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RESEARCH ARTICLE

EXPRESSION OF PROPER NOUNS AND PRONOUNS BY DEAF SIGNERS OF INDIAN SIGN LANGUAGE (MUMBAI-DELHI DIALECT).

Yashomathi¹ and R. Manjula².

1. Lecturer in Speech Pathology, Department of Speech Language Pathology, All India Institute of Speech and Hearing Mysore – 570006.
2. Former Professor of Speech Pathology, Department of Speech Language Pathology, All India Institute of Speech and Hearing, Mysore – 570006.

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Abstract

The aim of the study was to investigate the expression of proper nouns and pronouns by deaf signers of Indian Sign Language (ISL) (Mumbai-Delhi dialect) in narration. Ten fluent Deaf signers of Indian Sign Language (5 Males & 5 Females), in the age range of 18-40 years using signs of Mumbai-Delhi dialect were included in the study. The picture cards of the story “The snake and the mongoose” was used for the narration task. The participants were presented with the picture cards and instructed to narrate the story using sign language. The signed expressions of the participants were video recorded and later analyzed by two judges individually. The judges transcribed and coded the signed expression of the participants for proper nouns and pronouns types using ELAN software and the frequency of occurrence was calculated for the proper nouns and pronoun types. The results showed that the deaf signers of ISL used noun sign or fingerspelling to express the proper nouns; and used a combination of ‘manual pointing and eye gaze’ as a predominant strategy to indicate pronouns. Use of other strategies such as a) manual pointing/indexing alone and b) manual pointing/indexing using combination of non-manual markers were also used to express the pronoun types.

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Introduction:-

Indian Sign language (ISL) is used in Nepal, Bangladesh, Sri Lanka and border regions of Pakistan (Vasishta, Woodward and Wilson, 1978; Woodward, 1993; Zeshan, 2000 & Zeshan, Vasishta & Sethna, 2004). Gordon Jr., (2005) identified three dialects of ISL: Mumbai-Delhi Sign Language, Kolkata Sign Language and Bengaluru-Chennai Sign Language.

The ‘Signing space’ in Sign languages extends from the top of the head to just below the waist vertically; and from the signer’s extreme right to extreme left horizontally/laterally. The signing space is used to express phonological contrasts in signs (Brentari, 1998; Sandler, 1989) and express pronouns, number and verb arguments in the morphological structure of signs (Janis, 1992; Mathur, 2000 & Padden, 1988). At the discourse level, however, spatial locations are associated with discourse referents (Klima & Bellugi, 1979).

Corresponding Author:- Ms. Yashomathi.

Address:- Lecturer in Speech Pathology, Department of Speech Language Pathology, All India Institute of Speech and Hearing Mysore – 570006.

Pointing gestures typically co-occur with speech, and are used to draw the attention of the listener (Bangerter, 2004; Clark, 2003 & Haviland, 2000b). Kendon (2004) & Kita (2003a, 2003b, 2003c & 2009) reported that pointing signs in sign language are not different from that of pointing gestures used by non-signers. In pointing gestures, an extended index finger is used to point at the object, location, person etc. In sign languages, pronouns are signed by pointing to a person or thing that is “present” in the space or by pointing to a specific location in the signing space which represents a person or thing that is “not present” in the communication area. Kendon (2004) and Kita (2003a, 2003b, 2003c & 2009) observed that the pointing signs are used to express pronominal reference in sign languages and they do not look different from that of the pointing gestures that are used by the non-signers. The association between the referent and a spatial locus is established by articulating the sign for the referent in space, by producing the sign and then pointing to the locus or by gazing in the direction of the locus being established while making the sign (Lillo-Martin & Klima, 1990; Padden, 1983). Once the locus for a referent is established, the locus is maintained throughout the discourse. This phenomenon of establishing loci in space in sign languages to indicate pronouns is known as ‘Pronominalization’. Bangerter (2004) observed that in sign languages, the signs used for pointing refer to precise, unambiguous, pronominal reference.

