, 11, 489-501.

Christopher, D.A. (1976) . Manual Communication-A basic Text and Workbook with practical Exercisec, University Park Press; Baltimore.

Conrad, R. (1979). Why sign? Teacher Deaf,3 (3), 80.

Crawford, J. and Ottinger, P. (1980) . The sign language dimension of total communication for India. Hear. Aid J. (India), 2(2),11-18 .

Crawford, J. and Ottinger, P.A. (1980). A suggested framework for successful implementation of Total communication philosophy for the deaf in India. Hear. Aid J. (India), 2(3), 30-33.

Fischer, S. and Gough, B. (1978). Verbs in American sign language, sign Lang. Stud., 18,17-48.

Fristoe, M., and Lloyd, L.L. (1979). A survey of non speech systems with the severely communication impaired. Ment. Retard., 16(2), 99-103.

Goodman, L. and Kroc, R.A. (1981). A class room communication for the severely handicapped. Lang. Speech Hear. serv. Schs., 12(4), 233-239.

Goodman, L., Wilson, F.S., and Bornstein, H. (1978). Results of a national survey of sign language programs in special education. Ment. Retard., 16(2),104-106.

Griffith, P.L., Robinson, J.H., and Panagoss, J. (1981). Perception of iconicity in Amercan sign language using hearing and deaf subjects. J. Speech Hear. Dis., 388-397.

Harold Schiffman (1979). A reference Grammar of Spoken Kannada., U.S. Department of health and Education Welfare.

John Van Cleve. (1987). Gallaudet enclyclopedia of Deaf people and Deafness. Washington D.C. Gallaudet College Press.

Kahn, J.V. (1981). A comparasion of sign and verbal language training with nonverbal retarded children. J. Speech Hear. Res., 24(1), 113-119.

Kyle, J.G., Woll, B., and Llewellyn-Jones, P. (1981). Learning and using British sign language: Current skills and training of hearing professionals. Sign Lang. Stud., 31, 155-178.

Lane, H. (1977). Notes for a psycho-history of American Sign Language. Deaf American, 30(1), 3-7.

Meadow, K. P. (1977). Name signs as identity symbols in the deaf community. Sign Lang. Stud., 16,237-246.

Meadow, K. P. (Ed) (1980). Deafness and child development. Edward Arnold; New york.

Poizner, H. (1981). Visual and "phonetic" coding of movement: Evidence from American Sign Language. Science, 212(495), 691-693.

Prinz, P. M., and Prinz,E. A. (1981). Acquisition of AS1 and Spoken English by a hearing child of a deaf mother and hearing father: Phase II, Early combinational pattern, sign Lang. Stud., 30 78-88.

Raffin, M. J. M., Davis, M. and Gilman, L. A. (1978). A comprehension of inflectional morphemes by deaf children exposed to visual English sign system. J. Speech Hear. Res., 21(2), 387-400.

Rajalakshmi, K. (1984). A lexicon in signed language and its comprehensibility to normals.(An unpublished dessertation University of Mysore).

Schlesinger, I.M. and Namir, L.(Eds.) (1978). Sign language of the deaf: Psychological, linguistic, and social perspectives. New York: Academic press. 380.

Siple, P., Fischer, S.D.,and Bellugi, U. (1977). Memory nonsemantic attributes of American Sign Language and English words. J. Verb. Lear. Verb. Behav., 561-564.

Siple, P. (Ed.) (1978). Understanding language through sign language research. New York; Academic press.

Stokoe, W. C, Casterline, D., and Croneberg, C.G. (1965). A dictionary of American sign language. Washingto D.C.; Gallaudet College Press.

Vasishta, M., Woodward, S., and De Santis (1980). An Introduction to Indian Sign Language- Focus on Delhi. All India Federation of the Deaf. New Delhi.

Thirumalai, M.S. (1987) . Silent talk- Nonverbal communication. Cental institute of Indian Languages, Mysore.

SIGN-(BOY) ಹುಡುಗ

SIGN ಮಗು (Baby)

SIGN-ಹೆಂಗಸು (woman

SIGN - ಗಂಡಸು (man)

SIGN - ಹೆಂಡತಿ (wife)

SIGN- ಹುಡುಗಿ (GIRL)

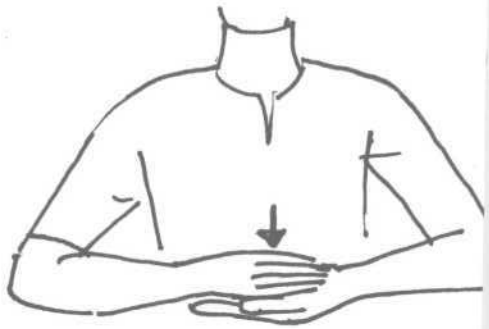
SIGN ಮಗು (Baby)

SIGN- ಗಂಡ (Husband)

SIGN -ತಂಗಿ/ತಂಗಿ (Sister)

SIGN ಅಜ್ಜ (Grandfather

SIGN -ತಮ್ಮ/ತಮ್ಮ (Brother)



SIGN- ಮದುವೆ (Wedding)

SIGN ಶಾಲೆ (school)

SIGN - ಟೀಚರ್ (Teacher)

SIGN - ವಿದ್ಯಾರ್ಥಿ (student)

SIGN - ವಿದ್ಯಾಭ್ಯಾಸ (Education)

SIGN - ಪ್ರಿನ್ಸಿಪಾಲ್ (Principal)

SIGN ಬ್ಯಾಗ್ (Bag)

SIGN - ಊಟದ ಡಬ್ಬಿ (lunch box)

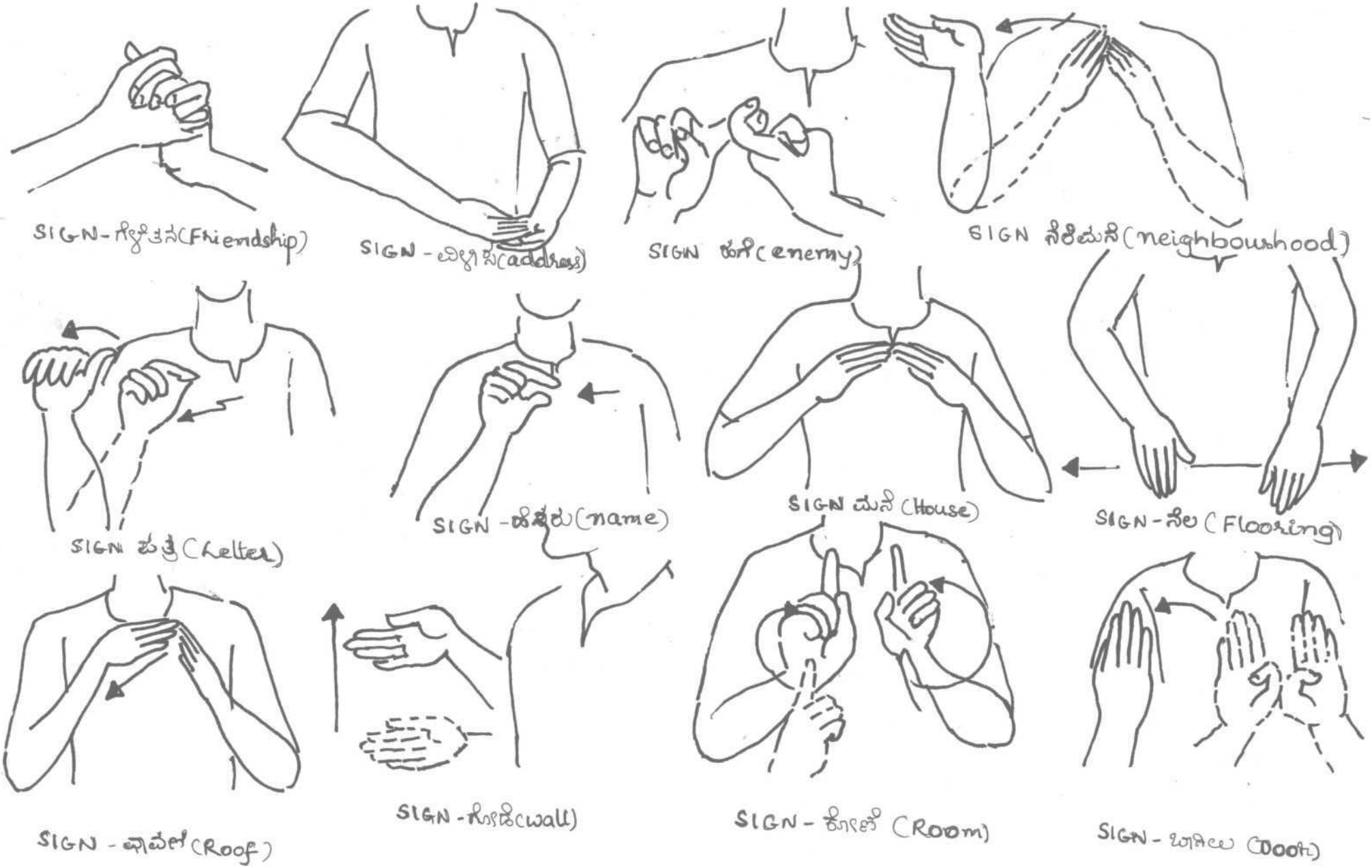
SIGN - ಪಾಠ (Lesson)

