

**THE ORDER OF S, O, V STRUCTURES IN SIGN LANGUAGE USERS
WITH HEARING IMPAIRMENT: INFLUENCE OF VERBAL NATIVE
LANGUAGE?**

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CERTIFICATE

This is to certify that this dissertation entitled "*The order of S, O, V structures in sign language users with Hearing Impairment: Influence of verbal native language?*" is the bonafide work submitted in part fulfillment for the degree of Master of Science (Speech - Language Pathology) of the student with Register No. 07SLP012. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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DECLARATION

I hereby declare that this dissertation entitled "*The order of S, O, V structures in sign language users with Hearing Impairment: Influence of verbal native language?*" is the result of my own study under the guidance of Dr. R. Manjula, Professor of Speech Pathology, Department of Speech-Language Pathology, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier to any other University for the award of Diploma or Degree.

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~ Author Unknown

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Piglet sidled up to Pooh from behind. "Pooh!", she whispered. "Yes, Piglet?" "Nothing", said Piglet, taking Pooh's paw. "I just wanted to be sure of you."

~ A.A. Milne

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INTRODUCTION

“As long as we have deaf people on earth, we will have sign language. It is my hope that we will all love and guard our beautiful sign language as the noblest gift God has given to deaf people.”

~ George W. Veditz (1913).

A language is a dynamic set of visual, auditory, or tactile symbols of communication and the elements used to manipulate them. The understanding of languages deals with the study of how the language works i.e. in terms of syntax, semantics, morphology, phonology, etc and this study is termed as linguistics. Hall (1968) defined language as the institution whereby human beings communicate and interact with each other by means of habitually used oral – auditory arbitrary symbols.

Sign language is a language which uses manual communication, body language and lip patterns instead of sounds to convey meaning—simultaneously combining hand shapes, orientation and movement of the hands, arms or body, and facial expressions to express fluidly a speaker's thoughts. In linguistic terms, sign languages are as rich and complex as any oral language, despite the common misconception that they are not "real languages". They have complex grammars of their own. Signs are conventional in nature, often arbitrary and do not necessarily have a visual relationship to their referent, as in most of the spoken languages. Sign languages are used most commonly by those individuals who have Hearing Impairment. Woodward (1977) identified several language

families based on hypothesized relationship between known sign languages. American Sign Language (ASL) belongs to the French sign language family and British Sign language (BSL) belongs to the British sign language family. Other families identified include Asian and South American, Egyptian, Indian, and Malaysian.

The structure of sign languages as used in different countries, for example, American sign language (ASL), British sign language (BSL) differ from each other in terms of their structure to represent syntax, morphological units, lexicon and other features. Sign languages are natural languages that arise spontaneously wherever there is a community of communicators; they effectively fulfill all the social and mental functions of spoken languages; and they are acquired without instruction by children, given normal exposure and interaction. These characteristics have led many linguists to expect sign languages to be similar to spoken languages in significant ways. But sign languages are different too. Sign languages exploit a completely different physical medium from the vocal-auditory system of spoken languages. These two dramatically different physical modalities are also likely to have an effect on the structure of the languages through which they are transmitted. Thus, sign languages have their own unique phonology, morphology and syntax; which is essentially not similar to the spoken languages. Like oral languages, sign languages also have an organization of elementary, meaningless units called 'cheremes' (Stokoe, 1960) which are bound into meaningful semantic units. The elements of a sign are **H**andshape (or Handform), **O**rientation (or Palm Orientation), **L**ocation (or Place of Articulation), **M**ovement, and **N**on-manual markers (or Facial **E**xpression), which are summarized in the acronym '**HOLME**'. These parameters are common for all the sign languages used across the world.

In sign languages, syntax is primarily conveyed through a combination of word order and non-manual features. One of the controversial areas in the area of sign

language research is the sign language syntax. There are different viewpoints pertaining to the signed word order. Major research is carried out in American Sign Language and British Sign Language, and other sign languages like Israeli Sign Language, Sign Language of Netherlands, Brazilian Sign Language etc. Indo-Pakistani Sign Language is the name of the sign language used in the areas of India and Pakistan. Owing to the large area of this region and many multicultural variations found in this area, various sub types of Indo-Pakistani Sign Language have been identified namely, Delhi Sign Language, Mumbai Sign Language and Bangalore -Madras Sign Language.

A major issue in the area of research that less addressed is the influence of word order of the verbal language to which the person with Hearing Impairment who uses sign language belongs, on the order expressed in the sign language of that individual. There are no studies which have addressed this topic and it is quite understandable because most of the well studied sign languages such as ASL and BSL originate from countries which are essentially monolingual. The implication of this is that it does not facilitate cross language comparisons in terms of the influence of native verbal language on sign language or the influence of one or more verbal language over the sign language usage. India is a multilingual country with 114 languages belonging to four distinct linguistic families: Indo-Aryan, Dravidian, Tibeto-Burman and Austro-Asiatic. All these language communities essentially have individuals with hearing impairment using sign language as their predominant means of communication. Thus, the scope to address the issue of influence of verbal language word order on the order of emergence of structure in the sign language is abundant in India.

This study attempts to look into the influence of the word order in the verbal language on that of the order of emergence of structure S, O, V in the sign language in all the four Dravidian Languages (Kannada, Malayalam, Telugu and Tamil) and Indo-Aryan Language (Hindi). All these languages have been found to have SOV as their predominant word order. Thus, it is interesting to address the issue of the influence of the word order of verbal language on the structured expressions in persons with Hearing Impairment using sign language belonging to various native language backgrounds. The specific issues addressed in this study include questions such as:

- (1) What is the influence of the verbal language word order, on the subject, object, verb (SOV) order patterns that emerge in sign language users presented with a limited topic as stimuli?
- (2) If there is an influence of the verbal language, what kind of patterns emerge in the sign language expressed by the persons with Hearing Impairment belonging to these verbal language backgrounds?

This study is a preliminary attempt made to understand the emerging order of Subject, Object and Verb structures in the sign language used by persons with Hearing Impairment belonging to five verbal languages, viz., Kannada, Malayalam, Telugu, Tamil (belonging to Dravidian language family) and Hindi (belonging to Indo – Aryan language family). The outcome of the study will facilitate comparison of the emerging word order in the sign language expressed by persons with Hearing Impairment and will throw light on the influence of the verbal language if any, on the signed order by persons with Hearing Impairment. It can indirectly

contribute in understanding the factors which have led to the finding of different types of signs used by persons with Hearing Impairment residing in different states in India, even different regions/ districts within a state of India. It will help in understanding the linguistic constraints if any in the variations seen in the sign languages of persons with Hearing Impairment from region to region in India.

Aims of the study

- Compare the sequence in which the Subject, Object, Verb (SOV) signs occur in the sign language produced by individuals with hearing impairment belonging to five verbal native languages (Kannada, Malayalam, Telugu, Tamil and Hindi) and investigate if there is any similarity between the sequences of SOV in signs used and
- Understand the influence of mode of communication by the signers and others in the family on the use of SOV sequence of signs as tapped through a questionnaire.

Method

90 subjects belonging to the verbal native language background of Kannada, Malayalam, Telugu, Tamil and Hindi languages participated in the study. They were made to fill a questionnaire through which basic information regarding the mode of communication used by them and their significant surroundings. Then, they were asked to produce signs for a related picture sequence which was selected such that it had scope for occurrence of Subject, Object and Verb for each card. Open ended instructions were provided and they were asked to narrate

the sequence action seen in the picture cards through signing as slowly and clearly as possible. The signs produced were video-recorded and later analyzed by 3 judges who were sign language interpreters by profession. Each judge identified the 'Base unit' which is an operational unit defined for this study. Each judge analyzed the samples individually and coded for the occurrence of 'base units' identified. Inter-judge reliability was checked to establish the reliability of coding and α coefficient was found to be > 0.8 .

The raw data obtained from the three judges was compiled, tabulated and treated statistically to verify the specific aims of the study.

Limitations of the study

1. Some Personal variables of the subjects like influence of third language, detailed information regarding the mode of communications in various situations, type of schooling etc were not controlled.
2. Gender variations were not taken into consideration due to small sample size.

REVIEW OF LITERATURE

The history of sign languages is not the same as spoken languages because they arise due to special conditions. This is the reason why they can offer unique insight into essential features of human language. Wherever Hearing Impaired individuals have an opportunity to interact regularly, a sign language is born. Hearing Impaired individuals make up a very small percentage of the population. It is estimated that lesser than 1 in 20 (around 10,000,000 persons) are hard of hearing in the United States (Mitchell, 2005) and approximately 291 persons per one lakh population (National Sample Survey Organisation, 2002) in India.

Origin of sign language

The most common setting in which a community of persons with Hearing Impairment can be formed is a special school. Earliest data about the establishment of such schools dates to about two hundred years ago in Europe and North America. On the basis of this historical information and some others based on observations of groups of people using sign language, it is assumed that the oldest of the sign languages does not date back farther than about 300 years (Woll, Sutton-Spence & Elton, 2001). Only recently, linguists have had the rare opportunity to observe the emergence and development of a sign language from the beginning in a school established in Nicaragua only about 25 years ago (Sandler, 2005).

The genesis of a sign language is not only special; but also, the way in which it is passed down from generation to generation is unusual as well. Typically, fewer than 10% of Hearing Impaired children acquire sign language from deaf parents, and of those deaf parents, only a small percentage are themselves native signers. The other 90+% of these children have hearing parents and may only be exposed to a full sign language model when they get to school (Fischer, 1978). Another way in which emergence of sign language in a social group has been observed is through the propagation of a genetic trait within a small village or town through consanguineous marriages which would result in a proportionately high incidence of Hearing Impairment, and thus, the spread of the sign language among both hearing impaired and hearing people. This kind of situation can allow a linguist to observe the genesis and development of a language in a natural community setting (Groce, 1985).

Approximately 121 sign languages are reported to exist in the world (Gordon Jr., 2005). It is felt that probably this figure is an underestimate because it is observed that a highly structured communication system among humans, the manual-visual modality emerges inevitably when the oral-aural channel is unavailable (Sandler, 2005). Hearing Impaired children who live in hearing households where only oral language is used, who have not yet experienced speech training, and thus have no accessible language model, devise their own systematic means of communication called home sign (Goldin-Meadow, 2003). At the same time, the form and content of home sign are rudimentary, and do not approach the richness and complexity of a language used by a community, spoken or signed.

Sign language syntax

For a long time, sign languages have been regarded as somewhat disreputable related of spoken language. Sapir (1921) described it as a derivative of spoken language and later Bloomfield (1935) stated the same view as well, listing the 'deaf-and-dumb' language alongside writing and telegraphy. He also suggested that many of the complicated and not immediately intelligible gestures are based on the conventions of ordinary speech; reason being that gestures played a secondary role in communication under the dominance of language for a long time that they have lost their independent character. But the authors did not cite any evidence for their judgments.

All the languages of the world are categorized according to the order of the main elements of the sentences: subject, verb and object. The information about which element is the subject and which element is the verb may be given through three ways:

1. Inflectional morphology
2. The form of the word
3. Word order

Syntax, whether in verbal language or in sign language, begins with phrase structure. It is the set of properties which determine the construction of sentences in that language (Hawkins, 2001). It involves uncovering those properties of a sentence which are involved in the construction of grammatical sentences in a particular language like *agreement* (do all verbs agree with their subjects?, Do the verbs agree with their objects?), *selection* (what kind of complements do verbs select?), *adjacency* (what kinds of categories must be adjacent?) and

movement (what kinds of categories can move?, Where do they move or where do they move to?) (Hawkins, 2001).

In spoken languages, there are conventional markings in the beginning and end of the sentences. The order of words in a language is as important as is the meaning. If the words or signs are not combined to the syntactic rules of that language, then the meaning is either changed, lost or becomes unclear. The same holds good for sign languages as well. The major breakthrough in the area of sign language syntax research began with sign language studies in American Sign Language (ASL). Amongst the 121 existing sign languages in the world (Gordon Jr., 2005), American Sign Language (ASL) has been studied most extensively.

American Sign Language (ASL)

American Sign Language (ASL) is the dominant sign language of the Deaf community in the United States, Canada, and in some parts of Mexico. The number of Primary users of American Sign Language users is estimated to be 1, 00, 000 to 5, 00, 000 (Padden, 1987).