The use of pronominalization to express pronouns is well reported in several sign languages such as American Sign Language (ASL) (Hatzopoulou, 2008 & McBurney, 2002), British Sign Language (BSL) (Kyle & Woll, 1985; Meier, 1990), Israel Sign Language (ISL) (Meier, 2003), Swedish Sign Language (SSL) (Bergman, 1980), and Brazilian Sign Language (LSB) (Berenz, 1996). Three distinct signs are often reported across many sign languages in the signed expression of pronouns which include: (a) pointing towards the signer to refer to first person pronoun ‘I/Me’, (b) pointing towards the person to indicate second person pronoun ‘You’ and (c) pointing to another person to indicate ‘He/Him’, or ‘She/Her’ (For example, in American sign language (ASL) [Berenz (1996); Cormier (2005, 2007); McBurney, (2002); Hatzopoulou (2008); Liddell (2000b, 2003)] in British Sign Language (BSL) [Cormier, Fenlon, Rentelis, & Schembri (2011)] in Sign Language of Netherlands [Bos (1995)] in Swedish Sign Language (SSL) [Bergman (1980)] in Israel Sign Language (ISL) [Meier (2003)] in Brazilian Sign language (LSB), [Berenz, 1996]). Further, there are no stand alone signs reported to express pronouns (lexicalized pronouns) in ASL (Friedman, 1975); the pronouns in ASL are signed by establishing a frame of reference in front of the signer’s body, wherein the reference points for objects, persons, and locations are established.

The pointing (with an extended index finger)/ indexing in sign languages convey several functions including the expression of pronominals, adverbials (locative) and determiners. Locative (adverbial) pointing signs are those signs that point to the signing space to refer other location which have adverbial function. E.g., ‘here’ ‘there’ etc. Demonstrative pointing signs are those signs used to express demonstrative pronouns such as ‘this’, ‘that’ ‘here’ and ‘there’ etc. The distinction between proximal demonstrative pronouns (this, these & here) and distal demonstrative pronouns (that, those & there) are made based on the distance of the locus being established by the speaker to indicate object, place etc (Lyons, 1979). Diessel (1999) reported that demonstrative pronouns are the very first words that typical children learn and that demonstrative pronouns are frequently used by typical adults in conversation (Wu, 2004).

Possessive pronouns in sign languages are expressed in the same way as that of Non-possessive pronouns/Personal pronouns, but the latter have a distinct handshape. Non-possessive pronouns/personal pronouns are generally expressed with pointing handshape whereas possessive pronouns assume different handshapes i.e., palm directed towards the referent in several sign languages such as ASL (Cormier & Fenlon, 2009), Australian Sign Language (OGS) (Johnston & Schembri, 2007), and Hong Kong Sign Language (HKSL) (Tang & Sze, 2002). The pointing function is also reported to indicate plural pronominal signs. In ASL and BSL, Cormier (2005 & 2007) found that, the plural pronominal signs have less of a pointing function than that of the singular pronoun signs i.e., plural pronominal signs are less indexic in nature when compared to singular pronominal signs. IPSL has a transnumeral pronominal sign (an extended index finger pointing sign) which is used for singular and plural; pointing towards the signer’s chest refers to the signer or the signer plus others, depending on the context. Most sign languages use spatial inflections to mark person and number inflections (Zeshan et al., 2004).

The expression of pronouns in sign languages also involves signing of a manual sign along with the non-manual markers. The non-manual expressions used to express pronouns include eye gaze, head turn in American Sign Language (ASL) (Baker & Cokely, 1980; Bellugi & Fischer, 1972; Liddell & Metzger, 1998), wherein, the direction of eye gaze follows direction of hand; the direction in which pointing sign is made. Neidle, Kegl, MacLaughlin,

Bahan and Lee (2000) reported that in ASL, in addition to eye gaze, pronouns are often accompanied by other non-manual markers such as wrinkled nose, furrowed brows, and a slight rapid head shake.