SIGN ಪ್ರಮಾಣ ಪತ್ರ (certificate)

SIGN - ಬಸ್ (school bus

SIGN - ಕಾಲೇಜು (College)

SIGN - ಮೇಣದ ಬತ್ತಿ (candle)


SIGN-ಸ್ನೇಹತನ(Friendship)
SIGN - ವಿಳಾಸ(address)
SIGN ಶತ್ರು(enemy)
SIGN ನೆರೆಹೊರೆ(neighbourhood)
SIGN ಹೆಸರು(name)
SIGN ಮನೆ (House)
SIGN - ನೆಲ (Flooring)
SIGN ಹೆಂಚು (Roof)
SIGN - ಗೋಡೆ(wall)
SIGN - ಕೋಣೆ (Room)
SIGN - ಬಾಗಿಲು (Door)

DESCRIPTIONS OF SOME SIGNS OF MSL

I VOCABULARY RELATED TO BODY PARTS.

1. ತೋಳು Arm
With right index point to the left arm. c.f. ISL.

2. ಬಕ್ಕತಲೆ Bald
Right hand is held above the head and moved backwards indicating loss of hair. c.f. ISL.

3. ಗಡ್ಡ Beard
Right hand is cupped and held at chin and a downward tapering movement (c.f. to ISL)

4. ರಕ್ತ Blood
Right index placed over the left wrist and move down indicating a vein and sign red. c.f. ISL.

5. ದೇಹ Body
A two handed sign the hand configuration is horizontal 'D'. and movement is downwards simultaneously from Chest level, c.f. ISL.

6. ಮೂಳೆ Bone
Grasp wrist of one hand with thumb and index finger of other hand.

7. ಗಲ್ಲ Chin
Right index is placed at the chin(c.f. ISL)

8. ಕಿವಿ Ear
With right index finger point to the ear.

9. ಕಣ್ಣು Eye
is made by pointing to the eye with the right index.(c.f.ISL).

10. ಮುಖ Face
is made with one handshape index finger moving in a circular fashion from the forehead(c.f. ASL).

11. ಕೂದಲು Hair
Right index and thumb held close together and moved to the head and as though holding hair. c.f. ISL.

12. ತಲೆ Head
is made by placing the X5' shaped right hand just above the head, (c.f ISL).

13. ಹೃದಯ Heart
Right hand is held on the right side of body at chest position c.f. ISL.

14. ತುಟಿ Lips
Right index is placed over the lips(c.f.ISL)

15. ಮೀಸೆ Mustache
Right index is placed just below the nose and then moved sidewards to the cheek(c.f.ISL).

16. ಚರ್ಮ Skin
Pinch the skin of arm with thumb and index finger of other hand.

17. ಕಣ್ಣೀರು Tears
Right hand with only the index finger extended is **held** near the lower border of the eyes and moved downwards (c.f. ISL).

II VOCABULARY RELATED TO MAN AND HIS FAMILY

18. ಮಗು Baby
Place one arm above the other palms facing upwards in front of and slightly away from body and move twice from one side to the other.

19. ಹುಡುಗ Boy
Move index finger from base of nose outlining half of upper lip (indicating moustache) . Then cup palm at side of shoulder and move down slightly.

20. ಕಹೊಡರ Brother
Move index finger from base of nose outlingin ghalf of upper lip. Then place palm on edge of shoulder.

21. ಮಗಳು Daughter
Tap index finger on side of nose. Then move slightly cupped palm facing downwards away from belly.

22. ವಿಚ್ಛೇದನ Divorce
Make a cross with both index fingers at chest level. Then briskly move index finger to either side of shoulder.

23. ನಿಶ್ಚಿತಾರ್ಥ Engagement
Slide index finger and thumb along ring finger of left hand indicating putting on a ring.

24. ತಂದೆ Father

Tap index finger twice above half of upper lip.

25. ಕುಟುಂಬ Family
Place thumb and tips of fingers of one hand vetically in front of chest, hold (1) . With other hand, beginning at side of chest, circle with palm facing downwards and end

with back of palm with thumb truned inwards, resting on the inside of 1.

26. ಹುಡುಗಿ Girl
Tap index finger at side of nose (indicating nose ring) . Then cup palm at side of shoulder and move down slightly.

27. ಅಜ್ಜ Grandfather
Move index finger from base o fnose outlining half of the upper lip. Then grasp chin with thumb and index finger.

28. ಅಜ್ಜಿ Gradmother
Tap index finger on side of nose then grasp chin with thumb and index finger.

29. ಗಂಡ Husband
Move index finger from base of nose outling half of upper lip. Then place both palms horizontally, fait against each other at chest level.

30. ಮನುಷ್ಯ Man
Move index figner form base f nose outling half of upper lip. Then cup palm and move to side of head.

31. ತಾಯಿ Mother
Tap side of nose twice.

32. ಹೆತ್ತವರು Parents
Move index figner from base of nose outlining half of the upper lip (indicating mustache). Then tap index finger at side of nose (indicating nose ring).

33. ತಂಗಿ Sister
Tap index finger to side of nose. Then palce palm on edge of shoulder.

34. ಮಗ Son
Move index finger from base of nose outlining half of upper lip (indicating moustache). Then move slightly cupped palm facing downwards away from belly.

35. ಮದುವೆ Wedding
Place both palms flat against each other horizontally at chest level.

3 6. ಹೆಣ್ಣು Woman
Tap index finger to side of nose. Then cup palm and move to side of head.

37. ಕುರುಡ Blind
Place the prongs of a V handshape on either eye then place palm facing downwards, fingers slightly apart at entre of chest and move from side to side as if feeling your way about.

III **Vocabulary related to common objects**

38. ಚೆಂಡು Ball
is signed by one hands and a circular shape is indicated in front of the body.

39. ಬಳೆ Bangle
Right hand placed on the left wrist and circular movements.

40. ಸೀಸೆ Bottle
Hold cupped hand in front of chest as if holding bottle. Move the fingers of the other hand on top of its as if screwing the lid.

41. ಡಬ್ಬಿ Box
By placing both fist in front of the chest and both hands moved to the sides of the body with palms facing each other.

42. ಕಸಪೊರಕೆ Broom
Right hand held in front of the body below the level of abdomen and moved towards the left side.

43. ಬದನೆ Brinjal
Is represented by twisting movement of the curved right hand.

44., ಬಕೆಟ್ Bucket
is signed by the right hand in lower portion of the body as if carrying it.

45. ಜರ Chain
Circling movement round the neck with both hands.

46. ಕೋಟು Coat
Both fist held on the shoulder and moved towards the centre of the chest as if wearing a coat.