One of the earliest data regarding the word order of ASL was obtained from the study by Keep (1871) who identified SOV as the basic order of ASL. This historical evidence suggests the difference between the ASL of the 1870s and the modern day ASL. McCall (1965) studied the American Sign Language (ASL) and took Chomsky's earlier version of Transformational Grammar (Chomsky, 1957) as the framework for analysis and postulated rules for the generation of the phrase structure. One of the rules generated by McCall (1965) was called as 'adverb of

emphasis' followed by a noun phrase, a predicate, and a time marker. All of these, except the predicate, are optional indicated in Example 1.

Example 1

(Adv_e) (NP) Pred (T)

(Maybe) (John) help (tomorrow)

(Adv_e – Adverb of Emphasis

NP – Noun Phrase

T – Time marker)

McCall (1965) supported the view that sign languages have grammar by stating that those who are conversant with signs can indicate whether or not a particular construction is typical of manualism and this is only possible if there exists any grammar. McCall's (1965) analysis suggested that many of the features of ASL were similar to the spoken language. This has been attributed to the fact that McCall (1965) studied ASL that was apparently of a higher variety and thus the subjects had bilingual interference from the spoken language. Thus, if fixed order is considered according to this study, it is not necessary that other sign languages would also have the same kind of word order expression if they are relatively uninflected by the spoken language.

The proposal that basic order in ASL is Subject-Verb-Object (SVO) was supported by Fischer (1975) who claimed that SVO is the order that one finds in a sentence with reversible subject and object. Fischer (1975) also suggested the possibility of other orders as well which generally accompanied intonation breaks. Intonation breaks are accomplished by pausing and non-manual markers (Example2):

Example 2

a)	Signed expression	<i>man notice child</i>	SVO
	English	The man noticed the child	
b)	Signed expression	<i>child, man notice</i>	OSV
	English	As for the child, the man noticed it.	
c)	Signed expression	<i>notice child, man</i>	VOS
	English	He noticed the child, the man did.	

Fischer (1975) reported that in examples like sentence (2b), the object is topicalized, and in examples like sentence (2c), the subject or perhaps the verb phrase is topicalized. It was also observed that it would be possible to have SOV order or even OVS order when there is only one plausible way to interpret the grammatical relations in the sentence. In Example 3, alternative orders for semantically “non-reversible” prepositions are cited by Fischer (1975).

Example 3

- | | | |
|----|-------------------------------|------|
| a) | <i>man must b-i-l-l-s pay</i> | SMOV |
| b) | <i>man must pay b-i-l-l-s</i> | SMVO |
| c) | <i>boy like ice-cream</i> | SVO |
| d) | <i>boy ice-cream like</i> | SOV |
| e) | <i>ice-cream like boy</i> | OVS |
| f) | <i>like ice-cream boy</i> | VOS |
| g) | <i>ice-cream boy like</i> | OSV |

(M – must

b-i-l-l-s – finger spelling)

Example 4 cited by Fischer (1975) shows that other “non-idiomatic” cases only permit OV order.

Example 4

- | | | | |
|----|-------------------|--------------------------|----|
| a) | Signed expression | <i>water turn-faucet</i> | OV |
| | English | Turn on water | |
| b) | Signed expression | <i>movie flash-flash</i> | OV |

	English	Take movies	
c)	Signed expression	<i>neck cut-off</i>	OV
	English	Slaughter, as a chicken	

Fischer (1975) also discussed about the process known as *verb agreement* and indicated that it is related to the possibility of orders other than SVO. With agreeing verbs, OSV is preferred over SOV for articulatory reasons. If the object is signed in location (a), then the subject in another location (b), the hand will then be in proper position for the verb to move from the second location to the first location (a-noun, b-noun, b-verb-a). However, if the subject is signed in location (a) first, then the object in another location (b), an extra movement (back to a) will be required to move from the first location to the second location (a-noun, b-noun, a-verb-b). Fischer (1975) claimed that the extra movement required in an S-O-sVo sequence would render it as dispreferred. Thus, according to Fischer (1975), following orders were identified as grammatical in ASL:

Table 1: Summary of word order in ASL identified by Fischer (1975)

<i>Word order</i>	<i>Comment</i>
<i>SVO</i>	The underlying order
<i>O,SV</i>	Topicalised object
<i>VO,S</i>	Topicalised Verb Phrase

<i>SOV</i>	Nonreversible subject and object or grammatical relations shown by the direction or orientation of the verb
<i>OVS</i>	Nonreversible subject and object (OVS order is regarded as ungrammatical)

Friedman (1976) argued against Fischer's (1975) analysis claiming that several orders occur in ASL and that the word order is of no grammatical significance. Friedman (1976) claimed that word order is relatively free, with the exception of the tendency for the verb to be at last. Further, SVO order is infrequent in discourse, in which case the phenomenon of semantic reversibility determine the interpretation of nouns and context and rewording avoids ambiguity, if any. Friedman (1976) also did not agree with the grammatical process of verb agreement and described the movement of the hand in pronouncing the verb as an iconic device to aid interpretation.

Liddell (1980) critically evaluated both Fischer's (1975) and Friedman's (1976) accounts and argued that Friedman's (1976) proposals were not convincing. Although there was some variability in order for declaratives, the only grammatical order corresponding to the yes/no question was SVO as shown in Example 5.

Example 5

Signed expression _____q

woman forget purse

English Did the woman forget the purse?

(q – Question)

The specific rule of “Topicalisation” was proposed by Liddell (1980). According to Liddell (1980), Specific timing, Facial expressions and Head position marked topicalisation and topics were held longer in the noun phrases than in other parts of the sentence. Liddell (1980) also proposed that particular structures are associated with topicalisation by using evidence from the interaction of topic marking and the handshake marking negatives. A topic can be outside the scope of a negative marker where only the verb phrase is associated with the negative handshake as shown in Example 6.

Example 6

Signed expression _____t _____n

dog chase cat

(t – topic

n – negation marker)

In accordance with Fischer's (1975) claims, Liddell (1980) also claimed that an object or a VO sequence could be topicalised when there is interaction with negation. In such a case, the topicalised object was not marked for negation (as seen in Example 7a) and in some other cases, the topicalised verb phrase is not marked for negation (as seen in Example 7b).

Example 7

a) Signed expression *__ t _____ n*

cat dog chase

English

As for the cat, the dog did not chase it.

b) Signed expression *_____ t __ n*

chase cat dog

English

As for chasing the cat, the dog did not do it.

Liddell (1980) further cited that basic word order analysis was rendered difficult because certain sequences of Subject, Object and Verb were grammatical and did not contain any non-manual marking as shown in Example 8.

Example 8

a) Signed expression *man book read*

English

The man read the book.

- b) *woman pie put-in-oven*
- c) *me bicycle buy*

Example 9

- a) *man movie see*
- b) *man number forget*
- c) *boy candy not like*

Liddell (1980) claimed that some kind of ‘mimetic’ relationship distinguished the acceptable as shown in Example 8 from the ungrammatical ones as shown in Example 9. For example, with respect to 8(b), he claimed that for such a sequence to be acceptable, the hand which is used as the base hand for *pie* is used as the active hand for the sign *put-in-oven*. Thus, the iconicity of the sequence is important for this Subject – Object – Verb sequence.

Liddell (1980) also observed exceptions when the sentence constructions involved *classifiers* as shown in Example 10.

Example 10

Signed expression	<i>fence 4-cl</i> ----- <i>cat v-cl on 4-cl</i>
English	A cat is lying on the fence.

(*4-cl* – size and shape classifier representing the fence.

v-cl – a semantic classifier for small animals.)

In the Example 10 cited above, an order other than SVO is evident. The classifier subsystem involves spatial or locative relations with verbal components and thus *figure-ground relationship* becomes evident here. Liddell (1980) argued that '*fence*' in Example 10 is not a grammatical object as in the English translation of the signed expression. Thus, *fence* represents the surrounding i.e. ground and *cat* represents the main entity i.e. figure and the figure-ground relationship is thus established. In such cases, the basic order was *Locative Object-Locative Subject-Locative Predicate* as opposed to the basic Subject-Verb-Object order for ordinary transitive verbs.

Overall analysis of the phrase structure in ASL as carried out by many researchers suggests that the unbeatable order of ASL is Subject – Verb – Object (SVO) as in the spoken

language. Other Sign language which has been extensively researched is British Sign Language (BSL).

British Sign Language (BSL)

British Sign Language (BSL) is the sign language used in United Kingdom (UK), and is the first or preferred language of deaf people in UK where the number of signers has been put at 250,000 BSL persons with Hearing Impairment as well as 125,000 hearing people who use BSL (British Deaf Association, 2007).

A terminology known as “Proform” is identified in BSL and understanding proforms is very essential to understand the syntax of BSL. Proforms are similar to pronouns. A “pronoun” is defined as something that occurs in place of a noun. Similarly, “Proform” is anything that refers to, and stands in the place of; something previously identified (Sutton-Spence & Woll, 1999). So, pronouns and proforms may seem to be the same. But in case of sign language, the term pronoun is used to mean *I, you, he, she, it we them etc.*, and proform is more specific only to BSL.

Pronouns are articulated by pointing (or indexing) to the location associated with the noun. The form of indexing used is same in all pronouns, but the location varies depending upon the specific location that is assigned to that noun. This is depicted in Figure 1.

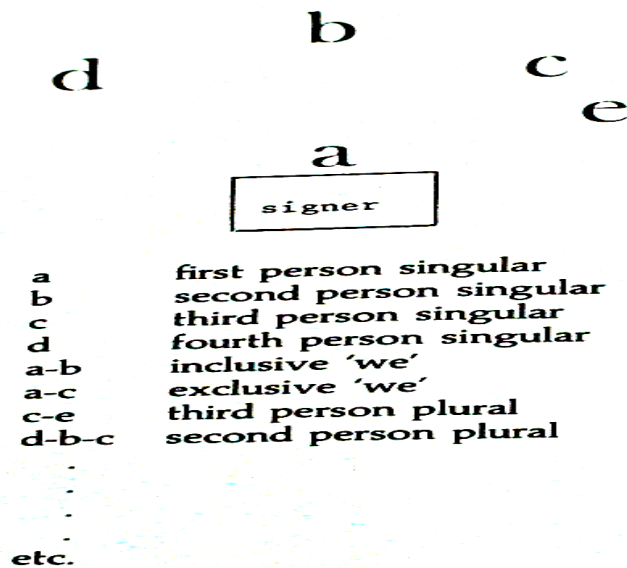


Figure 1: Pronominal Reference. (Cited from: Kyle and Woll (1988). *Sign language: The study of deaf people and their language*, Page 138).

Pronouns in BSL are similar to the pronouns in English, but there are five main differences:

1. *There is not distinguishing feature for 'he' and 'she' in BSL but in English, it is present:* Even English does not make gender distinctions in some pronouns like 'they' which can be used to refer to more than one woman, more than one man or a group of men and women.

2. *There are more pronouns in BSL than in English:* In English, the categories of pronouns are only present for one and for more than one. Example: For 'singular'- I, you, he, she, it. For 'plural'- we, they. *They* covers *he*, *she* and *it*, whereas *you* is same for singular as well as plural. In BSL, there are pronouns for one, two, three, four and five and many. Thus, instead of limiting to we as in English, BSL has WE-TWO, WE-THREE, WE-FOUR and WE-FIVE as well as WE-ALL and EACH-ONE-OF-US.

3. *Possessive pronouns are not always used in BSL as is used in English:* In BSL, generally pointing is used for possession. The usual possessive pronouns are with closed fist (MY, YOUR, OUR).

4. *BSL pronouns depict additional information about the noun which is not present in English:* Example - TEACHER Index₃ (sign for TEACHER and then point which means 'the teacher, he...'), here the pronoun refers to teacher as well as the location where he is.

5. *The English pronoun it refers to almost everything that is not a person:* BSL uses a simple point with the index finger to refer to 'it', but it also uses so many different handshapes for different shaped and sized referents. This special group of pronouns is given the term 'proforms'.

When a signed sentence includes a proform, then the full sign is produced normally first for the referent to identify, followed by the proform. There are three basic groups of proforms that are frequently used in BSL. There is also a fourth handshape that is slightly different.