Several other studies on ASL have recorded the role of 'body shift' to indicate the third-person reference with a pointing sign directed towards the signer; the shift indicated by the change in orientation of signer's shoulders, head and/or eyes in ASL (Lillo-Martin & Klima, 1990). On the other hand, Meier (1990) reported that head position and the direction of eye gaze in Israel Sign Language (ISL) distinguishes third-person pronoun from non-third person pronoun. MacLaughlin (1997) noted that pointing signs in Hong Kong Sign Language (HKSL) could be interpreted as a pronoun when signed alone. The pronouns in HKSL are optionally signed by using eye gaze directed at the location of referent in signing space. Liddell and Metzger (1998) reported that the use of eye gaze to express pronouns in ASL was consistently directed toward the addressee during the production of both second person pronouns and third-person pronouns and no distinction in eye gaze was found between second and third person referents.

Studies addressing the linguistic attributes of Indian Sign language (ISL) when compared to other sign languages are very scarce (Prajapati & Asai, 2010). There is need to address the sign language structure of Indian Sign language, in order to provide a base for formalizing the approaches towards teaching and learning the Indian sign language by the hearing impaired individuals as well as their communication partners. It will also facilitate and open opportunities to research and develop sign language recognition systems. This study aimed to analyze and report on expression of pronouns used by the deaf signers of Indian Sign language (ISL) using Mumbai-Delhi dialect, including the use of non-manual markers in a story narration task.

Method:-

Participants:-

Ten fluent Deaf Signers (5 Males & 5 Females) using Indian Sign Language (ISL) signs of Mumbai-Delhi dialect were included. The participants were in the age range of 18-40 years. Informed written consent was obtained from each participant prior to the recording of their samples. The participants met the following criteria:

They were pre-lingually deaf born to hearing parents.

They were proficient in using ISL in day to day conversation. They were using ISL for a minimum of 10 years, as ascertained using a checklist prepared for the purpose by the investigator.

They interacted with their parents, family members and other communication partners using a combination of sign language and few verbal expressions for day to day communication.

They had a minimum educational qualification of secondary education in a school for Persons with Hearing Impairment with the medium of instruction for curricular work being English.

They did not have any other disabilities in motor, visual and neurological domains (as ruled out using Quick neurological screening test (QNST) by Mutti, Sterling and Spalding, 1978), and cognitive deficit (as ruled out using Mini-Mental State Examination (MMSE) by Folstein, Folstein, and McHugh, 1975).

All the participants used Mumbai-Delhi dialect of Indian Sign Language (ISL) as ascertained through information collected in the demographic data sheet by the investigator.

Task and procedure:-

A story on the topic 'The Snake and the Mongoose' was selected and depicted as sequential picture event on 6 cards with the help of an artist. This story was selected as it provided opportunities to use pronouns repeatedly when the story was narrated. The pictures depicting the story sequence were verified for disambiguity and order of continuity in the sequence by two qualified speech-language pathologists on a three-point rating scale. Video recording of each participant at a time was carried out at the educational centre or work place of the participant by the principal investigator. The video recording of the signed expression of the participants for narration of story was carried out in a room which was well illuminated with minimal visual and sound distraction. The sequential story cards were initially given to the participant (from whom the data was collected individually) and was asked to understand the concept represented in each card and the summary of the story. The participant was then asked to narrate the story using sign language as naturally as possible and the signed expressions of the participants were video-recorded by

the principal investigator using a hand held Sony Digital Video Camera Recorder (Model no: DCR-SR47E) with the capacity of 800K pixel, 60*optical zooming, and storage capacity of 45 hours of video footage. The camera was mounted in front of the participant on a tripod stand at a distance of minimum 5 to 7 feet and zoomed to capture the sign space from head to trunk and arms extended on both the sides of the participant. Each participant was given two trials each and the same was recorded.