47. ಕಾಫಿ Coffee
is signed by placing right fist over the left fist and hands are moved in circular fashion as if grinding.

48. ವಜ್ರ Diamond
Signed by placing the hand near the ear and the hand is then moved opening the fingers front of the ear indicating shining.

49. ಕಿವಿ ಬಟ್ Earstud
Pointing to the ear.

50. ಉಂಗುರ Ring
Index finger of right pointing to the ring finger of the left hand.

51. ಪೇಟ Turbon
both hands at head indicate knot.

Vocabulary related to animals

52. ಪ್ರಾಣಿ Animals
Place slightly cuppped palm, facing downwards fingers apart at side of body at waist level. Pull towards chest then move a horizontal V handshape from inside of shoulder outwards wriggling fingers.

53. ಇರುವೆ Ant
Touch tip of bent index finger with tip of thumb at waist level and move it forward showing the movement of an ant.

54. ಕರಡಿ Bear
Form upside down B handshapes on either side of chest.

55. ಹಕ್ಕಿ Bird
Is signed by placing both the hands '5' shape at shoulder and the flaying action indicated by moving the hand upwards and downwards.

56. ಎಮ್ಮೆ Buffalo
Move thumb and index finger from side of head outwards as if outlining the horn of a buffalo.

57. ಬೆಕ್ಕು Cat
Bend figners placing them slightly apart on either side of mouth and pull outwards indicating the whiskers of a cat.

58. ಒಂಟೆ Camel
Place base of cupped palm in front of the head. Maintaining the same handshape, move palm slightly upwards and forwards twice indicating the gangly walk of the camel.

59. ಕೋಳಿ Chicken
Place elbows sticking out on either side of body and flap up and down.

60. ಜಿರಲೆ Cockroach
Move the prongs alternately of a Horizontally V handshape on chin indicating the feelers of a cockroach.

61. ಕಾಗೆ Crow
Sign black then sign bird

62. ಮೊಸಳೆ Crocodile
Place palms flat against each other in front of body. Lift open using the wrists of the upper hand as a lever as if indicating the opening of a crocodile's jaw.

63. ಜಿಂಕೆ Deer
Form V handshapes with both hands on either side of temples. Move upwards and slightly away from head indicating the antlers of a deer.

64. ನಾಯಿ Dog
Snap thumb with middle finger at side of waist as if calling dog.

65. ಕತ್ತೆ Donkey
Form fist at side of head with index and middle finger standing up then bend them down as if indicating the ear of a donkey.

66. ಆನೆ Elephant
Bend palm downwards at wrist and place in front of body, hold (1). Place the wrist of the other hand on 1 and move the palm from side to side indicating the trunk of an elephant.

67. ನರಿ Fox
Place cupped palm, fingers apart, on face then move palm forward cupping it a little more and ending at chest level.

68. ಜಿರಾಫೆ Giraffe
Skim tips of fingers of an open palm over neck then grasp middle and ring finger with thumb away from front of head.

69. ಆಡು Goat
Place wrist on chin and wae fingers as if indicating the beard of a goat.

70. ಕುದುರೆ Horse
Form fists, one in front of the other, (Facing upwards) and move towards and away from body twice.

71.• ನೊಣ' House-fly
Form slightly bent F handshape at side of head and move it as if showing a fly flying fast.

72. ಸಿಂಹ Lion
Place slightly cupped palm, fingers apart at side of body at waist level and pull towards chest, at the same time. Comb fingers of one hand from forehead backwards through hair indicating the mane of a lion.

73. ಹಲ್ಲಿ Lizard
Place index and middle finger together facing away from side of body then move upwards in a zig zag manner indicating a lizard running up a wall.

74. ಕೋತಿ Monkey
Scratch side of waist with bent fingers.

75. ಸೊಳ್ಳೆ Mosquito
Hit hooked index finger and then open palm onto hand as if being bitten by a mosquito.

76. ಇಲಿ Mouse
Bend the fingers of one hand over thumb at side of body and move handshape outwards in a wavy manner.

77. ಗೂಡು Nest
Flap palms on either side of shoulder. Then with palms facing upwards outline the shape of a nest at chest level.

78. ಗಿಳಿ Parrot
Place hooked index finger on mouth and move forward indicating the hooked beal of a parrot.

79. ನವಿಲು Peacock
Move palms (facing outwards), fingers apart on either side of shoulder as if showing the plumes of a peacock.

80. ಹಂದಿ Pig
Cup palm to resemble the letter C near nose and twist it sideways as if indicating the snout of a pig.

81. ಪಾರಿವಾಳ Pigeon
Touch tip of thumb to horizontal index finger and move it back and forth whilst moving head back and forth at the same time.

82. ಮೊಲ Rabbit
Place index and thrid finger (Facing outwards) together on either side of head as if indicating the ears of a rabbit.

83. ಚೇಳು Scorpin
Interlock fingers at centre of chest and move bent index fingers towards and apart from each other.

84. ಹಾವು Snake
Move hand bent at elbow in front of body as if imitating the slither of a snake.

85. ಗುಬ್ಬಚ್ಚಿ Sparrow
Grasp tip of thumb with tip of bent index finger indicating the beak of a bird. Then lay slightly cupped palms facing each other together at centre of chest.

86. ಜೇಡ Spider
Place slightly cupped palm at side of shoulder facing outwards, fingers apart and bent, move fingers a little and simultaneously move hand up.

87. ಹುಲಿ Tiger
Place index finger horizontally on chest twice at equal distance indicating stripes of a tiger. Then simultaneously place slightly cupped palms, fingers apart at side of body and pull towards chest at the same time.

88. ಆಮೆ Tortoise
Place one palm on top of back of the other and wiggle index finger of the lower hand about as if indicating the head of a tortoise.

IV Vocabulary related to fruits and vegetables

89. ಸೇಬು Apple
Move curved palms with bent fingers towards mouth and then briskly away and downwards, indicating a crisp apple.

90. ಬಾಳೇಹಣ್ಣು Banana
Place palm vertically at chest level, hold (1) - With the other hand, peel as you would a banana.

91. ಪೇಚಿಹಣ್ಣು Guava
Grasp tips of fingers with tip of thumb in front of chest, hold (1) - Slide the other hand over 1 and move it sideways.

92. ಮಾವಿನಹಣ್ಣು Mango
Move curved palm and bunch into fist at mouth.

93. ಕಿತ್ತಳೇಹಣ್ಣು Orange
Squeeze bent index finger with thumb near side of eye.

94. ಮೂಸಂಬಿ Sweet-lime
Place palm facing upwards at chest level, hold (1) - Slide thumb across other fingers and move hand in a semi-circle over 1.

95. ಟೊಮೆಟೊ- Tomato
Sign red and then place thumb, index and middle finger facing upwards at side of shoulder and twist.

96. ಕಲ್ಲಂಗಡಿ Watermelon
Place slightly curved palms under chin then move apart indicating apart indicating a slice of watermelon.

V. Vocabulary related to clothing

97. ಶರ್ಟ್ Blouse
Both palms facing upwards are held at abdomen level and hold.

98. ಗುಂಡಿ Button
By placing the right index and thumb held close near the chest.

99. ಮೇಣದ ಬತ್ತಿ Candle
Place hand vertically with index finger at side of shoulder level.

100. ಚಪ್ಪಲಿ Chappal
Right index held in between the index and middle finger of the left hand in front of the body.

101. ಬಟ್ಟೆ Clothing
With tip of index figner and tip of thumb grasp clothing at side of chest and then wiggle V handshape away.

102. ಫ್ರಾಕು Frock
Place both palms facing the body and slightly apart in front of chest and move downwards to side of hip ending with palms facing downwards.

103. ಅಂಗಿ Shirt
by pointing to the clothes.

104. ಚಮಚ Spoon
Move H handshape from chest level to mouth

105. ಪ್ಯಾಂಟು Trousers
With both palms facing one another outline one leg moving from top of thigh to knee level.

Vocabulary related to questions

106. ಯಾರು Who
Outline half of mouth with index finger.