1. *A single finger ('G')* stands for referents that are long and thin like PERSON, PENCIL, TOOTHBRUSH etc. It is used when an object is represented having one dimension i.e. length or height.
2. *A flat hand ('B')* stands for referents with two dimensions like BED, PLATE, TABLE, CAR, PICTURE etc. The 'B' hand occurs in different orientation as well like palm-down (e.g. FAX); palm-up (e.g. PLATE) and palm-sideways (e.g. WALL). There are differences in the proforms used across sign languages. Irish sign language and ASL uses palm facing sideways as a proform for cars and other similar vehicles which represents length and depth. Whereas, BSL proform has the palm facing down that represents length and width. Thus, though these different languages are focusing different dimensions, but still CAR is represented as two dimensional.
3. *A curved 'clawed' hand ('5')* stands for referents represented as having three dimensions like BUILDING, ROCK, CAKE etc. There are different hand orientations present for this handshape as well; one with palm facing sideways (e.g. MUG) and other with palm facing down (e.g. HOUSE). This represents length, width and depth.
4. *Two extended fingers and spread ('V')* does not focus on dimensions. This focuses on the legs of a person or animal. This proform is used to represent the movement or location of a person or animal previously identified.

But unlike proforms, pronouns are “zero-dimensional” i.e. they do not have “dimensions”. The sign used points to the area that refers to the place where the person or thing is placed but there is no reference to shape. Proforms use only one hand, and are not body-anchored. Thus, they can be placed in different locations, repeated and moved. Whereas, full signs use both the hands and are anchored to the body, thus restricting the freedom of movement. It has been noticed that proforms are not used for such one handed signs that are made in the space in front of the body because signs themselves are free to move. The placement and movement of signs in space indicates their relationship to each other.

The sign order of BSL has its own rules which are very different from the rules of English. As mentioned earlier, to use the proform, it is necessary to sign the full sign and then the proform. There are important rules related to the order of adjectives and nouns as well. BSL usually puts adjective second whereas English puts adjective first. BSL can also build adjectives into nouns by changing the form of the noun. For example, it is possible to sign BOX SMALL, it is found that the sign with the size or shape incorporated is more common. Also, incorporating adjectives into nouns is seen in the form of noun’s proform, for Example *book thick-book*.

The time frame in BSL is marked at the beginning of the signer’s first sentence. Thus, all the sentences are assumed to be following the same time order till the time frame is changed. For example, *yesterday girl eat cake* (English: The girl ate the cake yesterday; ungrammatical form in BSL: *girl eat cake yesterday*). Time marker ‘been’ is the general time marker that is used to set the time frame followed by more specific information. For example, *yesterday been*

lecture me or *been lecture me yesterday* are the acceptable sign forms because the general time frame 'past' is set up at the beginning of the specific information.

The question marker sign is usually placed at the end in BSL as shown in Example 11:

Example 11

a)	Signed expression	<i>keys where</i>
	English	Where are the keys?
b)	Signed expression	<i>tom who</i>
	English	Who's Tom?
c)	Signed expression	<i>tickets how many</i>
	English	How many tickets?
d)	Signed expression	<i>train leave what-time</i>
	English	What time does the train leave?

Questions like 'what time' are single units in BSL. Also, the question sign may be placed at the beginning as well as the end of the sentence as shown in Example 12:

Example 12

where keys where

Sometimes nouns come before verbs and sometimes verbs come before nouns in BSL. There are several reasons for this. As mentioned earlier, noun comes first when proform is used in the verb, for example, CAR Veh-CL-BACK-UP. Other factors come into being if proforms are not involved. The type of order followed depends on the type of verb. There are two types of verbs namely:

a) *Effective*- These verbs make something exist. Example: bake, light, paint.

When a sentence consists of an effective verb, then the verb comes before the noun as shown in Example 13:

Example 13

a) *bake cake*

b) *light fire*

c) *paint painting*

b) *Affective*- These verbs act on something that already exists. Example: pack, break, paint.

When a sentence consists of an affective verb, then the noun comes before the verb as shown in Example 14:

Example 14

- a) *food pack*
- b) *glass break*
- c) *wall paint*

1. Inflectional morphology in BSL

BSL includes more information in verb than English language. There is variation seen in the direction of the movement of the verb as well as the orientation of the hand. This is illustrated in the Figure 2. Here, in *i-ask-you*, the palm faces outward; whereas in *you-ask-me*, the palm faces towards the signer.

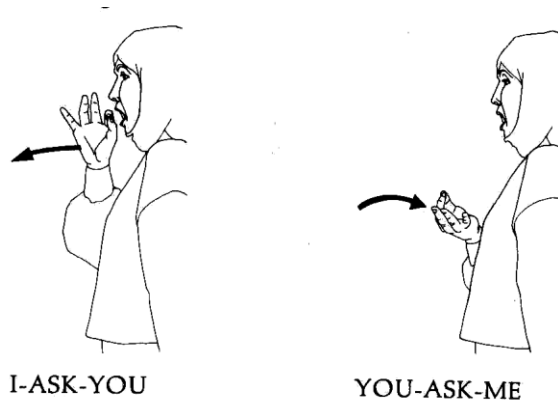


Figure 2: Reversing Verb. (Cited from: Kyle and Woll (1988). *Sign language: The study of deaf people and their language*, page 139).

2. The form of the word in BSL

A pronoun change is seen depending on whether the subject or object is the topic of discussion in English language. Example: *I like mice* or *He likes mice*. Here *I* and *He* are used for

subjects. Example: *mice like me* or *mice like him*. Here *Me* and *Him* are used for objects. But in BSL, there is no difference between the pronouns for the subject or the object.

3. *Word order in BSL*

There are three basic elements of a sentence i.e. S, V and O; and there are six ways that they can be ordered (SVO, SO, OVS, OSV, VOS and SOV). Where languages are highly inflected, sign order is less important as the relationship between the subject and object is represented by the inflectional morphology. Such languages are free of the sign order.

Like spoken languages, even the sign languages have a varied order for occurrence of S, O, V. To some extent, the order of the signs is influenced by the spoken language of the community. But there is variation in the importance of word order in identifying the subject and object between English and BSL. On one hand, word order is very important to identify the subject and the object in English (Example: Jane smiled at Mary; only the word order tells us who smiled at whom); but in BSL, sign order is not so important. This is because there is extra information carried in the verb and some other non-manual cues such as role shift and eye gaze changes which make the meaning clear.

Influence of English on the order of BSL signs is also seen in many ways:

1. It may occur when sign language is the second language. In such a case, the order of spoken language influences the signing.

2. Signers who are fluent in English choose to use more of English sign order with other signers who have better English and limited BSL.
3. In formal situations, the need of using Signed English is often felt by the signer.
4. The influence of the English word order is seen more when the signer is translating from text.

In BSL, the topic is established first followed by the comment on the topic. Thus, the topic is the subject of the sentence. It does not have fixed role. It can also be the focus, some old information, theme of the discourse till the next theme is established, or the person or thing upon which the conversation is centered. On the other hand, comment is the predicate. It is the new information about the topic. In BSL, the topic is marked in several ways:

- a) Topic comes first.
- b) It is always followed by a pause as shown in Example 15:

Example 15

Signed expression

school (pause) letter send

English

It was the school that sent the letter

- c) Eyes are widened during the topic as shown in Example 16:

Example 16

Signed expression

_____ wide eyes ____ question

sister before live America (pause) now come-back

English

Is your sister who was living in America, back now?

d) It can be accompanied by a head nod as shown in Example 17:

Example 17

Signed expression

__hn

dog cat chase

English

It's the dog that chases the cat

(hn – head nod)

e) The topic may be signed and held with one hand while producing the comment with the other hand as shown in Example 18:

Example 18

Signed expression *newspaper (nd) newspaper*

(d) *read*

English It's the newspaper that I'm reading

(nd – non-dominant hand, d – dominant hand)

Different parts of the sentence serve as topics and comments. Thus, on analyzing the sentence on the basis of order of signs, the order varies and various types of sign orders are present. In such a case, any of the orders can be obtained if the topic is marked.

Example19

a) Signed Expression *girl eat cake* SVO

English As for the girl, she ate the cake

b) Signed Expression *cake girl eat* OSV

English As for the cake, the girl ate it

c) Signed Expression *eat cake girl* VOS

English As for eating the cake, the girl did it

Major contribution in the area of S, O, V order of BSL was made by Deuchar (1983) who supported the analysis of Friedman (1976) and stated that topic- prominence is the

characteristic of both BSL and ASL. Deuchar (1983) explained topic-prominence in BSL by using the following examples shown in Example 20 below:

Example 20

a)	Signed Expression	<i>clean all</i>	VO	TC
	English	I cleaned everything		
b)	Signed Expression	<i>ten.p.put in</i>	OV	TC
	English	I put in 10p		
c)	Signed Expression	<i>father fall</i>	SV	TC
	English	Father fell		

(TC – topic comment)

If these sentences are analyzed according to sign order, three different orders for the sentences are observed. Deuchar (1983) analyzed them as topic-comment. This is because topics may have a larger scope than one sentence. The topic may not appear before every verb, although it may appear at the change of topic. Topics need not be nouns. They can be adverbs as well (Example: *There*, we two go). Deuchar (1983) also points that non-manual markers may accompany the topics as shown in Example 21:

Example 21

Eyebrows:	pause	raised	
Hands:	.k.i.l.b.y	<i>before good</i>		<i>now good</i>	

This example could be translated in English as follows:

Kilby, who was good before,	is he good now?
(Topic)	(Comment)

On the basis of these evidences, Deuchar (1983) questioned the variation reported in studies. Some studies as that of Fischer (1975) and Liddell (1980) identified SVO as the basic sign order whereas others (McIntire, 1980) identified topic-comment as the basic structure of sign language sentences. In fact, the studies which reported a topic-comment structure have generally used recordings of spontaneous signing, while other studies reporting SVO structure have used elicited sentences. Thus, Deuchar (1983) suggested that communication situation may have an important effect on sentence type and thus analysis of the data in terms of the topic-comment nature may give a useful insight into the syntactic structure of a Sign language.

Indian Sign Language (ISL) or Indo-Pakistani Sign Language (IPSL)

In contrast to ASL and BSL, Indian Sign Language (ISL) or Indo-Pakistani Sign Language (IPSL) is the sign language variety that is predominantly used in the Indian sub-continent. It is used by approximately 2,680,000 Hearing Impaired in India (Gordon Jr., 2005). Vasishta, Woodward and Wilson (1978) estimated that Indian sign language is used by over 1,000,000

Hearing Impaired adults and by approximately 500,000 Hearing Impaired children. Based on population growth between 1981 (683 million according to the census) and the 2005 (estimated at 1.027 billion), approximately 1.6 million Hearing Impaired adults and 0.8 million Hearing Impaired children for a total of 2.4 million or 24 percent of all Hearing Impaired use the ISL (Johnson and Johnson, 2008). Gordon (2005) listed the number of signers as 2.68 million.

The sign order in IPSL appears to be largely indigenous. The rules of IPSL are neither similar to ASL nor BSL although some elements in IPSL are derived from British Sign Language. It does not have signs for the Devanagari script, and fingerspelling is based on the Latin alphabet. IPSL has also been found to share grammatical features with many other sign languages, including the use of space and simultaneity and the five meaningful parameters of handshape, location, orientation, movement and non-manual features such as body position, head movement and facial expression (HOLME).

Sign languages across urban India appear to share about 75% of their vocabularies, and that the Mumbai - Delhi dialect is the most influential. The following sign language families across India have been identified (Gordon Jr., 2005):

1. Mumbai-Delhi Sign Language (or separately: Delhi Sign Language, Bombay Sign Language),
2. Calcutta Sign Language,
3. Bangalore-Madras Sign Language (or Bangalore-Chennai-Hyderabad Sign Language).

One of the earliest attempts to study IPSL was made by Vasishta, Woodward and Wilson (1978). They studied the sign languages from the four major divisions of India which are expected to have some variations in the pattern of signing within the country, namely, Delhi, Bombay, Bangalore and Calcutta. The results that they obtained were as follows:

1. In simple sentences comprising of a subject and a verb relation was expressed as Subject – Verb sign order (SV) and no other grammatical marking was evident.
2. Sentences comprising of Subject, Object, Verb relation were expressed using sign order as well as various grammatical operations. Subject always preceded the object and verb occupies the final position in 95% of the sentences. Vasishta, Woodward and Wilson (1978) reported that IPSL is also a highly inflected language like American Sign Language (Kegl, 1977). It also uses signer's body orientation, reference to self and directionality and handshape modification into the verb to indicate the subject and object.
3. The expression of Subject, Verb, Object and Indirect Object relations gave different results for different cities. Although, subject occupied the initial position and verb occupied final position, there were considerable variations in the sign order beyond the general rule. The Subject – Verb – Object – Indirect Object relation in the signing patterns of these different cities emphasized the role of incorporation in ISL.