Analyses:-

Of the two video samples recorded, the sample which had less visual distracters/repetitions/good visibility of signing was considered for the analyses. The sample was fed into a computer. ELAN (EUDICO Linguistic Annotator) software (Hellwig & Van Uytvanck, 2007) was used for coding the signed expressions. A set of annotations sharing the same characteristics can be coded on a single tier using ELAN software (Johnston & Crasborn, 2006). Few other investigators have provided annotation guidelines for coding sign language video samples (Crasborn et. al., 2007; Johnston & Crasborn, 2006; Johnston & Schembri, 2006; Neidle, 2002; Zwitterlood, Ozyurek & Perniss, 2008). Based on these guidelines of annotations and transcription conventions, the signed expression of each participant was coded by the principal investigator. The coding of the signed expressions of the participants was carried out to record the use of (a) different pronoun types, (b) strategies used in the expression of the pronouns and (c) the use of non-manual markers to sign various pronoun types.

The data was analyzed and coded under three tiers in ELAN software as follows:-

1st tier - Sign Gloss: The data was transcribed and annotated for expression of lexical signs i.e., glossing for each sign of each participant was carried out by selecting the respective portion in video sample under this tier. The glosses in this tier were transcribed in upper case as per the guidelines.

2nd tier – Identification of types of pronouns: In this tier, data was checked for the presence of pronouns in signed expression. Instances where pronouns were expressed by the participant were noted and coded for types of pronouns such as personal pronouns, demonstrative pronouns, possessive pronouns etc.

3rd tier – Identification of non-manual markers used in the expression of pronouns: In this tier, the data was coded for use of different non-manual markers in signed expression of pronouns. This was carried out as per the operational definition of Non-Manual Markers defined by the investigators (provided in Annexure 3). The function of each of the 3 tiers as defined in this study is presented in Annexure 1.

The annotations used to code different types of pronouns and non manual markers expressed by participants are shown in Table 1 and 2 respectively.

Table 1:- Annotations used in the coding of different pronoun types.

Sl no.	Annotations	Pronoun Types
1.	IX-1P (pe pr)	1 st Person (personal pronoun)
2.	IX-2P (pe pr)	2 nd Person (personal pronoun)
3.	IX-3P: i (pe pr)	3 rd Person (personal pronoun) associated with location 'i'.
4.	POSS-1P (po pr)	1 st Person (possessive pronoun)
5.	POSS-2P (po pr)	2 nd Person (possessive pronoun)
6.	POSS-3P (po pr)	3 rd Person (possessive pronoun)
7.	Dem	Demonstrative Pronoun

Table 2:- Annotations used for various non-manual markers.

Sl no.	Annotations	Non-manual markers
1.	Eg	Eye Gaze
2.	Psp	Pointing to space
3.	Pse	Pointing to self
4.	hm: bd	Head movement: bent down
5.	Hp:ti fr	Head position: tilt front
6.	Hp:ti side	Head position: tilt side
7.	Htu	Head turn
8.	hm:Jut	Head movement: jut
9.	BL: for	Body leaned forward
10.	EBr	Eye Brow: raised

Reliability check:-

10% of the video samples of each participant were subjected to reliability check. Another coder/judge with post graduate degree in speech- language pathology and knowledge of sign language, having normal hearing and vision, and familiar with the operation of a computer was recruited for the reliability check. The 2nd coder was trained by the first coder (principal investigator) using samples of deaf signers that were not included in this study, on the following aspects: 1) identification and selection of signed expressions 2) referring to operational keys and annotating data on ELAN software and 3) coding the pronoun types as per the operational definition of the pronoun types (Annexure 2) and reviewing the annotated samples to confirm the expression of pronouns as per the definitions. Once the data was coded by the 2nd coder, the inter and intra judge reliability was established.

Inter judge reliability: This was established between the two coders, based on item by item verification for agreement/disagreement in various domains of the data. In instances of disagreement between coders for any of the items, analyses were repeated by coders independently and parameters mutually agreed upon by two coders were noted as final. The reliability coefficient was calculated

Intra-judge reliability: Reanalyses of 10% of the data per participant was carried out within a month from the day of first analyses by the 1st coder (investigator) and the 2nd coder also in order to check for intra judge reliability. In instances of disagreement between the two instances of coding, it was resolved by reviewing and confirming the parameter analyzed. The reliability coefficient for the samples analyzed in two instances by investigator and other coder was determined.