107. ಯಾವ Which
Tap middle finger to centre of palm and sign what.

108. ಎಲ್ಲಿ Where
Move palm in a circular motion with palm facing upwards, fingers apart index and ring finger slightly bent.

109. ಏನು What
place palm facing downwards at chest level. Flip upwards so that fingers are slightly apart and little and ring finger bent upwards.

110. ಯಾಕೆ Why
Make fist at shoulder level with thumb facing body and shake b ack and forth twice.

VI. Vocabulary related to schooling

111. ಉತ್ತರ Answer
Move A handshape away from chest.

112. ವಿದ್ಯುಚ್ಛಕ್ತಿ Electricity
Grasp thumb" and tittle finger together, at side of shoulder leaving the other three fingers pointing outwards, move horizontally away from body indicating electricity overhead wires.

113. ನೋಟು ಪುಸ್ತಕ Excercise book
Join palms in front of chest, then open seperating palms indicating the opening of a book.

115. ಪ್ರಶ್ನೆ Question
Form Q handshape in front of body

116. ವಾಕ್ಯ Sentence
Move C handshape across front of chest Then briskly move palm facing sideways to side of body.

117. ಕಥೆ Story
Grasp tip' of thumb with tip of index finger at mouth - Move away from mouth and end at waist level.

VI. Vocabulary related to religion

118. ಕ್ರಿಶ್ಚಿಯನ್ Christian
Move index finger from middle of forehead to centre of chest and then from one shoulder to the other indicating the sign of a cross.

119. ದಸರಾ Dassera
Place slightly cupped palms facing outwards with fingers slightly apart on either side of temple then move same handshapes away from head in several jerky movements.

120. ದೀಪಾವಳಿ Diwali
From D handsahpe with both hands at chest level. Move alternately upwards towards either side of shoulder three times.

121. ಹೋಳಿ Holi
place fist, faicng upwards at chest level, hold (1). Form a fist, facing body with the other hand and move backwards and forwards as if using a pump.

122. ಈದ್ Id
Place palms facing upwards one on top of the other. Move from one side of chest to the other side bending head and shoulders forward simultaneously.

123. ಮುಸ್ಲಿಂ Muslim
Place thumbs on ear lobes with fingers outstretched. Then bring both palms forward to end with palms touching at sides facing body at chest level.

VII Vocabulary related to man's profession

124. ನಟ Actor
Move horizontal index finger over upper lip indicating man. Then move palms (facing each other) slightly up and down at side of body.

125. ನಟಿ Actress
Tap horizontal index finger to side of mose. Then move palms (facing each other slightly up and down at side of body.

126. ಮರಗೆಲಸದವ Carpenter
Place palm facing body, hold (1). Place the other palm on index finger of 1 and move back and forth as if sawing. Then sign person.

127. ಚಪ್ಪಲಿಕಾರ Cobbler
Place palm facing upwards, hold (1) . Place fist of other had on 1 and move forwards and backwards slighly. Then sign person.

128. ವೈದ್ಯ Doctor
Place palm on wrist of the other hand as if taking the pulse of a patient.

129. ಚಾಲಕ Drivers(car)
Sign car and then sign person

130. ರಾಜ King
MOve index finger horizontally above half of upper lip, indicating man. Then place palm, facing outwards on forehead.

131. ಮಂತ್ರಿ Minister
Fingerspell M. Then bunch fist in front of shoulder.

132. ದಾದಿ Nurse
Form L handshape on either side of face.

133. ಜೀತದಕ Peon
Move slightly cupped palms (Facing upwards) slighly from side to side at waist level.

134. ಪೊಲೀಸು Police
Place thumb and bent index finger near side of head (as if holding a cap). Then sign person.

135. ಅಂಚೆಯಳ್ಳ Postman
Move slightly cupped palm (fingers pointing away from body) forwards at shoulder level. Then sign person.

136. ಪ್ರಿನ್ಸಿಪಾಲ್ Principal
Sign school then make hand into a fist with thumb pointing upwards at shoulder level.

137. ಪ್ರಧಾನಿ ಮಂತ್ರಿ Prime Minister
Fingerspell using two handed alphabet.

13 8. ರಾಣಿ Queen
Tap index finger to nostril indicating women. Then place palm, facing outwards on forehead.

13 9. ಚಾಕರ Servant
Place palm facing body, hold (1). Rub other palm over one (As if washing something) and then sign person.

140. ವ್ಯಾಪಾರಿ Shopkeeper
Place palms facing body at chest level. Then bunch one hand into fist at shoulder level and shake slightly.

141. ಸೈನಿಕ Soldier
Form C handshape (fingers pointing upwards) at shoulder level, hold (1) . Hook the index finger of the other hand in the thumb of 1 as if holding a gun.

142. ದರ್ಜಿ Tailor
Move palms as if using a sewing machine. Then sign person.

143. ಕಳ್ಳ Thief
Form horizontal F handshape fingers pointing away from body at waist level and pull lightly towards body.

VIII. Vocabulary abulary related to food items

144. ಚಪಾತಿ Chapatti
Slide fists at chest level towards and away from body several times as if rolling out a chapatti.

145. ಮೊಟ್ಟೆ Egg
Shake C handshape near ear.

(ಅರಿಶಿನ)
146. ಹಳದಿ ಪುಡಿ Haldi Powder
Sign yellow and then grasp tips of fingers with tip of thumb, vetically at side of chest and move up and down.

147. ಅನ್ನ Rice
Place palm facing upwards at waist level, hold (1) - Grasp tips of fingers with thumb and place on 1 and move upwards.

148. ಸಾಂಬಾರು Sambar
Move cupped palm (facing upwards) from chest to shoulder level as if ladling curry.

IX. Vocabulary related to adjectives

149. ಎಲ್ಲಾ All
hold index finger vertically at chest level (1). Place other index finger on 1 and move in a circular movement bringing finger to rest at 1.

150. ಧೈರ್ಯ Brave
Bunch both fists, one on to of the other at centre of chest. Move apart to either side of shoulders.

151. ಕಡಿಮೆಬೆಲೆಯ Cheap
Snap thumb and index finger into an L handshape at shoulder level with elbow sticking out. Then move palm downwards (Facing downwards)

152. ಹೇಡಿ Coward
Move fists (facing each other), as if shivering at chest level.

153. ಶುಚಿಯಾದ Clean
Place one palm over the other and move one palm across body at chest level.

154. ಕಷ್ಟವಾದ Difficult
Tap underside of chin lightly with bunched fist.

155. ಸುಲಭ Easy
Touch tip of thumb to tip of finger holding hand vertically at shoulder level then move away from body opening palm.

156. ಖಾಲಿ Empty
Grasp tip of index finger with tip of thumb so that the other three fingers stand vertically, then move upwards in a circular movement.

157. ಅಮೂಲ್ಯ ಬೆಲೆಯ Expensive, costly
Snap thumb and index finger into an L handshape at shoulder level with elbow sticking out. then wave palm (facing body) repeatedly at side of face.
Snap thumb with thrid finger at side of shoulder moving it fast to centre of body at the same time.

158. ದಪ್ಪ Fat
Bunch fists slightly apart at chest level with elbows sticking outwards then move fists apart.

159. ಕೆಲವು Few
Touch base of the first three fingers with tip of the thumb at side of shoulder and then shake gently, palm facing outwards.

160. ಭರ್ತಿ Full
Bunch fist at stomach level, hold (1) slide palm facing downwards across top of 1.

161. ಎತ್ತರ High
Lift palm facing downwards from hip level to above side of head.

162. ಬಿಸಿಯು Hot (feel)
Wave palm twice at side of body starting at shoulder and ending at waist level.

163. ಹಸಿವು Hungry
Form fist at centre of belly and tap belly.

164. ಕಡಿಮೆ Less
Place palms together facing downwards and outwards in front of chest, hold (1) . Then move palm vetically, facing downwards about 6 inches.

165. ಕೆಲವು Little
Touch base of vertical index finger wuith tip of thumb at side of shoulder palm facing outwards.