Table 2: Expression of Subject (S), Verb (V), Object (O) and Indirect Object (IO).

<i>Cities</i>	<i>Word order</i>
<i>Delhi</i>	S – O – IO – V (Incorporation of O and IO in V)
<i>Bangalore</i>	S – IO – O – V (Incorporation of O in V)
<i>Calcutta</i>	S – IO – O – V IO – S – O – V (Incorporation of O and IO in V)
<i>Bombay</i>	S – IO – O – V IO – S – O – V (Incorporation of O and IO in V)

4. Pronominal forms are used when a context has been established earlier. But no specific classifiers were observed to designate Pronouns in ISL unlike The American Sign Language. Instead, effective use of space was seen which eliminated the need for classifiers.

5. Adjectival modification seen was distinct of ISL in all the four cities and did not bear any relation with the indigenous spoken languages. It was noticed that adjectives were always placed after nouns that they modified, but with one exception. Color adjectives were always placed before the noun, particularly, when modifying object nouns.

6. Negation was always placed at the end of the sentence and this rule was applied consistently in all the cities.

7. The single past marker occurred in the sentence final position. Like the American Sign Language, even in Indian Sign Language, a time frame is generally set and no mention of it is made till shift is made.

8. Non-manual markers are seen in case of Interrogative sentences. In an attempt to produce the interrogative equivalent of a declarative sentence, forward and sideward tilting of the head, raised eyebrows or holding the hands in the position of the last sign is found.

Zeshan (2003) reported that sentences are always predicate final and generally has a verb ending. She also reported that one-word sentences are common IPSL and that there is a strong preference for sentences with only one lexical argument. Further, Zeshan (2003) commented that constituent order does not play any role in the marking of grammatical relations. These are coded exclusively by spatial mechanisms (e.g., directional signs) or inferred from the context. Topicalization of constituents was reported as a common strategy in IPSL (Zeshan 2003; Aboh, Pfau & Zeshan 2005) as shown in Example 22.

Example 22

- | | | |
|----|-------------------|--|
| a) | Signed Expression | <i>man (indefinite) walk</i> |
| | English | Someone is walking |
| b) | Signed Expression | <i>apple child eat</i> |
| | English | A child eats an apple |
| c) | Signed Expression | <i>tomorrow index1 delhi index3 go</i> |
| | English | I am going to Delhi tomorrow |

Verbal language syntax

English language

English is the most widely spoken verbal language. It is the official language of around 53 nations including United States, Canada, United Kingdom, Australia etc. The number of native speakers of English language is roughly estimated to be three hundred and nine to four hundred million, making it the 3rd most spoken language in the world. Whereas, second language users of English are estimated to be about one hundred and ninety nine to fourteen hundred million making it the most spoken second language of the world (Gordon Jr., 2005). It belongs to the Indo – European language family which includes other languages like German, French, Spanish etc. It is derived from Latin language which belongs to Indo – European Language family as well. English has an unmistakable word order of Subject – Verb – Object (SVO) (Tomlin, 1986a). It is observed that English maintains a rigid SVO word order mainly used to signal grammatical roles.

Indian Languages

India is a country of varied cultures and diversities. 114 languages have been identified as official languages in India (Gordon Jr., 2005) which belong to distinct language families namely Indo-Aryan, Dravidian, Tibeto-Burman and Austro-Asiatic. Kannada, Malayalam, Telugu and Tamil are the major languages that come in the Dravidian Language family.

A) Dravidian Language Family

a) Kannada

Kannada is one of the major Dravidian languages of India, spoken predominantly in the southern state of Karnataka. The number of native speakers of Kannada language are roughly estimated to be Thirty Five million (Gordon Jr., 2005), making it the 27th most spoken language in the world. There have been a couple of studies to identify the word order in Kannada language. Hiremath (1961) reported that there is freedom of occurrence in the expression of various words in the sentence in Kannada language, implying that the SOV usage is flexible. He also further stated that a Noun – object – verb (NOV) word order is preferred at times by the verbal language users. Schiffman (1979) also stated that the basic word order in a Kannada sentence is SOV, but other orders can be found in the language, due to stylistic variations. He further stated that sometimes in colloquial speech, the verb may be followed either by a subject or the object; and these instances were named by him as due to ‘after thought’ in the word order, since it was observed that such structures were evident when the speaker had not thought out the sentence well and wanted to add something later.

b) Malayalam

Malayalam is a Dravidian language used predominantly in the state of Kerala, in southern India. It is one of the 22 official languages of India, and it is used by around Thirty Seven million (Gordon Jr., 2005) making it the 26th most spoken language in the world. Peet (1980) stated that noun precedes its governing particle and the finite verb always closes the sentence in Malayalam language. Adverbs are placed before the verbs and adjectives or sometimes in any part of the sentence. Verbs of intensity are used with principal verbs in any part of the sentence. Mohanan (1982) stated that the consistent pattern of constituents of a sentence and components of Noun Phrases (NP) is essentially operator/operand (according to

the distinction proposed by Vennemann, (1974), with adjuncts preceding the head, or in other words, the head occurs at the end. Further, Asher and Kumari (1997) illustrated that though the basic word order for Malayalam is SOV, there is considerable freedom of word order. This is because of the fact that function of NP is clearly shown either by case marker or postposition, or a combination of both. Whereas, freedom of movement is slightly less in subordinate clauses as for example, head noun is always final in adjective clauses, and verb form + marker of subordination may conclude noun clauses and adverb clauses (Asher and Kumari, 1997).

c) Telugu

Telugu is a Dravidian language used predominantly in the state of Andhra Pradesh, in southern India. It is one of the 22 official languages of India, and it is used by around Seventy million (Gordon Jr., 2005) making it the 14th most spoken language in the world. Subhramanyam (1974) reported that verb occupies the final position in the sentence, and there is an object in the sentence then it usually precedes the verb in Telugu language and the subject occupies the first position in the sentence. When the subject is a proper noun, then it is expressed in the first sentence and omitted in the subsequent sentences in which the same subject is being mentioned. But if the pronoun takes the position of a subject, then it is omitted since the finite verb in the sentence contains the corresponding pronominal suffix. Adjectives always precede the noun that they represent and the position of adverbs of time and place is not fixed. But generally, they can occur at any position in the sentence. Krishnamurti and Cwynn (1985) stated that when there exists a transitive verb in the sentence, then the natural word order of words is noun (subject) - noun (object) – verb. They also added that Adverbs of time mark the beginning of the sentence, even before the subject. Also, other words come between the subject and the verb and may either precede or follow the object.

d) Tamil

Tamil is a Dravidian language used predominantly in the state of Tamil Nadu, in southern India. It is one of the 22 official languages of India, and it is used by around Sixty eight million (Gordon Jr., 2005) making it the 17th most spoken language in the world. Kerslake and Aiyar (1953) reported that verb always comes in the last and the object always precedes the verb in Tamil sentences. So the unmarked word order of Tamil language is Subject – Object – Verb (SOV). This principle is followed by the adverbial parts of the sentence as well. They mentioned some other rules for the sentence word order as well. They are stated as follows (Kerslake and Aiyar, 1953):

1. An adverb always precedes the verb it modifies.
2. A word in the generative case always precedes the noun on which it depends.
3. The comparison always precedes that which is compared.
4. The similitude always precedes that which is similar.

In general, the unmarked word order of constituents in a sentence is subject-object-verb (SOV) in the Dravidian languages (Krishnamurti, 2003).

B) Indo – Aryan Language Family

a) Hindi

Hindi belongs to Indo-Aryan Language family. It is one of the 22 official languages of India, and it is used by around Eight Seventy Three million (Gordon Jr., 2005) making it the 2nd most spoken language in the world. Books on Hindi grammar released by the Ministry of Human

Resource and Development (Sharma, Chatterji, Satyanarayana, Saksena and Nene, 1994) gave the following rules for the normal word order in Hindi:

1. When a sentence has an Intransitive Verb, then the word order found is subject – Verb (SV).
2. When a sentence has a Transitive Verb, then the word order found is Subject – Object - Verb (SOV).
3. When a sentence consists of a Transitive verb with two objects then the word order followed is Subject – Secondary Object – Primary Object – Verb (S 2^oO 1^oO V).
4. Adjectives are placed immediately before the noun that they qualify.
5. Adverbs are usually placed before the verb.
6. Negation denoting words are placed before the verb.

It is noteworthy that all these varied cultures have individuals with hearing impairment who would use Sign Language. Thus, it seems natural that there would be influence of these spoken languages on the sign language used by these individuals as a result of their interaction with the hearing individuals. The present study aims to address the pattern of occurrence of S (Subject), O (Object) and V (Verb) in sign language used by hearing impaired sign language users belonging to verbal native language background of five languages namely, Kannada, Malayalam, Telugu, Tamil and Hindi; and to investigate if there exists any similarity between the pattern of signed expressions used by the individuals belonging to different backgrounds and also, if there is any similarity between the word order of the signed expressions and the word order of the verbal native language.

METHOD

India is a multilingual country and has high prevalence of hearing impaired who use sign language (24%) according to the reports by Johnson & Johnson (2008). This study focuses on cross language comparison of the order of signs produced across hearing impaired sign language users belonging to five different verbal native language backgrounds. Thus, this inquiry facilitates the comparison of the word order of verbal language versus the sign language order and find any similarities between them, if any.

Aims of the study

- Compare the sequence in which the Subject, Object, Verb (SOV) signs occur in the sign language produced by persons with Hearing Impairment belonging to five verbal native languages (Kannada, Malayalam, Telugu, Tamil and Hindi) and investigate if there is any similarity between the sequences of SOV in signs used and
- Understand the influence of mode of communication by the signers and others in the family on the use of SOV sequence of signs as tapped through a questionnaire.

Subjects: 90 sign language users with Hearing Impairment participated in the study (20 each from verbal native language background of Kannada, Malayalam and Telugu; and 15 each from the verbal native language background of Tamil and Hindi). The subjects were selected

randomly for the study. The demographic details of the subjects and the mean ages across groups are provided in Table 3.

Table 3: Demographic details of the subjects.

Age Range	Verbal Native Language									
	Kannada		Malayalam		Telugu		Tamil		Hindi	
	M	F	M	F	M	F	M	F	M	F
15 to 25 yrs	12	8	17	3	18	2	14	1	15	-
Total	20		20		20		15		15	
Mean Age	18.75		20.47		19.4		20.06		21	

M = Males
F = Females

Subject selection criteria: The inclusion criteria for the selection of the subjects in the two language groups were as follows:

- They belonged to the verbal native language background, of Kannada, Malayalam, Telugu, Tamil and Hindi languages (not necessarily spoken by the subjects, but the subjects could be exposed to these languages through parents / caregivers / teachers or medium of instruction through writing or reading).
- They were in the age range of 15 - 25 years.
- The minimum educational qualification of the subjects was Secondary Education in a special school for the persons with Hearing Impairment.
- The subjects were not exposed to any other verbal language other than their native verbal language under which they were grouped.

Procedure: The subjects were grouped according to their verbal native language into five separate groups (i.e., Kannada, Malayalam, Telugu, Tamil and Hindi). Each subject participated in the task individually. All the subjects were kept blind to the purpose of the study. They were not allowed to discuss the task mutually before the completion of the task.

Material: Two types of material were used in the experiment:

a) Questionnaire

b) Three picture cards depicting a short story sequence

a) *Questionnaire:* A questionnaire was prepared to collect the following information from each subject:

- Family history of hearing loss
- Type of school attended
- Predominant mode of communication of the subject – sign / speech / sign and speech.
- Predominant mode of communication used by subject's parents, teachers and other communication partners, with the subject – sign / speech / sign and speech.

The questionnaire used for the study is included in Appendix A which was translated in all the five native languages.

b) *Picture stimulus cards:* The subjects were provided with three sequence picture cards which consisted of a story sequence. The three-picture story sequence cards depicted a theme and it was such selected, that it provided a chance for the occurrence of a subject, object and a verb in each card. The picture cards used for the study are included in Appendix B.

Setting and instruction: Initially, each subject was asked to fill the questionnaire. Then, each subject was made to sit on a comfortable chair in a well-lit room with no external distracters. He / She had to face a video camera which was handled by the investigator. Before beginning the recording, he / she were desensitized for the presence of the camera and the recording. Each subject was asked to express through signs, the content that was seen in the three picture sequence story cards, as slowly and as clearly as possible.