The raw data obtained by the coders was tabulated and subjected to statistical analysis.

Results and Discussion:-

The coded data was used to tabulate and record frequency of occurrence of different pronoun types, strategies used to express pronouns and use of non-manual markers/facial expressions by participants to express the pronoun types. The signed expressions of the story narrated by most participants majorly included use of proper nouns (woman, snake, mongoose, baby, and cradle) that occurred in the story and several pronoun types such as demonstrative pronouns (here, there, that, this), 1st person pronoun (I, me), 2nd person pronoun (you, she), 3rd person pronoun (it) and 1st person possessive pronoun (my, mine) that substituted the proper nouns.

The proper nouns were expressed by participants using following strategies: a) Signing the noun signs/lexical signs and b) Finger spelling the nouns. The expression of pronoun types involved use of strategies such as a) manual pointing/indexing alone and b) manual pointing/indexing used along with non-manual markers to mark pronoun types. The frequencies of occurrence of the features under study were calculated as follows:

The frequency of occurrence of proper nouns:

$$\frac{\text{The number of occurrences of proper nouns}}{\text{The observation period of the sample}}$$

The frequency of occurrence of different pronoun types:

$$\frac{\text{The number of occurrences of a pronoun type}}{\text{The observation period of the sample}}$$

The frequency of occurrence of different strategies:

$$\frac{\text{The number of occurrences of a strategy type}}{\text{The observation period of the sample}}$$

The expression of various features studied as computed by the ELAN software were noted and subjected to statistical analysis. The data was subjected to statistical analysis using SPSS (version 16). Shapiro-Wilk test of normality revealed that the data was not normally distributed ($p > 0.05$). Hence non-parametric tests were used to find significant difference if any in the frequency of occurrence of various pronoun types and proper nouns.

1. Frequency of occurrence of proper nouns and pronoun types

The frequency of occurrence of proper nouns and different pronoun types is represented in table 3.

Table 3:- Frequency of occurrence of proper nouns and various pronoun types

Participants	Proper nouns	Demonstrative pronouns	1 st person pronouns	2 nd person pronouns	3 rd person pronouns	1 st person possessive pronouns
1	0.4395	0.0845	0	0	0	0.0338
2	0.4572	0.0795	0	0	0.0198	0.0397
3	0.2844	0.0890	0	0.0098	0	0.0196
4	0.4333	0.1083	0	0	0.0154	0
5	0.2309	0.0355	0.0355	0.0355	0.0177	0.0177
6	0.3110	0.1072	0.0214	0	0.0214	0.0214
7	0.6068	0.1213	0.0242	0	0	0
8	0.4373	0.2460	0.1093	0.1913	0.0546	0.0000
9	0.4655	0.1643	0.0273	0	0	0
10	0.4939	0.0790	0.0592	0.0197	0	0

The data was subjected to Friedman test and the results revealed a significant difference in frequencies [$\chi^2 (5) = 37.997, p < 0.01$] across proper noun and various pronoun types. There was a significant difference in the frequency of occurrence of proper nouns, demonstrative nouns, 1st person pronouns, 2nd person pronouns, 3rd person pronouns and 1st person possessive pronouns. Hence, Wilcoxon Signed Rank test was run to make a pair-wise comparison of frequencies of occurrence of proper nouns and pronoun types. Significant differences between the frequency of occurrence of proper nouns and demonstrative pronouns ($Z = -2.805, p < 0.01$), proper nouns and 1st person pronouns ($Z = -2.803, p < 0.01$), proper nouns and 2nd person pronouns ($Z = -2.803, p < 0.01$), proper nouns and 3rd person pronouns ($Z = -2.803, p < 0.01$), and proper nouns and 1st person possessive pronouns ($Z = -2.803, p < 0.01$) were found. The proper nouns were more frequently signed when compared to demonstrative pronouns, person pronouns (1st, 2nd and 3rd person pronouns) and possessive pronouns (1st person), as represented in Figure 1.