166. ತುಂಬಾ Many
Grasp tips of fingers of both hands with thumb at chest level then move apart opening fingers at either side of shoulder.

167. ಚಿಕ್ಕದಾದ Narrow
Move palms facing each other at shoulder level towards each other at stomach level.

168. ಹಳೆಯ Old
Right hand is moved towards the shoulder with the palm facing backwards.

'169. ನೋವು Pain
Bunch and release fingers at stomach level.

170. ಸರಿಯಾದ Right
With index finger trace a tick make beginning at centre of chest and ending at shoulder.

171. ಒರಟಾದ Rough
From fist (facing downwards), hold (1) with index finger of the other hand outline knuckles of 1.

172. ದುಃಖ Sad
Spread fingers slightly apart and cover face. slowly move hand simultaneously grasping tips of fingers with tip of thumb ending at centre of chest.

173. ಮೃದುವಾದ Soft
Touch fingers on to ball of thumb and pull apart twice at shoulder level.

1 7 ಕಿಡ್ನಿ h o r t
Place xnex finger vertically in front of chest, hold (1) . slide the other index finger horizontally and downwards against.

175. ಚಿಕ್ಕ Small
Place palms vertically facing eah other at side of shoulders then move inwards.

176. ಅಂಟಾದ Stickly
Place together and apart twice the middle finger and thumb at shoulder level.

177. ನೇರವಾದ Straight
Place palm facing upwards in front of chest, hold (1) . Form a V handshape beside 1 and then flip it over and rest prongs of V on 1.

178. ಮೃದು Smooth
Make fist (facing downwards, hold (1) . Run palm over top of 1.

179. ಸಿಹಿಯಾದ Sweet
By playing right palm over the checks.

180. ಗಟ್ಟಿ Thick
Bunch fists slightly apart at chest level with elbows sticking outwards then move fists apart.

181. ಬಾಯಾರಿಕೆ Thristy
Move palm, facing inwards (fingers apart) horizontally down length of throat.

182. ತಪ್ಪು Wrong
With index finger make an imaginary cross mark in form of chest.

183. ಅಗಲ Wide/Broad
Place palms horizontally facing each other at stomach level then move apart simultaneously to either side of body.

X Vocabulary related to verbs

184. ಬದುಕಿರುವ Alive
Move index finger horizontally from chest to nostrils (to indicate breathing) then move palm(facing outwards) vertically downwards.

185. ಕೇಳು Ask
Hook index finger near mouth and move away from body.,

186. ಸ್ನಾನಮಾಡು Bathe
Place fist above shoulder with tip of thumb on shoulder. At the same time rub palm (facing body) of the other hand on chest.

187. ಹೊಡೆ Beat
Bring palm down with force as if beating someone.

188. ಉಸಿರಾಡು Breathe
Place palm horizontally facing upwards at waist level then move up to nostrils.

189. ತಾ Bring
Right palm held in front of the body and moved to the chest level and palm faced downwards.

190. ಮುರಿದ Broke
Both fist held in front of chest and fist moved towards the shoulder.

191. ಹಲ್ಲುಜ್ಜು Brush
With the index brushing action is indicated.

192. ಕೊಂಡುಕೊ • Buy
Place slightly cupped palm (facing upwards at side of cehst move towards chest closing into fist at the same time.

193. ಹಿಡಿ Catch
With cupped palm of one hand, hold the wrist of the other.

194. ಮಾತನಾಡು Chat
Snap index finger and thumb of both hands together and apart several times, placing one hand at centre of chest and the other away from the shoulder, facing each other.

195. ಮುಚ್ಚು Close
Place palms facing outwards, vetically on either side of shoulder then move palms towards body so that they meet with thumbs touching at chest level.

196. ಅಡಿಗೆ ಮಾಡು' Cook
By placing cupped bands in front of the body a sign boil.

197. ಕೊಂಕು Collect
Move cupped palms, facing body, towards centre of waist cupping them together to form a small circle.

198. ಬಾ Come
Place palm facing away from body at side of shoulder and fold fingers into palm.

199. ಮುಗಿಸು Complete
Place palm facing upwards at centre of chest, hold (1) . Move the tips of fingers of the other hand across 1 and then move it hand Maintaining the position of 1.

200. ಕೆಮ್ಮು Cough
With the right hand combing is indicated.

201. ಎಣಿಸು Count
Touch tip of thumb to tips of index fingers alternately at side of chest indicating counting with fingers.

202. ಅಳು Cry
Index is moved from the eye towards the cheek.

203. ಕತ್ತರಿಸು Cut
Place palm facing upwards near centre of chest, hold (1) . Rest the side of the little finger of the other palm on 1. With fingers pointing away from body and move it away and towards body as if cutting something.

204. ನರ್ತಿಸು Dance
Right 'F' handshape held near the shoulder left index extended and other finger closed at the waist level and movement of both hands.

205. ಅಲಂಕರಿಸು Decorate
'5' handshape held near the head.

206. ಇಳಿ Descend
'V handshape from above moved downwards.

207. ಸಾಯು Die
Slide index finger across neck horizontally ending with cupped palm facing back and tilting head simultaneously.

208. ಹಂಚು Distribute
Grasp tip of thumb with tip of slightly bent index finger in front of centre of chest and move hand away from body and then slightly to the side.

209. ಕನಸು Dream
Touch index finger to temple and move it slightly upwards in a wavy manner.

210. ಕುಡಿ Drink
Cup palm near mouth (so that it look like a c) and tilt it towards and then away from mouth as if drinking from a glass.

211. ಬೀಳಿಸು Drop
Form F handshap at side of shoulder, palm facing down and release handshape moving downwards.

212. ಮುಳುಗು Drown
Down plam, facing downwards with fingers apart, hold (1) . Place the index finger of the other hand in between the third and ring finger of 1 then move index finger downwards.

213. ಗಳಿಸು Earn
Place open" palm facing upwards, fingers pointing away from body at side of waist, hold (1) . Place the other hand on 1 signing money and pull away the hand towards body.

214. ತಿನ್ನು Eat
Form bunched fingers at mouth an dbring it towards and away from mouth twice.

215. ಸಮಾನಾಗು Equal
Indices of both hands held at same level in front of the body.

216. ಆಸ್ವಾದಿಸು Enjoy
Form a horizontal L handshape (palm facing body) at chest leve, hold (1) . Outline 1 with the index finger of the other hand.

217. ಫೇಲ್ ಆಗು Fail
Form fist, facing outwards at shoulder level, thumb pointing downwards and thrust fist downwards to centre of chest.

218. ಸ್ಪರ್ಶಿಸು Feel
Touch third finger to centre of chest and move it slightly upwards.

219. ಜಗಳವಾಡು Fight
Form fists "at chest level and hit each other several times.

220. ಹುಡುಕು Find
Place V handshape on both eyes then move in circles at chest level maintaining the same handshape.

221. ಹಾರು Fly
place palms facing downwards on either side of chest and flap indicating wings of a bird.

222. ಮರೆ Forget
Slide palm across forehead and then grasp tips of fingers with tip of thumb to above shoulder level then release grasp and end sign at shoulder.

223. ಹೋಗು Go
Place palm horizontally in front of chest. Swing out so that palm faces outwards vertically.

224. ಕೊಡು Give
Form slightly cupped B handshape (palm facing upwards) at waist level and move hand away from body.

225. ಬೆಳೆ Grow(plants)
Place plam horizontally facing downwards body with thumb tucked into palm, hold (1) . Rest palm on 1 and grasp tip of fingers with tip of thumb and move upwards opening palm..

226. ಬೆಳೆ Grow (person)
Place palm facing upwards at chest level, hold (1). Place the other palm, facing downwards slightly above 1 and move it to shoulder level.

227. ಊಹಿಸು Guess
Tap hooked index finger to temple and then move hand into a fist downwards to centre of waist.

228. ದ್ವೇಷಿಸು Hate
Place palm in front of side of chest. flip palm briskly so that it faces away from body and trun it to face the opposite side.