Recording and storing: Before the commencement of the task, the three sequence cards were presented to the subject for about 2 minutes to facilitate familiarization of the theme, the picture cards and formulation of thoughts to express the contents through signs. Then, the cards were placed in a row in front of the subject and the subject was asked to narrate the content using signs. Recording of each individual's performance was done using a video camera and the data was saved in compact disks for later analysis.

Analysis

Analysis of the data was done by three judges (sign language interpreters by profession). The judges carried out the coding task independently without mutual consultation / discussion. A '*base unit*' was identified in the signs produced by the subjects for the ease of analysis and to identify the word order. The '*base unit*' was operationally defined in this study as one identified by each judge on the basis of following criteria:

- The unit selected should include a meaningful (semantic) unit.
- The selected base unit should be related semantically to the preceding and following base units.

The video recordings were shown to each judge separately. Each video was paused at appropriate 'base unit' locations identified by the judge. Then the judge was asked to write down the order of occurrence of Subject (S), Object (O) and Verb (V) produced in the video in that particular 'base unit'. In this manner, all the videos were coded by all the three judges. The various orders in which S, V and O occurred in these five languages was then coded according to the 'Base units' identified by the judges and tabulated separately. The order identified by the judges was then grouped as the signs beginning with 'S' as the initial structure, or 'V' as the initial structure, or 'O' as the initial structure. As the number of 'base units' identified in each video by the three judges was varied; the data obtained was converted into percentages for later statistical analysis.

Inter-judge reliability: Item-by-item comparison (agreement- disagreement) of the judges was carried out. To treat the coding as valid, a reliability coefficient of 0.8-0.9 between the judges per subject was considered.

The results of the analysis are presented and discussed in the following section.

RESULTS AND DISCUSSION

The study aimed to

- Compare the sequence in which the Subject, Object, Verb (SOV) signs occur in the sign language produced by persons with Hearing Impairment belonging to five verbal native languages (Kannada, Malayalam, Telugu, Tamil and Hindi) and investigate if there is any similarity between the sequences of SOV in signs used and
- Understand the influence of mode of communication by the signers and others in the family on the use of SOV sequence of signs as tapped through a questionnaire.

The results of the study are presented under the following sections:

- I) Analysis for Subject, Object and Verb (SOV) order occurrence in signs
 - A. Analysis of various SOV patterns
 - B. Analysis of sentence initial structures
- II) Response to the questionnaire to understand the mode of communication.

I) Analysis of Subject, Object, Verb (SOV) order occurrence in signs

The video samples were analyzed by three judges who were professional sign language interpreters. They identified the 'base unit' in the signed utterances as a meaningful unit which has a semantic relation with the preceding and following base units.

The analysis of word order occurrence has been divided into two sub-sections:

- A. Analysis of various SOV patterns
- B. Analysis of sentence initial structures

A. Analysis of various SOV patterns

With the identification of the base units, it was observed that different patterns of SOV orders emerged in the signs used by persons with Hearing Impairment belonging to different native verbal language groups. There were some common order patterns and some exclusive order patterns that were exhibited by the subjects.

Different SOV order patterns exhibited by subjects in the five language groups, as identified by at least two judges are shown in Tables 4, 5 and 6.

Table 4: Percentage use of order patterns beginning with initial structure S by the subjects

<i>Signed order</i>	<i>Kannada</i>	<i>Malayalam</i>	<i>Telugu</i>	<i>Tamil</i>	<i>Hindi</i>
<i>S</i>	5%	15%	10%	6.66%	-
<i>SV</i>	90%	100%	90%	80%	80%
<i>SOV</i>	25%	30%	25%	13.33%	20%
<i>S1S2V</i>	-	15%	-	-	-
<i>SV1V2</i>	5%	-	-	-	-
<i>SV1V2O</i>	-	-	5%	-	-
<i>SV(+O)*</i>	70%	85%	75%	40%	40%
<i>S(+V)*</i>	10%	-	5%	-	-

(* - embedded order pattern)

Table 5: Percentage use of order patterns beginning with initial structure O by the subjects

<i>Signed order</i>	<i>Kannada</i>	<i>Malayalam</i>	<i>Telugu</i>	<i>Tamil</i>	<i>Hindi</i>
<i>O</i>	10%	20%	20%	33.33%	6.66%
<i>OV</i>	20%	-	-	-	6.66%
<i>OSV</i>	5%	10%	10%	6.66%	6.66%

Table 6: Percentage use of order patterns beginning with initial structure V by the subjects

<i>Signed order</i>	<i>Kannada</i>	<i>Malayalam</i>	<i>Telugu</i>	<i>Tamil</i>	<i>Hindi</i>
<i>V</i>	5%	-	-	6.66%	-
<i>VS</i>	-	5%	-	-	-
<i>V(+S)*</i>	80%	50%	50%	66.66%	66.66%
<i>V(+O)*</i>	20%	35%	-	-	6.66%
<i>V(+S),V*</i>	-	-	-	-	-
<i>V(+S),O*</i>	-	-	5%	-	-
<i>VV(+S)*</i>	5%	-	-	-	-
<i>V(+S, O)*</i>	-	20%	25%	40%	33.33%

(* - embedded order patterns)

As evident from Tables 4.1, 4.2 and 4.3, some discrete order patterns for Subject, Object and Verb (SOV) in the signs of both the groups were evident as coded by the judges. Some embedded forms of order patterns which are shown with * mark, were also seen. The use of the

term 'Discrete order' here means that the signs were expressed to indicate the S, V and O separately as independent units; whereas the 'embedded order' included either S, or V, or O [Example: S (+V), V (+S), VV (+S) etc.] or more than one structure embedded within one structure [Example: V (+ S, O)] and not expressed as a separate sign expression. As apparent from the tables, there were many patterns which were exhibited in some language groups, but non-existent in the other language groups. The list of structures which were exhibited in only one language group has been tabulated in Table 7.

Table 7: Exclusive SOV order patterns in signed expression

<i>Signed order</i>	<i>Language group</i>
	Malayalam
SV1V2	Kannada
SV1V2O	Telugu
VS	Malayalam
V(+S),O	Telugu
VV (+S)	Kannada

On the other hand, there were some structures that were present in all the five verbal native languages and the same is presented in Table 8.

Table 8: Order of structures present in all the five languages

<i>Sentence initial structure</i>	<i>Various structure present in all languages</i>
<i>S</i>	SV, SOV, SV(+O)
<i>O</i>	O, OSV
<i>V</i>	V(+S)

In depth analysis of the various sentence structures revealed that there were many structures that were exhibited less frequently than others. In order to understand this, a criterion based on percentage occurrence of the pattern was considered. A score of ' $\geq 25\%$ ' of occurrence was considered to include a sentence structure for further statistical analysis. Although the structure 'OSV' was exhibited by all the language groups, it occurred $< 20\%$ of times. Thus, the structure 'OSV' was not considered for further statistical analysis as it fell below the criterion percentage. Similarly, the structure 'V (+O)' was exhibited in high percentage in the Malayalam language group (35%) and thus was taken up for statistical analysis only for Malayalam language group to check if it was present significantly in this group. Also, the structure 'O' was exhibited in lesser percentages in all language groups except Tamil (33.33%) and thus the structure 'O' was taken up for further statistical analysis to check if it was present significantly in Tamil language group. The structure 'V (+S, O)' was exhibited in high percentages in Telugu, Tamil and Hindi language groups (25%, 40%, and 33.33% respectively) and in lesser percentage in Malayalam language group (20%) and not found in Kannada language group.

Thus, the structure 'V (+S, O)' was taken up for statistical analysis only for Telugu, Tamil and Hindi language groups. The structure 'SOV', which is the predominant word order pattern of all the verbal native languages of the selected languages by many investigators [Kerslake and Aiyar (1953); Hiremath (1961); Subhramanyam (1974); Schiffman (1979); Peet (1980); Mohanan (1982); Krishnamurti and Cwynn (1985); Sharma, Chatterji, Satyanarayana, Saksena and Nene (1994); Asher and Kumari (1997); and Krishnamurti (2003)], was also exhibited by all the language groups in their signed expressions. This was seen in a lesser percentage (i.e. <25%) in Tamil and Hindi language groups (13.33% and 20% respectively). But this structure was still considered for statistical analysis to find out if this structure was significantly present in these languages or not, as it is significantly present in all the verbal native languages of the subjects of the study. The same is depicted in the Figures 3 – 7 below:

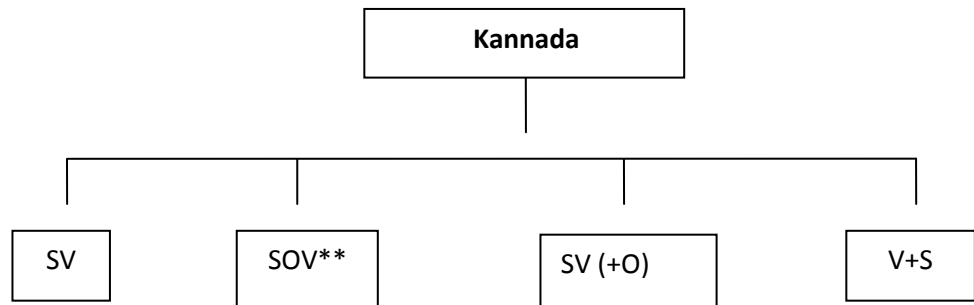


Figure 3: Predominant order patterns in signed expressions of Kannada language group

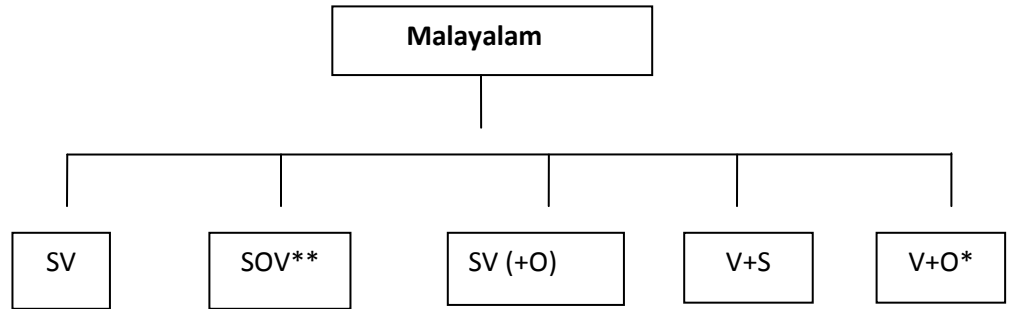


Figure 4: Predominant order patterns in signed expressions of Malayalam language group

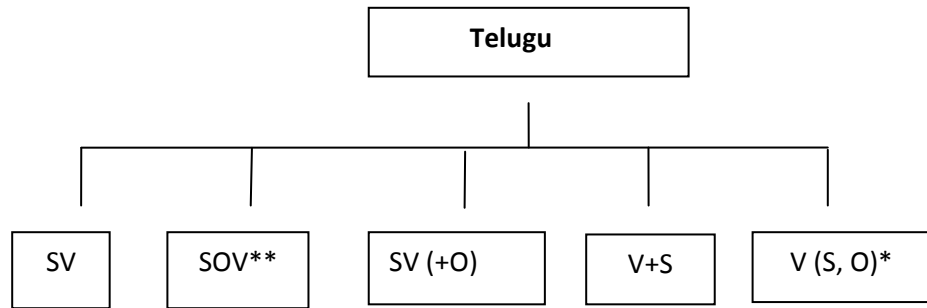


Figure 5: Predominant order patterns in signed expressions of Telugu language group

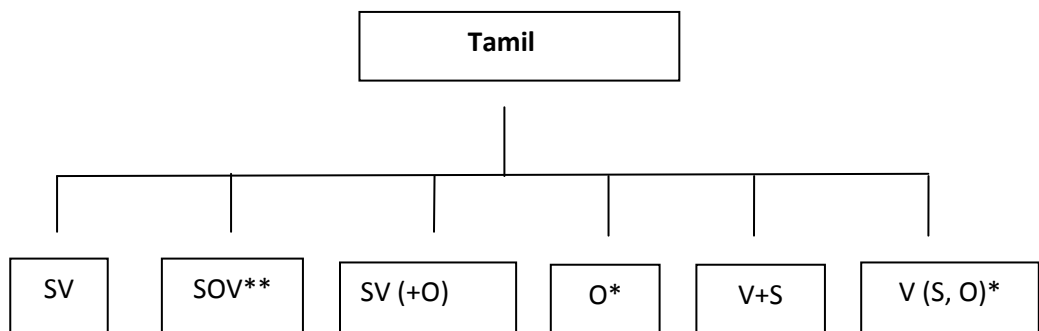


Figure 6: Predominant order patterns in signed expressions of Tamil language group

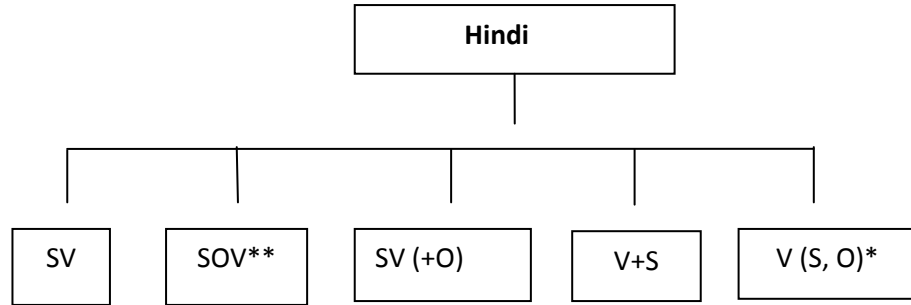


Figure 7: Predominant order patterns in signed expressions of Hindi language group

(* - exclusive SOV order patterns

** - signed expression matches the word order pattern of the verbal native language)

Thus, a total of seven Subject, Object, Verb (SOV) order patterns in the signed expressions were considered for further analysis which included SV, SOV, SV (+O), O, V (+S), V (+O) and V (+S, O). The exclusion criteria followed for this selection was based on Reliability coefficient α for these SOV order patterns across all the language groups as coded by all the three judges was computed and high reliability values were obtained ($\alpha < 0.8$). The α values for the seven structures are presented in the Table 9.