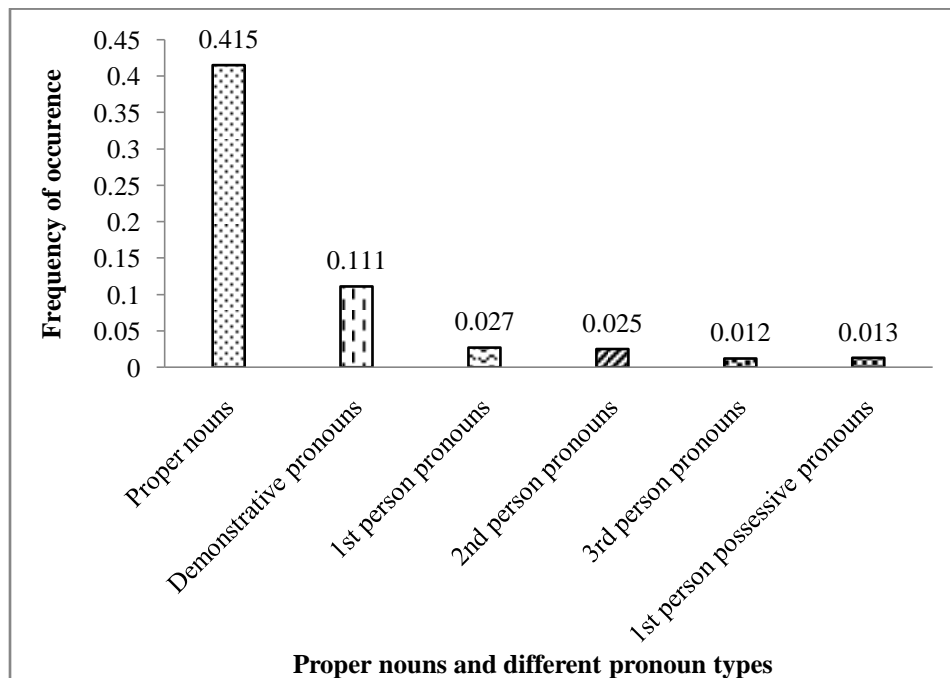


Figure 1. Mean frequency of occurrence of proper nouns and different pronoun types used by the participants.

The participants signed proper nouns using lexical signs representing them and also by using finger spelling. The use of pronouns such as demonstrative pronouns, person pronouns (1st, 2nd and 3rd person pronoun) and possessive

pronouns (1st person) required the participant to establish a loci in space, whereas use of proper nouns by the deaf signers involved signing the noun signs or using fingerspelling, which could probably be the reason for more frequent use of proper nouns when compared to the pronouns.

There was a significant difference in the frequency of occurrence of demonstrative pronouns demonstrative pronouns and 1st person pronouns ($Z = -2.666$, $p < 0.01$), demonstrative pronouns and 2nd person pronouns ($Z = -2.666$, $p < 0.01$), demonstrative pronouns and 3rd person pronouns ($Z = -2.803$, $p < 0.01$), and demonstrative pronouns and 1st person possessive pronouns ($Z = -2.803$, $p < 0.01$). Amongst the pronoun categories, the demonstrative pronouns occurred more frequently compared to 1st, 2nd and 3rd person pronouns and 1st person possessive pronouns. However, difference between the frequencies of 1st, 2nd, 3rd person pronouns and 1st person possessive pronoun were not significant.

Overall, the participants used proper nouns and different types of pronouns in their signed expression of the story. Amongst the pronoun types that represented nouns, demonstrative pronouns were used more frequently compared to that of other pronoun types (1st, 2nd, 3rd person pronouns and 1st possessive pronoun).