229. ಕೇಳು Hear
Move index finger from side of head of ear with head slightly bent.

230. ಸಹಾಯ ಮಾಡು Help
Place palm facing upwards at centre of chest, hold (1) . Place fist of other hand on 1 with thumb pointing upwards and move both a little away from the body.

231. ಹಿಡಿ Hold
Move open palm with fingers aprt forward at waist level ending in a fist.

232. ಊಹಿಸು Imagine
Place little finger vertically on temple then move it upwards in a wiggly manner.

233. ಜೊತೆಗೂಡು Join
Place index fingers horizontally near centre of chest (palm facing body) and move them until the tips of the index fingers meet.

234. ಒದೆ Kick
Place palm facing upwards in front of chest, hold (1) . Place the index and third finger of the other hand on 1 and then move the index fingers backwards.

235. ತಿಳಿ Know
Tap Y handshape (middle three fingers) to side of temple.

23 6. ಕಲಿ Learn
Place palm facing upwards at waist level, hold (1) Form cupped palm and place fingers so that they stand on 1. Grasp tips of thumb with tips of fingers and move to temple still maintaining the handshape of 1.

237. ಜೀವ Life
Tap index finger to side of nose. Then palce both palms horizontally, fait against each other at chest level.

238. ಕೇಳು Listen
Right index is placed near the ear and one moved away and towards the ear.

239. ಬದುಕು Live
Meet tips of fingers of both hands in front of chest with the base of the palms apart, indicating the roof of a house. Then move palms downwards so that the tips of the fingers touch each other at waist level, palms facing downwards.

240. ಕಳೆದುಕೊ Lose
Grasp tips of thumbs with tips of fingers at chest level, palms facing upwards. Flip over releasing fingers.

41. ಪ್ರೀತಿಸು Love
Place palms one on top of the other, at a slight angle in centre of chest.

242. ಚಲಿಸು Move
Place plam in centre of chest with fingers pointing away from body and move form side to side,

243. ತೆಗೆ Open
Place palms horizontally, facing body and with fingertips touching. Then swing open palms away from body so that palms end facing each other but apart at chest level.

244. ತೆಗೆಡಿಯಾದು Pass
Grasp thumb with bent index finger (fist facing outwards) and move hand upwards and slightly to the side.

245. ಹಣ ಕೊಡು Pay
Place thumb at centre of bent index finger in front of chest. Move away from body releasing thumb from index finger whilst keeping the rest of the fingers in fist.

246. ಆಟವಾಡು Play
Move horizontally Y handshapes up and down on either side of body.

247. ಓದು Read
Place palm facing upwards at waist level, hold (1) . Form an upside down V handshape and skim it above 1.

248. ನೆನಪಿಸಿಕೊ Remember
Tap bunched fingers twice on side of forehead.

249. ರಿಪೇರಿ ಮಾಡು Repair
Form fist (facing outwards), with thumb at side, hold (1). Grasp tip of thumb with tip of bent index finger and knock it twice against thumb of 1.

250. ಹಿಂದಿರುಗು Return
Place open palm at side of shoulder, palm facing body. Then move inwards to centre of body.

251. ಸುತ್ತಾಡು Roam
Place inverted V handshape in front of chest and wiggle the progns and move hand in a zig-zog manner.

2 5 2 ಉಳಿಸು a v e
Place open palm faing upwards, fingers pointing away from body at side of waist, hlld (1) . Cup palm of other hand and slide over 1.

253. ಹೇಳು Say
Move index finger from and away from mouth in small repeated cercular movements.

254. ನೋಡು See
Place V handshape so that tips of both prongs are on both eyes and move away from body.

255. ಮಾರು Sell
Grasp tip of thumb with tip of fingers in front of chest then move palm away from body palm outwards.

256. ಹೊಲಿ Sew
Miiming of the action sew.

257. ಹಂಚಿಕೊ Share
Place palm facing upwards in front of chest, hold (1) . Place little finger of other palm on 1 and move palm from side to side on 1.

258. ತೋರಿಸು Show
Place palm, facing outwards vertically in front of shoulder, hold (1). Place index finger of the other hand at centre of 1 and move both hands slightly forwards.

259. ಕುಳಿತು ಕೊ. Sit
Bunch rises at either side of chest and move downwards at the same time, bending body slightly at the same time.

260. ನಗು Smile
Index and thumb of right hand held near mouth (G handshape) and index finger moves towards away from the thumb.

261. ಚೆಲ್ಲು Spill
Place palm at center of chest palm facing upwards, hold (1) . Place as handshape on 1 and then maintaining the same hand position hand position rest knuckles on

262. ನಿಲ್ಲು Stand
Place plam facing upwards in front of chest, hold, (1). Then place index and third finger vetically in centre of

263. ಇರು Stay
Move both hands slightly, palms facing downwards at chest level.

264. ಕದಿ Steal
Place palm facing down, hold (1) . at waist level. Place the other palm (facing dwon) below 1 grasping thumb with bent index finger and pull sideways.

265. ಓದು Study
Place palms tittled slightly upwards at centre of chest then move a little towards and away from body twice.

266. ಆಶ್ಚರ್ಯ ಪಡು Surprise
Grasp tip of fingers with tips of thumbs on either side of the eyes keeping the rest of the fingers in palm release so that fingers from an L handshape on either side of eyes.

267. ಬೋಧನೆ ಕಲಿಸು Teaching
Move index finger horizontally towards and away from mouth repeatedly.

268. ಹೇಳು Tell
Tap index figner to lips and move it way from the body, slightly downwards so that the figner ends up pointing away from the body.

269. ಆಲೋಚಿಸು Think
Tap hocked index finger to side of temple twice.

270. ಎಸೆ Throw
Place slightly cupped palm with fingers apart at shoulder and throw hand outwards maintaining the same hand position opening finger slightly more.

2 271. ಮುಟ್ಟು Touch
Place hand slightly bent at side of body, hold (1) . Then touch wrist of the other hand to 1.

272. ಪ್ರಯತ್ನಿಸು Try
Form fist, facing sideways at waist level and move it slightly away from body wioth force twice.

273. ಉಪಯೋಗಿಸು Use
Move U handshape in a circular manner near centre of chest.

274. ಕಾಯು Wait
Move open palm facing away from body forwards at chest level.

275. ನಡೆ Walk
Move index and thrid finger alternately and moving hand foward at the same thime, indicating walking.

2 276. ಬೇಕು Want
Place palms, fingers apart and palms slightly bent in front of chest. Pull towards chest closing palms into fists simultaneously.

277. ತೊಳೆ Wash
Place palm facing upwards, fingers poiting away from body at side of chest, hold (1). Cup other palm (as if holding a cake of soap) and move it back and forth on 1.

278. ನೋಡು Watch
Move index fingers away from the body starting at the eyes.

279. ಹಾಕಿಕೊ / ಧರಿಸು Wear, put on
Plage palm horizontally facing body, hold (1) . Place cupped hand to rest on side of 1 as if covering something.

.280. ಗೆಲ್ಲು Win
Place fist, facing body in front of centre of chest with thumb pointing upwards and move fist upwards and slightly to the side.

281. ಚಿಂತಿಸು Worry
Form W handshape at side of temple and move in small circular movements near temple.

282. ಬರೆ Write
Grasp tip of bent index finger with tip of thumb and move as if writing.

Vocabulary related to time

2 83. ದಿನ Day
Move horizontally D handshape (palm facing up) in a semi circular movement to rest horizontally on the other side at waist level, palm facing down.,

2 . ಸೋಮವಾರ 84 Monday
Grasp tip of thumb with tip of bent index finger at base of side of nostril then straighten index finger to stand vertically.

285. ಮಂಗಳವಾರ Tuesday
Touch index finger to side of centre of open palm of the other hand at chest level.

286. ಗುರುವಾರ Thursday
Place index finger horizontally on the tips of two vertical index and middle figner of the other hand at chest level.

287. ಬುಧವಾರ Wednesday
Fingerspell W at centre of chest.