Table 9: α coefficient reliability values for the predominant structures in various language groups

Language groups	SV	SOV	SV(+O)	O	V(+S)	V(+O)	V (+S, O)
<i>Kannada</i>	0.89	0.94	0.92	-	0.98	-	-
<i>Malayalam</i>	0.92	0.96	0.92	-	0.98	0.93	-

<i>Telugu</i>	0.95	0.83	0.99	-	0.99	-	0.92
<i>Tamil</i>	0.97	0.96	0.95	0.93	0.96	-	0.97
<i>Hindi</i>	0.98	0.99	0.92	-	0.92	-	0.95

It may be noted that the α coefficient was computed only for the structures that were present predominantly in a particular language group (> 25%) with the exception of the structure SOV. Thus, α was computed only for Tamil language group for the structure 'O', only Malayalam group for the structure 'V (+O)' and only Telugu, Tamil and Hindi groups for the structure 'V (+S, O)'. Further, the means and standard deviations of these structures were computed and are tabulated in Table 10. The same is depicted in Figures 8 and 9.

From Table 10, it is evident that the standard deviation is greater than the mean percentage for many of the structures like 'SOV', 'O' and 'V (+S, O)' in all the language groups; 'SV (+O)' in Tamil language group and 'V (+S)' in Kannada, Malayalam, Telugu and Tamil language groups. This is probably because of the occurrence pattern of the structures as these structures were not exhibited in high percentages in all the language groups.

Table 10: Mean and Standard Deviation (SD) of the various SOV order patterns in all the language groups

<i>Language groups</i>	<i>Mean & SD</i>	<i>SV</i>	<i>SOV</i>	<i>SV(+O)</i>	<i>O</i>	<i>V(+S)</i>	<i>V(+O)</i>	<i>V(+S,O)</i>
<i>Kannada</i>	Mean	35.34	4.45	15.72	1.30	29.84	7.93	.66
	SD	21.11	8.21	15.05	3.67	30.67	17.56	2.05

<i>Malayalam</i>	Mean	39.95	4.60	23.70	2.32	13.81	15.40	4.12
	SD	15.02	7.42	13.39	4.82	16.89	28.41	7.34
<i>Telugu</i>	Mean	45.20	3.44	19.33	3.10	17.26	.00	5.48
	SD	20.47	6.61	15.57	5.61	23.36	.00	9.95
<i>Tamil</i>	Mean	36.49	3.17	10.79	5.25	24.78	.00	13.38
	SD	25.44	7.90	14.10	7.17	27.30	.00	20.26
<i>Hindi</i>	Mean	36.17	5.33	20.65	1.48	19.12	3.57	13.66
	SD	25.76	11.93	19.15	4.43	15.46	13.83	19.10
<i>Total</i>	Mean	38.89	4.19	18.29	2.61	20.85	5.78	6.79
	SD	21.29	8.26	15.69	5.26	23.84	17.49	13.46

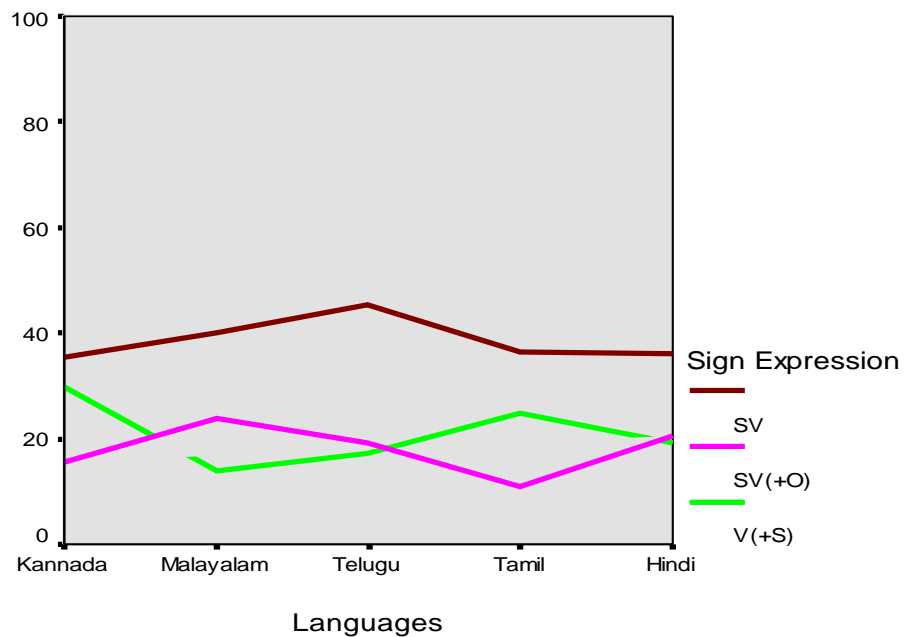


Figure 8: Mean percentage of identification of predominant sign expressions with respect to SOV order pattern in five language groups

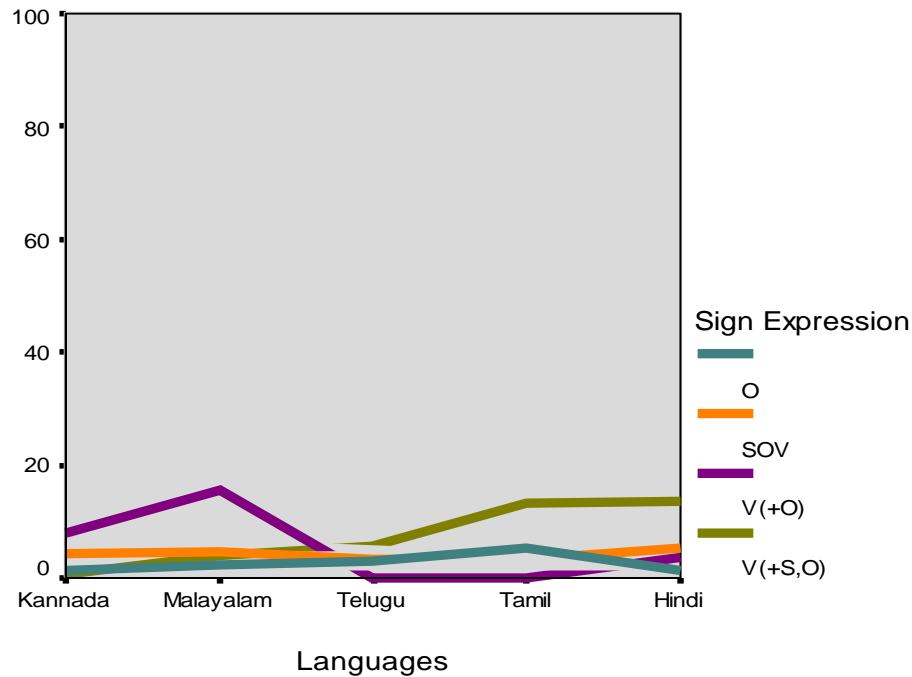


Figure 9: Mean percentage of identification of other sign expressions in five language groups

Furthermore, it is observed that the 'SV' structure emerged as the most predominant SOV order pattern in all the language groups with mean percentage occurrences of 35.34% in Kannada language group, 39.95% in Malayalam language group, 45.20% in Telugu language group, 36.49% in Tamil language group and 36.17% in Hindi language group. This finding suggests that an overly simple sentence structure was used by the subjects belonging to all the language groups predominantly which was not similar to the one observed in verbal languages i.e. SV was found to be the most predominant structure in all the language groups whereas SOV has been identified as the principal word order in verbal languages Kannada, Malayalam, Tamil, Telugu and Hindi languages [Kerslake and Aiyar (1953); Hiremath (1961); Subhramanyam (1974); Schiffman (1979); Peet (1980); Mohanan (1982); Krishnamurti and Cwynn (1985); Sharma, Chatterji, Satyanarayana, Saksena and Nene (1994); Asher and Kumari (1997); and Krishnamurti (2003)]. Thus, the order pattern of occurrence of Subject, Object, Verb (SOV) in sign language

expression is not similar to the verbal language word order pattern. This finding is in line with the findings of Zeshan (2003) and Aboh, Pfau and Zeshan (2005), who stated that ISL is a verb-final language. Vasishta, Woodward and Wilson (1978) also observed that in simple sign expressions, subject always precedes the verb.

Multivariate measure ANOVA was carried out to compare all the five language groups for the occurrence of predominant order patterns namely SV, SOV, SV (+O) and V (+S) in the signed expression; which were present in all the language groups. Results of the test revealed no significant difference for all the SOV order patterns across all the language groups [SV - t (4, 85) = 0.180, $p < 0.05$; SOV - t (4, 85) = 0.180, $p < 0.05$; SV (+O) - t (4, 85) = 1.747, $p < 0.05$; V (+S) - t (4, 85) = 1.406, $p < 0.05$]. This finding signifies that there exists identical pattern of occurrence of these structures for all the language groups. Thus, it can be deduced that there is no difference in sign expressions among these groups further suggesting the yet to be proved possibility that there are no dialects in ISL as observed by Gordon Jr. (2005).

One way ANOVA was also carried out to compare the occurrence of the structure 'V (+S, O)' in Telugu, Tamil and Hindi Language groups, as this structure occurred in relatively higher mean percentages (5.48%, 13.38% and 13.66% respectively) in these languages only. No significant difference was revealed for the occurrence of the structure 'V (+S, O)' in these languages [t (2, 47) = 1.43, $p < 0.05$] which indicates that the structure 'V (+S, O)' occurs in the same manner in these language groups on a statistical basis despite percentage variations for the occurrence of 'V (+S, O)' in Telugu language group (5.48%) and Tamil and Hindi language groups (13.38% and 13.66% respectively). This variation in the percentage of occurrence might be because of the e sample size wherein Telugu language group had a sample size of 20 subjects and both Tamil and Hindi language groups had a sample size of 15 subjects only. One way

ANOVA was also carried out to compare the occurrence of the order structure 'V (+O)' which was present in Malayalam language group (15.4%), Kannada language group (7.93%) and Hindi language group (3.57%) and was not present in Tamil and Telugu language groups. These results also indicated no significant difference [$t(2, 52) = 1.38, p < 0.05$] for the occurrence of 'V (+O)' in these groups. Further, one way ANOVA was carried out compare the occurrence of order structure 'O' across all the language groups to check if it was significantly present in Tamil language group in which it was found to occur with a relatively higher percentage (5.25%). The results revealed no significant difference among the five language groups [$t(4, 85) = 1.52, p < 0.05$]. One way ANOVA was carried out to compare the occurrence of order structure 'SOV' across all the language groups to check if it was present significantly in all the language groups and the result revealed no significant difference among the five language groups [$t(4, 85) = 0.180, p < 0.05$].