2. Frequency of occurrence of demonstrative pronouns

It was observed that the participants used demonstrative pronouns such as ‘this’, ‘that’, ‘here’, ‘there’ more frequently compared to person pronouns and possessive pronouns while narrating the story. Diessel (1999) reported that demonstrative pronouns are the very first words that typical children learn. Wu (2004) also reported that demonstrative pronouns are frequently used by typical adults in conversation. This seems to be true amongst the deaf signers also as seen in the results of this study. The demonstrative pronouns were expressed using the following strategies by the participants:

Using manual pointing signs/Indexing alone: this involved the signers extending their index finger towards the referent in signing space to establish reference/loci in space.

Using manual pointing/indexing accompanied by various combinations of non-manual markers such as Eye gaze, raising of eyebrows, body leaning forward in the direction towards the loci, head movements such as head bent down towards the loci, head turn towards the loci, head movements such as head bent down towards the loci, head turn towards the loci /referent etc in conjunction with pointing sign to mark the demonstrative pronouns.

Similar findings have also been reported in sign languages such as ASL (Baker & Cokely, 1980; Bellugi & Fischer, 1972; Liddell & Metzger, 1998; Neidle, Kegl, MacLaughlin, Bahan & Lee, 2000) and Israel Sign Language (Meier, 1990), where eye gaze, head turn, body shifts, were observed in addition to manual pointing to mark pronouns.

Several groups of strategies were used by the deaf signers of Mumbai-Delhi dialect of ISL to express the demonstrative pronouns during the story narration task and they are as follows:

Group 1: Pointing to space, eye gaze, head bent down and Body leaned forward

Group 2: Pointing to space, eye gaze, and head bent down

Group 3: Pointing to space, eye gaze

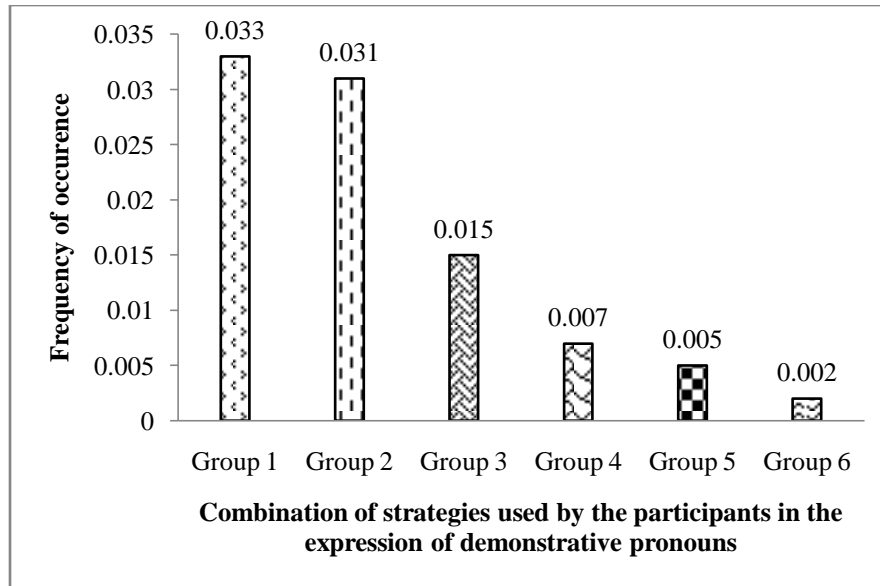
Group 4: Pointing to space, eye gaze and head turn towards the referent

Group 5: Pointing to space

Group 6: Pointing to space, eye gaze, and eyebrows-raised

Shapiro-Wilk test for normality of distribution revealed that the data was not normally distributed ($p > 0.05$). Hence non-parametric tests were administered to verify for significant difference if any in the frequency of occurrence of combination of strategies used in the expression of demonstrative pronouns. Friedman test revealed a significant difference in frequencies of occurrences [$\chi^2(5) = 13.612$, $p < 0.05$] of combination of strategies used to express the demonstrative pronoun.

Several combinations of non-manual markers along with manual pointing were used by participants to indicate demonstrative pronouns in story narration task and the same is represented in Figure 2.