288. ಶುಕ್ರವಾರ Friday
Grasp tip or thumb with tip of bent index finger at shoulder level and wave a little.

289. ಶನಿವಾರ Saturday
Scratch index finger to side of ear twice.

2 90. ಭಾನುವಾರ Sunday
Place palms apart at chest level, facing out, and move them to rest side by side at centre of chest as if indicating closed.

291. ದಿನಾಂಕ Date
Punch fist twice into palm of the other hand.

292. ವಾರ Week
Move vertical index finger across front of chest.

293. ತಿಂಗಳು Month
Place thumb of one fist on inside of palm of the other (indicating the payday thumb impression).

294. ವರ್ಷ Year
Palm facing downwards, spread thumb and index part keeping the rest of the fingers in the palm, hold (1) . Move the index finger of the other hand downwards from the base of 1.

295. ಸಮಯ Time
Tap index finger to wrist of other hand as if showing a wristwatch.,

296. ನಿಮಿಷ Minutes
Move the finger of one hand on the wrist of the other hand in three semi circular movements like the minute hand of a wristwatch.

297. ಗಂಟೆ Hour
Move index finger of one hand around wrist of the other hand in a circular movement.

298. ಬೆಳಿಗ್ಗೆ Morning
Grasp tips of fingers with tip of thumb, fingers pointing upwards at waist level. Bring hand to shoulder level release the palm and spreading fingers at the same time.

299. ಮಧ್ಯಾಹ್ನ Afternoon
Place palm, finger apart on head and shake slightly.

3 00. ಸಂಜೆ Evening
Place palm, with thumb resting on side of chin and close palm.

301. ರಾತ್ರಿ Night
Place hand in front of body with fingures spread and palm facing upwards. Pull down to end with bunched fingures facing upwards.

3 02. ಜನವರಿ January
Place palm facing body at chest level, hold (1) . Form J Handshape and move over 1 as if turning a page of a calendar.

3 03. ಫೆಬ್ರವರಿ February
Place palm facing body at chest level, hold (1) . form F handshape and move over 1 as if turining a page of a calendar.

304. ಮಾರ್ಚ್ March
Place palm facing body at chest level, hold (1) . Form M handshpae and move over 1 as if turning a page of a calendar.

305. ಏಪ್ರಿಲ್ April
Place palm facing body at chest level, hold (1) . form fist with thumb sticking out on inside of palm and move it over 1 ending in a L handshpae.

3 06. ಮೇ May
Place palm facing body at chest level hold (1) . Form M handshape on inside of palm and move it over 1 ending in a Y handshape.

307. ಜೂನ್ June
Place palm facing body at chest level, hold (1) . Move J handshape on inside of palm and move it over one ending in an N handshape.

308. ಜುಲೈ July
Place palm facing body at chest level, hold (1) . Form J handshape on inside of palm and move it over 1 ending in a Y handshape.

309. ಆಗಸ್ಟ್ August
Place palm facing body at chest level, hold (1) . Move fist, thumb sticking over 1.

310. ಸೆಪ್ಟೆಂಬರ September
Place palm facing body at chest level, hold (1) . Move S handshape over 1.

311. ಅಕ್ಟೋಬರ October
Place palm facing body at chest level, hold (1) . Move 0 handshape over 1.

312. ನವೆಂಬರ November
Place palm facing body at chest level, hold (1) . Move N handshape over 1.

313. ಡಿಸೆಂಬರ December
Place palm facing body at chest level, hold (1) . Move D handshape over 1.

314. ಬೇಗನೆ Early
Snap index finger and thumb at side of waist moving hand across to other side of waist at the same time.

315. ಈಗ Now
Place palm facing away from body at waist level and move down.

Vocabulary related to numbers

316. ಕೂಡು Add
Place index finger vertically at chest level, hold (1) . Place the other index finger horizontally on 1 forming a cross.

317. ಭಾಗಿಸು Divide
Place inex fingers at either side of chest move inwards and then outwards.

318. ಎಂಟು Eight
Tuck little and ring finger into palm leaving the thumb, index and middle finger vertical.

319. ಹದಿನೆಂಟು Eighteen
Place index finger vertically and then sign eight.

320. ಹನ್ನೊಂದು Eleven
Release index finger (facing outwards) vertically once.

321. ಹದಿನೈದು Fifteen
Place index finger vetically and then sign five

322. ಐವತ್ತು Fifty
Sign five then grasp tip of bent index finger with tip of thumb to indicate zero.

323. ನಲುವತ್ತು Forty
Sign four Ifhen grasp tip of bent index finger with tip of thumb to indicate zero.
same AS. 322.
324. Fifty
Sign five then grasp tip of bent index finger with tip of thumb to indicate zero.

325. ಮೊದಲನೆ First
place index finger facing outwards vertically in front of the shoulder. Move it away from shoulder in a small circular motion so that index finger faces the side of the body.

326. ಐದು Five
Place palm facing outwards, fingers apart in front of shoulder.

327. ನಾಲ್ಕು Four
Place palm facing outwards in front of shoulder with thumb tucked into palm and fingers vetical.

328. ಹದಿನಾಕು Fourteen
Place index finger vetically and then sign four.

329. ಅರ್ಧ Half
Place index finger vertically at side of shoulder then move hand dwon slightly forming a V handshape.

330. ನೂರು Hundred
Place index finger vertically in front of shoulder then form V handshape and move it to rest vertically.

331. ಕೆ.ಜಿ. Kilogram
Fingerspell K in front o fcentre of chest Place palm facing upwards at side of waist, hold (2). Form fist with the other hand above 2 as if holding a weighting scale.

332. same As Kilogram
Fingerspell K in front o fcentre of chest Place palm facing upwards at side of waist, hold (2). Form fist with the other hand above 2 as if holding a weighting scale.

333. ಕಳೆ Minus, Substract.
Move index figner horizontally across chest.

334. ಗುಣಿಸು Multiply
Form X handshape in front of chest.

335. ಒಂಬತ್ತು Nine
Place slightly bent index finger horizontally on side of nose.

336. ಹತ್ತೊಂಬತ್ತು Nineteen
Place index finger vetically then sign nine.

337. ಸಂಖ್ಯೆಗಳು Numbers
Palce palm~facing sideways, fingers spread, hold (1). Touch index finger of the other hand to the first three fingers of 1.

338. ಒಂದು One
Place index finger vertically in front of shoulder.

339. ಒಂದು ಸಾವಿರ One Thousand
Place index finger vertically in front of shoulder then move the index, middle and ring figner to rest vertically.

340. ಕಾಲು ಭಾಗ Quarter
Place index finger vertically at side of shoulder then move hand down slightly, palm facing outwards with ofur fingers vertical and thumb tucked into palm.

341. ಎರಡನೇ Second
Sign two and move it away from shoulder in a small circular motion so that fingers face side of body.

342. ಏಳು Seven
Place hooked index finger sideways in front of shoulder.

343. ಆರು Six
Place fist, thumb facing upwards in front of shoulder.

344. ಹದಿನಾರು Sixteen
Place index finger vetically and then sign six.

345. ಹದಿನೇಳು Seventeen
Place index finger vertically and then sign seven

346. ಮೂವತ್ತು Thirty
Sign three then grasp tip of bent index finger with tip of thumb to indicate zero.

347. ಮೂರು Three
Place index, middle and ring finger veticlly in front of shoulder.

348. ಹದಿಮೂರು Thirteen
Press tips of bent index, middle and ring fingers with tip of thumb and release with a jerk (palm facing outwards).

349. ಎರಡು Two
Place V handshape in front of shoulder.

350. ಇನ್ನೂರು Two handred
Sign two then form V handshape and move it to rest vertically.

351. ಹನ್ನೆರಡು Twelve
Press tips of bent index and middle figners with tip of thumb and release it once with a jerk in front of shoulder palm facing away from body.

352. ಇಪ್ಪತ್ತು Twenty
Sign two then grasp tip of thumb with tip of bent index finger to indicate zero.

353. ಸೊನ್ನೆ Zero
By moving the right hand with index extended in space in a circular manner.