Repeated measure ANOVA was carried out to compare the occurrence of predominant structures i.e., SV, SV (+O) and V (+S); within all the language groups. Repeated measure ANOVA for the Kannada language group revealed significant difference for SV and SV (+O) structure [SV and SV (+O) - $t(2, 38) = 19.62, p < 0.1$] but no significant difference was observed for V (+S) structure [SV & V (+S) - $t(2, 38) = 5.5, p < 0.1$ and SV (+O) & V (+S) - $t(2, 38) = 14.12, p < 0.1$] in the Kannada language group. This finding suggests that SV is the most predominantly occurring structure followed by V (+S) and SV (+O) which have equal probability of occurrence in the signed expressions of the Kannada language group. Repeated Measure ANOVA for the Tamil language group revealed significant difference for SV and SV (+O) [SV & SV (+O) - $t(2, 28) = 25.7, p < 0.05$] structures but no significant difference was observed for V (+S) structure [SV and V (+S) - $t(2, 28) = 11.72, p < 0.05$; SV (+O) and V (+S) - $t(2, 28) = 13.98, p < 0.05$] in the Tamil language

group. These results are in agreement with the results obtained for the Kannada language group but the results for the Tamil language group were highly significant at $p < 0.05$. Thus, even in the Tamil language group, SV is the most predominantly occurring structure followed by V (+S) and SV (+O) which had equal probability of occurrence in the Tamil language group. But this pattern [i.e. SV followed by SV (+O) and V (+S)] was more well-defined in Tamil language group than Kannada language group is evident from the higher significance obtained. The similarity between these two language groups might be because these languages are reported to have similar features in their linguistic structure including the phonetic and the syntactic structure (Narasimhacharya, 1990; Krishnamurti, 2003).

Repeated Measure ANOVA for the Malayalam language group revealed significant difference for SV & SV (+O) and SV & V (+S) [SV & SV (+O) - $t(2, 38) = 16.25, p < 0.001$; SV & V (+S) - $t(2, 38) = 26.15, p < 0.001$] but no significant difference was observed for SV (+O) and V (+S) [SV (+O) & V (+S) - $t(2, 38) = 9.890, p < 0.001$]. Thus, SV was the most predominantly occurring structure followed by SV (+O) and V (+S) in the Malayalam language group. Repeated Measure ANOVA for the Telugu language group also revealed similar results as the Malayalam language group at 0.01 level of significance [SV & SV (+O) - $t(2, 38) = 25.87, p < 0.01$; SV & V (+S) - $t(2, 38) = 27.93, p < 0.01$, SV (+O) & V (+S) - $t(2, 38) = 2.06, p < 0.01$]. This implies that SV is the most predominantly occurring structure followed by SV (+O) and V (+S) in descending order. But this pattern (i.e. SV followed by SV (+O) and V (+S) in descending order) was more well-defined in Malayalam language group than Telugu language group as evident from the statistical analysis. This similarity can be attributed to the fact that Kannada, Malayalam and Telugu verbal languages are reported to be similar in their grammar, syntax and vocabulary (Varma, 1999; Kunjamma, 1993). But here, only Malayalam and Telugu were found to share a similar hierarchy and Kannada shared a similar hierarchy with Tamil language group.

Repeated Measure ANOVA for the Hindi language group revealed different results as compared to the other language groups. The results showed no significant difference for any of the word order patterns at $p < 0.05$ [$t(2, 28) = 2.41$]. Thus, this finding shows that there exists equal probability of occurrence of all the three structures under comparison namely, SV, SV (+O) and V (+S) in the Hindi language group. This unique pattern obtained might be because of the fact that Hindi language belongs to Indo – Aryan language family which has a different origin than other language groups namely, Kannada, Malayalam, Telugu and Tamil which belong to the Dravidian language family.

From the above findings, it is deduced that sign language used by the signers belonging to all the language groups showed a predominant SV word order. In the literature, it has been reported that the SOV structure is the most predominant word order in Kannada, Malayalam, Telugu, Tamil and Hindi languages [Kerslake and Aiyar (1953); Hiremath (1961); Subhramanyam (1974); Schiffman (1979); Peet (1980); Mohanan (1982); Krishnamurti and Cwynn (1985); Sharma, Chatterji, Satyanarayana, Saksena and Nene (1994); Asher and Kumari (1997); and Krishnamurti (2003)]. However, it is apparent that the order that emerged in signed expressions of all the verbal native language groups (i.e. SV) was not the same as reported for the word order in verbal language expressions of these languages (i.e. SOV).

These findings support the fact that even though these language groups do not replicate the predominant word order pattern of the respective verbal native languages, they show some similarity in terms of depicting similar hierarchy of predominant word order pattern occurrence for Kannada & Telugu language groups and Malayalam & Tamil language groups; and Hindi

language group follows a totally different hierarchy which is not similar to any of the other groups.

B. Analysis of Sentence initial structures

After the analysis of the various word order patterns, signed expressions beginning with S or O or V as a whole were taken into consideration for further analysis. Reliability coefficient α for the signed expressions beginning with S, O or V; across all the language groups was computed for all expressions as coded by the three judges. The results revealed a high reliability value of $\alpha > 0.8$. The α values obtained are presented in the Table 11.

Table 11: α coefficient values for structures beginning with S, O or V in various language groups.

<i>LANGUAGE GROUPS</i>	<i>S</i>	<i>O</i>	<i>V</i>
<i>Kannada</i>	0.96	0.96	0.96
<i>Malayalam</i>	0.95	0.94	0.96
<i>Telugu</i>	0.98	0.98	0.98
<i>Tamil</i>	0.99	0.96	0.99
<i>Hindi</i>	0.95	0.88	0.96

The means and standard deviations (SD) for the occurrence of the signed expressions beginning with S, O and V were calculated and are represented in Table 12 and Figure 10.

Table 12: Means and SD for the structures beginning with S, O and V

Language	Mean and SD	Subject (S)	Object (O)	Verb (V)
Kannada	Mean	62.41	4.90	37.66
	SD	29.13	8.24	30.76
Malayalam	Mean	76.29	3.32	20.38
	SD	21.25	7.16	21.45
Telugu	Mean	69.66	5.11	25.22
	SD	25.92	8.49	26.79
Tamil	Mean	52.92	6.92	40.21
	SD	34.13	8.62	32.34
Hindi	Mean	62.54	3.48	33.97
	SD	23.30	6.43	24.74
Total	Mean	65.55	4.69	30.86
	SD	27.38	7.78	27.80

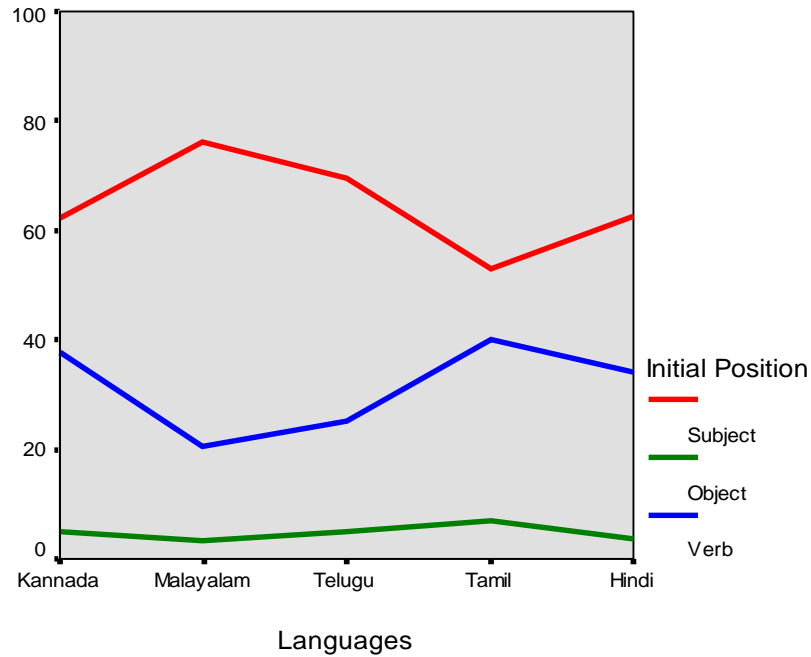


Figure 10: Mean percentage identification of the structures in initial position in the five language groups

It was observed that the standard deviation for the structures beginning with O was greater than the mean percentage of occurrence suggesting a scatter. From Table 4.9, it is evident that structures beginning with S occurred more frequently in the signed expressions of all the verbal native language groups (65.55%), followed by structures beginning with V (30.86%) and structures beginning with O (4.69%) in the descending order. This finding is in accordance with previous finding that 'SV' is the predominant sign pattern in all the five language groups (35.34% in Kannada language group, 39.95% in Malayalam language group, 45.20% in Telugu language group, 36.49% in Tamil language group and 36.17% in Hindi language group) which has contributed to the high percentage of occurrence of structures beginning with 'S' as well. Other structures found to be most predominantly occurring is 'SV (+O)' which is also a structure beginning with 'S'. Structures beginning with 'V' follow next as structures like V (+S), V (+O) and V (+S, O) were predominantly occurring in various language groups. The pattern of occurrence of these structures has been discussed earlier. Out of these structures, V (+S) was found to occur predominantly in all the language groups whereas, other structures i.e. V (+O) and V (+S, O) were found to occur predominantly only in Malayalam language group and Telugu, Tamil & Hindi language group respectively. Consequently, these factors have contributed to similar hierarchy in all the language groups.

Mixed ANOVA was carried out to investigate for interaction effect, if any among all the sentence initial structures namely S, O or V for all the language groups namely Kannada, Malayalam, Telugu, Tamil and Hindi. The results revealed no significant difference for the occurrence of the sentence initial structure (S or O or V) among the five language groups [t (8,

170) = 1.773, $p < 0.05$] i.e. there was no interaction between the sentence initial structures and the language groups. However, a significant difference was observed for the sentence initial structures alone [$t(2, 170) = 106.74$, $p < 0.001$]. Further, Bonferroni's test for pair-wise comparison revealed significant difference for all the three combinations i.e. S & O, O & V and S & V [S & O – $t(2, 85) = 60.017$; O & V – $t(2, 85) = 26.744$; S & V – $t(2, 85) = 33.274$]. On the other hand, comparison of the languages alone revealed no significant difference [$t(4, 85) = 0.862$, $p < 0.05$]. This finding reflects that the pattern of occurrence of these structures is similar across all the language groups.

Further, one-way ANOVA was carried out to find out the difference, if any, across the sentence initial structure categories between the language groups. The results of the test suggested no significant difference for the structures beginning with subject (S) [$t(4, 85) = 1.859$, $p < 0.05$], object (O) [$t(4, 85) = 0.562$, $p < 0.05$] or verb (V) [$t(4, 85) = 1.859$, $p < 0.05$]. This indicates that individuals with Hearing Impairment in all the verbal language groups showed a similar pattern of word order in signing when only sentence initial structure was taken into consideration.

These findings thus suggest that though there were some differences found in the pattern of occurrence of various signed order patterns, there was no evident difference obtained when sentence initial structures i.e. all the structures beginning with S, O and V, were taken up for investigation as a whole. This observation indicates that all the language groups follow a similar trend and there are no significant variations between signing patterns of hearing impaired individuals. This finding is in line with the findings of Vashista, Woodward and Wilson (1978) who also stated similar findings. But their investigation reported similarity of the signs for a list of words and not in terms of the emergence of signed order for S, O or V. Thus, the findings

of this study may be viewed as an extension to the findings of Vashista, Woodward and Wilson (1978) with respect to emergence of SOV order in signs. Although substantial support is required from other similar studies, it may be stated that at a preliminary level, the results probably point towards the existence of a single sign language in India. Further, it may also imply that ISL as a sign language may have less likelihood of presenting with different dialects. In other words, it may be inferred that at least in term of emergence of the order of signs for Subject, Verb and Object as syntactic constituents of ISL, there may not be much variation across deaf communities spread across Indian subcontinent. This observation falls in line with that of Vashista, Woodward and Wilson (1978); Woodward (1993); Zeshan (2000) and Jepson (1991)

Furthermore, Repeated measure ANOVA was carried out to compare the occurrence of order patterns beginning with S, O or V within the various language groups. Repeated measure ANOVA for Kannada group revealed no significant difference between S and V as initial structure ($S \& V - t(2, 38) = 24.74, p < 0.05$). But there was a significant difference between S & O and O & V as the initial structure [$S \& O - t(2, 38) = 57.51, p < 0.05$; $O \& V - t(2, 38) = 32.764, p < 0.05$]. Repeated measure ANOVA for Tamil and Hindi groups revealed similar results as the Kannada group. Hence, for Tamil and Hindi language group, there was no significant difference between S and V as initial structure. But there was a significant difference between S & O and O & V as the initial structure [{Tamil – $S \& O - t(2, 28) = 45.997, p = 0.05$, $O \& V - t(2, 28) = 33.290, p = 0.05$ }; {Hindi - $S \& O - t(2, 28) = 59.056, p = 0.05$, $O \& V - t(2, 28) = 30.495, p = 0.05$ }. Thus, the results of the present study show that Kannada, Hindi and Tamil language groups follow a similar trend i.e. for these language groups, there exists similar probability of occurrence for sentences beginning with S and sentences beginning with V in spite of the huge variation of the mean percentage occurrence of S as initial structure (Kannada – 62.41%, Tamil – 52.92%, Hindi – 62.54%) and V as

a initial structure (Kannada – 37.66%, Tamil – 40.21%, Hindi – 33.97%). The percentage of occurrence of structures beginning with S were significantly more than the structures beginning with O; and the structures beginning with V were significantly more than the structures beginning with O. The similarity of the trend in Hindi language group with Kannada and Tamil language group is not understandable as Hindi (Indo – Aryan language family) has different origin from Kannada and Tamil languages (Dravidian language family).

Repeated measure ANOVA for Malayalam language group revealed significant difference for all the combinations i.e. between S & V, O & V and S & O [S & V - t (2, 38) = 72.974, $p < 0.05$; O & V - t (2, 38) = 17.06, $p < 0.05$; S & O - t (2, 38) = 55.908, $p < 0.05$]. Repeated measure ANOVA for Telugu language group also revealed same results as the Malayalam language group [S & V - t (2, 38) = 64.546, $p = 0.05$; O & V - t (2, 38) = 20.02, $p < 0.05$; S & O - t (2, 38) = 44.444, $p = 0.05$]. Thus, Malayalam and Telugu language groups seem to follow a similar trend of presenting significant difference for all the sentence initial structures. Thus, sentences beginning with S occurred more frequently followed by sentences beginning with V and O in the descending order. This can be accredited to the piece of information that Malayalam and Telugu verbal languages have similar syntax structure (Varma, 1999; Kunjamma, 1993) which has resulted in this similarity in signed expression as well.

II) Response to the questionnaire to understand the mode of communication.

The responses to the questionnaire obtained from the subjects were tabulated for presence or absence of the factor sought for. The percentage of positive responses across the subjects in the group is represented in Table 13.

Table 13: Percentage responses of the subjects to the questionnaire

<i>Parameters</i>	<i>Kannada</i>	<i>Malayalam</i>	<i>Telugu</i>	<i>Tamil</i>	<i>Hindi</i>
<i>1. Positive family history of hearing loss</i>	20%	10%	5%	26.6%	20%
<i>2. Predominant mode of communication</i>					
<i>Speech</i>	-	-	-	-	-
<i>Signs</i>	%	55%	75%	80%	66.66%
<i>Signs and Speech</i>	%	45%	25%	20%	33.33%
<i>3. Mode used by the family members</i>					
<i>Speech</i>	35%	50%	30%	33.33%	13.33%
<i>Signs</i>	%	15%	15%	-	26.66%
<i>Signs and Speech</i>	%	35%	55%	66.66%	53.33%

From Table 4.10, it is evident that 26.6% of the Tamil, 20% of the Kannada, 20% of the Hindi, 10% of the Malayalam and 5% of the Telugu background subjects had a positive family history of hearing loss. It was also observed that all the signers belonging to different language groups used 'only signs' followed by 'both signs and speech' as their predominant mode of communication. However, persons with Hearing Impairment using 'both signs and speech' as the predominant mode of communication were more in Kannada and Malayalam language

group followed by Hindi, Telugu and Tamil language group in the descending order. This shows that the subjects fulfilled the criterion of being a signer more predominantly than being a user who used a 'combination of speech and signs' to communicate.

Regarding the mode of communication used predominantly by the family members with the persons with Hearing Impairment, it is evident that a combination of 'sign and speech' was used in all the language groups except the Malayalam language group. In Kannada, Tamil and Telugu language groups, it is obvious that the hierarchy of mode of communication of the family members was 'sign and speech' (55% - Kannada and Telugu, 66.66% - Tamil), 'only speech' (35% - Kannada, 33.33% - Tamil, 50% - Telugu) and 'only signs' (10% - Kannada, 0% - Tamil, 15% - Telugu) in the descending order. However, the Malayalam language group followed the hierarchy of 'only speech' (50%) followed by 'sign and speech' (35%) and lastly 'only signs' (15%) which may be attributed to the fact that the family members advocated Oralism in their practice of communication with the hearing impaired. In Hindi language group, the hierarchy followed was 'signs and speech' (53.33%) followed by 'only signs' (26.6%) and 'only speech' (13.33%).

In summary, it was seen that in general, although the individuals with hearing impairment used 'signs only' maximally as their communication mode, their family members communicated not only through the use of 'signs only', except the Hindi language group, but tended to use 'speech and signs' or 'speech only' while communicating with the subjects of the study.

This study investigated the order pattern for emergence of S, O and V in signed expression of deaf individuals belonging to five native language groups of Kannada, Malayalam, Telugu and Tamil; all being the chief languages of the Dravidian language family; and Hindi which is official language of India and belongs to Indo - Aryan language family. The results

provide a useful insight into the SOV order patterns leading to the major observation that all the language groups studied did not show much variation in the order of S, O, V although they belonged to different verbal languages suggesting that there could be some commonality in the expression of S, O, V as syntactic constituents in signs used by individuals spread across India irrespective of their verbal language background or the region/state which they represent. Further, the findings are not indicative of any influence of syntactic constituents of S, O, V in the verbal language as a sequence on the signed expressions of the persons with Hearing Impairment as these individuals did not show any variations in the signed expressions although they belong to various verbal native languages.

SUMMARY AND CONCLUSION

The primary focus of the present study was to investigate the difference if any, in the occurrence of Subject (S), Object (O), Verb (V) in the signed expressions produced by sign language users with Hearing Impairment, belonging to five different native verbal language backgrounds namely; Kannada, Malayalam, Telugu, Tamil and Hindi. Moreover, comparison was made to find out if there was any influence of the verbal native language background on the signed expressions produced by the Hearing Impaired individuals.

Ninety sign language users with Hearing Impairment participated in the study; twenty each in Kannada, Malayalam and Telugu language groups and fifteen each in Tamil and Hindi language groups. All the subjects were asked to fill a questionnaire which revealed information regarding their primary mode of communication and the mode of communication used by their family members. The results indicated that 'only signs' was the primary mode of communication used by the sign language users with Hearing Impairment. But different results were obtained for the primary mode of communication used by the family members of these subjects. A combination of 'sign and speech' was the primary mode of communication used by the family members except for the Malayalam language group wherein 'only speech' was the found to be the primary mode of communication. Interestingly, a higher percentage of family members of

the sign language users with Hearing Impairment of the Hindi language group used 'only signs' with the subject.

Second part of the analysis included the investigation of the occurrence of the order patterns for Subject, Object, Verb (SOV) in the signed expression of subjects belonging to various verbal language groups. The 'base units' were identified by the three judges and high inter-judge reliability was obtained for the identification of the 'base units' suggesting consistency of the data. Some 'discrete' SOV order patterns and some 'embedded' SOV order patterns in the signed expressions emerged. SV word order pattern was found to be the maximally occurring order pattern in all the language groups. Some order patterns were not taken up for the statistical analysis as they were exhibited in very less percentage of < 25%. Hence, on the basis of the following criteria only seven structures namely; SV, SOV, SV (+O), O, V (+S), V (+O) and V (+S, O) were taken for further statistical analysis wherein SV, SV (+O) and V (+S) were considered for all the five language groups. On the other hand, the word order structure 'V (+S, O)' was found only in signed expressions of subjects of Telugu, Tamil and Hindi Language groups and the order structure 'V (+O)' was found only in signed expressions of subjects of Malayalam language group and 'O' was found in the signed expressions of subjects of Tamil language group.

The order pattern 'SOV' was also found in all the language groups but it occurred less frequently. Even then, it was taken up for the statistical analysis as it is the predominant order pattern of the native languages (i.e. Kannada, Malayalam, Telugu, Tamil and Hindi) so as to investigate if 'SOV' occurred significantly.

Statistical analysis of the predominant order patterns namely; SV, SOV, SV (+O) and V (+S); which were present in all the language groups indicated no significant difference suggesting same pattern of occurrence of these structures for all the language groups. The occurrence of order structure 'V (+S, O)' in Telugu, Tamil and Hindi language groups, 'V (+O) in the Malayalam language group and 'O' in Tamil language group was studied and results revealed no significant difference for occurrence of these structures in their respective languages in which they occurred predominantly. Further, within language comparisons for the most predominantly occurring structures namely SV, SV (+O) and V (+S) revealed a different set of results. Similar findings were obtained for Kannada and Tamil language groups wherein SV was found to be the most predominantly occurring structure followed by V (+S) and SV (+O) which had equal probability of occurrence. But this hierarchy was more well-defined in the Tamil language group than the Kannada language group. Further, similar sort of hierarchy was obtained for Malayalam and Telugu language groups. Results indicated SV as the most predominant structure followed by SV (+O) and V (+S) in these language groups but this pattern was found to be more well-defined in the Malayalam language group than the Telugu language group. Results for the Hindi language group revealed equal probability of occurrence for the three predominant order patterns [i.e. SV, SV (+O) and V (+S)].

From the above findings it is apparent that SV is the most commonly occurring order pattern in all the sign language groups and there is no influence of the verbal native language background on the order of the sign language users with Hearing Impairment and SOV was not found to be among the predominantly occurring order patterns in any of the language groups.

After analysis of the various order patterns, signed expressions beginning with S or O or V as a whole were taken into consideration for analysis. High reliability was obtained across three judges suggesting reliability of the data coded. Results revealed that signed expressions beginning with 'S' occurred maximally followed by 'V' and lastly 'O' for all the language groups. Further, all the sentence initial structures were found to occur significantly in all the language groups. Within language comparison of the occurrence of order patterns beginning with S, O or V revealed different results. It was found that Kannada, Tamil and Hindi language groups followed the same pattern wherein there existed similar probability of occurrence for sentences beginning with S and sentences beginning with V. On the other hand, Malayalam and Telugu language groups showed similar results where the hierarchy of the structures present in the signed expressions by the subjects of these language groups was sentences beginning with 'S' followed by 'V' and 'O' in the descending order.

Thus, the study provides an insight into the SOV order pattern used by sign language users with Hearing Impairment belonging to various native verbal language background and this study supports the findings of the previous studies by Vashishta, Woodward and Wilson (1978), Zeshan (2003) and Aboh, Pfau and Zeshan (2005); that word order pattern of the various sign language groups is not same as the verbal native languages of those groups. Signers with Hearing Impairment tend to use an overly simplified sentence structure of SV pattern most of the time whereas verbal native languages have a predominant structure of SOV. Presence of embedded structures reflects upon the simultaneity feature of the sign languages. The similarities obtained between some of the sign language groups are suggestive of the fact that they have similar origin and similar syntactical structure. Thus, these results reveal that the

various sign language groups, at least in India may not be using different sign languages but probably various dialects of the Indian Sign language attributing to the fact that all sign languages show same structure with subtle variations when examined at a gross level.

Recommendations for future

- The study can be replicated in other languages of India.
- Only one Indo – Aryan language i.e. Hindi was taken up for investigation. Thus, the present study can be extended to other Indo – Aryan languages to investigate if, there exists any difference in the order patterns of signed expressions among different Indo – Aryan languages.
- Analysis of the conversation between hearing impaired individuals may yield a better insight into the word order structure used by them.
- This study can be extended to hearing impaired sign language users with Aphasia to inspect the order pattern and thus uncover the type of responses obtained according to the site of lesion.

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APPENDIX A

QUESTIONNAIRE

I. Demographic details

1. Name:
2. Age/gender:
3. Educational status:
4. Family history of hearing loss:

II. Linguistic background

1. Native language:
2. Speech-language therapy related details: Yes/ No
(If Yes, then for how long?)

III. School related information

1. Type of school attended: Normal school/Special school
2. Migration from school: Yes/ No
(If so, specify the change in the mode of communication)

IV. Years of use of sign language:

V. Mode of communication with

Verbal

Sign language

Verbal + Sign
language

Family

Friends

In college

Others

VI. Mode of communication used by the family members with the client:

Verbal

Sign language

Verbal + Sign language

APPENDIX B

PICTURE STIMULUS CARDS