Vocabulary related to colours

354. ನೀಲಿ Blue
Move index finger in an arc above head.

355. ಕಪ್ಪು Black
Move index finger form imaginary centre parting of hair to top of ear.

356. ಬಣ್ಣ Colour
Place V handshape on chin. move V handshape horizontally away chin wriggling V at the same time.

357. ಕೆಂಪು Red
Move index finger horizontally at chin.

358. ಬಿಳಿ White
Tap index finger to front tooth. Then move palm facing outwards, Horizontally away from mouth.

359. ಹಸಿರು Green
Make a small circle with the index finger on check.

360. ಕಂದು Brown
Move index finger towards chin and then downwards in a slightly semi-circular movement.

361. ಹಳದಿ Yellow
Move little finger across forehead.

Vocabulary related to vehicles

362. ಅಪಘಾತ Accident
Form fists on either side of chest, thumbs pointing up and bring fists together with force until the knuckles meet at centre of chest.

363. ವಿಮಾನ Aeroplane
Keep thumb little and index finger out horizontally with middle and ring finger tucked into palm and move it from shoulder across and above face as if indicating a plane taking off.

364. ದೋಣಿ Boat
Slightly cup palms to face each other and place the tittle fingers and side of hand together forming the sahpe of a boat and move away from chest.

365. ಬಸ್ Bus
Place fist facing each other on either side of body and move them as if steering with a large steering wheel.

366. ಕಾರು Car
Place fists facing each other in front of chest and turn as if steering a car.

367. ಸೈಕಲ್ಲು Cycle
Form fist, facing downwards in front of chest and move it in circles as if peddling on a cycle.

3 68. ಎತ್ತಿನಬಂಡಿ Handcart
Bunch fists on either side of waist, elbows sticking out slightly and pull body forwards as if pulling a handcart.

369. ಹೆಲಿಕಾಪ್ಟರ್ Helicopter
Place palm facing downwards at chest level, hold (1) . Rotate the vertical index finger of the other hand above 1 with the base of the fist resting on 1.

370. ರಸ್ತೆ • Road
Place palms facing each other fingers pointing down at waist level. Bring palms away from body (palms facing each other so that fingers point away from body.

371. ರಾಕೆಟ್ Rocket.
Place palm facing upwards in front of chest, hold (1) . Place the index finger of the other hand vertically on 1 and thrust it upwards indicating a rocket taking off.

372. ಸ್ಕೂಟರು Scooter
Form a loose fist with both hands (facing downwards) at chest level and flick it outwards as if accelerating.

373. ಹಡಗು Ship
Place palm facing upwards, fingers pointing away from body, hold (1) . Bend little and ring finger of the other hand into palm keeping thumb index and middle out and place it on 1.

374. ಟಾಂಗಾ Tonga
Form list (Facing downwards) in front of chest, hold (1) . Press bent index finger to thumb keeping the other fingers in a fist at shoulder level and towards body twice as if holding the reins of a horse.

375. ಸಂಚಾರ Traffic
Place palms horizontally facing body, one in front of the other and move them back and forth simultaneously.

376. ರೈಲು Train
Place palms facing each other in front of chest and move them in a circular motion indicating the wheels of a train turning.

377. ಲಾರಿ Truck
Place fists, thumbs sticking out (fists facing upwards) on either side of chest and turn as if steering.

Vocabulary related to miscllaneous

378. ತೊಂದರೆ Problem
Press tips of bent middle finger and thumb to forehead twice.

379. ಗೆಲುವು Success
Move fist, thumb pointing upwards from centre of chest to shoulder level.

380. ಸೋಲು Failure
Place fist, thumb pointing upwards at chest level and flip fist so that thumb points down and move it downwards.

381. ಉಪಾಯ Idea
Hold index finger with thumb at forehead and then flick apart so that index finger is vertical.

382. ಗುಟ್ಟು Secret
Place slightly cupped palm (facing body), fingers apart in front of mouth. Move hand downwards to chest level, forming a fist at the same time.

383. ಸಂಜ್ಞಾಭಾಷೆ Sign language
Form horizontall L handshapes (index finger pointing outwards) and move it in samll circles in front of centre of chest twice. Then sign language.

384. ಅಭ್ಯಾಸ Habit
Place palm horizontally facing mouth and move it downwards and outwards at chest level.

385. ರೂಪಾಯಿ Rupee
Form C handshapes facing each other in front of chest then pull the same handshape apart to either side of shoulder.

386. ಆದಾಯ Income
Sign money then place palm facing upwards in front of chest, hold (2). Then place slightly cupped palm fingers apart on fingerstips of 2 and move towards body closing into fist at the same time.

387. ತೂಕ Weight
Place palms, faicng upwards at chest level and move them alternately up and down as if using a weighting scale.

388. ವಯಸ್ಸು Age
Form a C handshape below chin and move it slightly upwards and downwards twice.

389. ಭೂಪಟ Map
Form L handshape in front of chest, hold (1) . Trace a V shape with the index finger of other hand,
away from hip.

Vocabulary related to prepositions

390. ಮಧ್ಯೆ Among
Move index finger, pointing downwards in a circle then lower index finger at centre of circle.

391. ಹಿಂದೆ Behind
Place first in front of chest thumb facing up, hold (1) . Place the other fist on thumb of 1 and move it backwards.

392. ಕೆಳಗೆ Down
Move index finger from side of chest vertically downwards to waist level.

393. ದೂರ Far
Place slightly cupped palm in front of chest (palm facing body) , hold (1) . Place tips figners of the other palm fingers of 1 and move it away from 1.

394. ಇಲ್ಲಿ Here
Move open palm, facing outwards slightly downwards at side of waist.

395. ಮುಂದುಗಡೆ In front of
Place fist in front of chest, thumb facing up, hold (1) . Place the other fist on thumb of 1 and move it slightly upwards and forwards, horizontally, halt against each other at chest level.

396. ಹೊರಗೆ Out
Place plam facing chest then move it upwards and away from shoulder, palm facing backwards.

397. ಕೆಳಗೆ Under
Place palm facing downwards at centre of chest, hold (1) . slide the other palm facing upwards (fingers pointing away from body) below 1.

3 98. ಮೇಲೆ Up
Move index finger from shoulder level vertically above head.

Vocabulary related to health

399. ರಕ್ತ Blood
Sign red then move index finger down back of palm as if outlining a vein.

400. ಆರೋಗ್ಯ Health
Move both index fingers inwards from shoulders to waist level and end in F handshapes at waist with palms facing outwards.

401. ಆಸ್ಪತ್ರೆ Hospital
Form a cross at centre of chest with the index and middle fingers of both hands.

402. ಔಷಧಿ Medicine
Place open palm facing upwards at chest leve, hold (1) . Move index finger in a circular motion of 1. Then grasp tip of bent index finger with tip of thumb and place near mouth.

403. ರೋಗಿ Patient
Place back of plam on side of neck the sign person

404. ಚರ್ಮ Skin
Pinch the skin of arm with thumb and index finger of other hand.

405. ಉಷ್ಣಮಾಪಿ Thrmometer
Shake index finger as if shking a thermometer then place index finger in armpit.

406. ಗಾಯ Wound
Move index figner just below elbow leel of the other hand indicating a cut.

407. ಕ್ಷ-ಕಿರಣ X-Ray
Sign X at centre of chest - Place open palm facing upwards at side of body, hold (2) - Spread tips of fingers and thumb on 2, then move up grasping tips of fingers with tip of thumb.

Vocabulary related to places

408. ನಗರ City
Place palm facing sideways, figners slightly apart at centre of chst, hold (1) . Press the tips of gingers to tip of thumb of the other hand and place a the centre of 1. Then move both palms to side of body so that they face each other.

409. ದೆಹಲಿ Delhi
Fingerspell D at centre of chest twice

410. ಹಳ್ಳಿ Village
Place Tips of fingers against each other at centre of chest as if indicating the roof of a house. Then form a semi circle, slightly away from body with palms facing body (at waist level) and move in a semi circle towards body.