[Combination 1: Pointing to space, eye gaze, head bent down and Body leaned forward; Combination 2: Pointing to space, eye gaze, head bent down; Combination 3: Pointing to space, eye gaze; Combination 4: Pointing to space, eye gaze, heard turn towards the referent; Combination 5: Pointing to space; Combination 6: Pointing to space, eye gaze, eyebrows-raised]

Figure 2. Mean frequency of occurrence of different group of strategies used by the participants in the expression of demonstrative pronouns.

A pair –wise comparisons of frequencies of occurrence of combination of strategies was carried out using Wilcoxon Signed Rank test. The results revealed a significant difference in frequency of occurrence ($Z = 2.521$, $p < 0.01$) between combination 1 and combination 4. A significant difference in frequency of occurrence between the combination 1 versus combination 6 ($Z = -2.547$, $p < 0.01$), and combination 3 versus combination 6 ($Z = 1.992$, $p < 0.01$) was also observed.

The predominant strategy used to sign demonstrative pronouns by participants in story narration task involved a) manual pointing sign accompanied by non-manual markers such as Eye gaze, Head bent down, Body leaned forward toward the referent (combination 1) followed by a combination of b) manual pointing sign and Eye gaze (combination 3) when compared to other combination of strategies (Figure 2). Observation of the data also revealed that although various combinations of non-manual markers and pointing were used to express the demonstrative pronouns by participants, manual pointing sign and eye gaze were invariably used as a common strategy by the participants.

Qualitative observation of the data revealed that the proximal demonstrative pronouns ('this' & 'here') were differentiated from that of distal demonstrative pronouns ('that' & 'there') based on the distance of locus being established by the signer in signing space. The demonstrative pronouns 'this' & 'here', were expressed with manual pointing sign in space that was proximal to the signer's body whereas, for pronouns 'that' & 'there', manual pointing signs were far away from the signer's body. This observation is similar to the report by Lyons (1979) for American Sign Language (ASL).

The phenomenon of establishing loci in space through use of manual pointing sign and use of non-manual markers to express the pronouns in sign language is known as pronominalization. Use of 'pronominalization' to express pronouns have also been documented in several sign languages such as American Sign Language (ASL) (Cormier, 2005, 2007; Hatzopoulou, 2008; McBurney, 2002), British Sign Language (BSL) (Kyle & Woll, 1985; Meier, 1990), Israel Sign Language (ISL) (Meier, 2003), Sign Language of Netherlands, (SLN) (Bos, 1995), Swedish Sign Language (SSL) (Bergman, 1980), and Brazilian Sign Language (LSB) (Berenz, 1996).

As reported by several researchers, pointing is also used in spoken language as a co-speech gesture (Clark, 2003; Haviland, 2000b) and it is used to indicate the direction, location, objects and/or people (Kita, 2003b). The sign languages also makes use of pointing gesture to mark person and number inflections (Zeshan et al., 2004). In this study, the deaf signers of Mumbai-Delhi dialect also relied on manual pointing sign to establish the pronominal reference in space. They also used non-manual markers such as raised eyebrows, body leaned forward (towards the referent), head bent down (towards the referent), head turn (towards the referent) in addition to pointing sign. This can be reasoned based on the fact that these were used by the deaf signers to augment semantic meaning for the expression of the demonstrative pronoun.

3. Frequency of occurrence of 1st person pronouns

The participants used 1st person pronouns forms such as 'I', 'Me' in the narration of the story. The expression of 1st person pronouns involved the use of following strategies:

a) Pointing to oneself i.e., usually towards the signer's chest with extended index finger or with open hand touching the signer's chest or

b) Use of non-manual markers along with pointing to oneself

The combination of strategies that were used by the deaf signers of Mumbai-Delhi dialect of ISL to express the 1st person pronouns during the story narration task are as follows:

Combination 1: Pointing to oneself

Combination 2: Pointing to oneself and body leaned forward

Combination 3: Pointing to oneself, head tilted to side, and body leaned forward

Combination 4: Pointing to oneself and head movement in jut position i.e., the chin touching the neck.

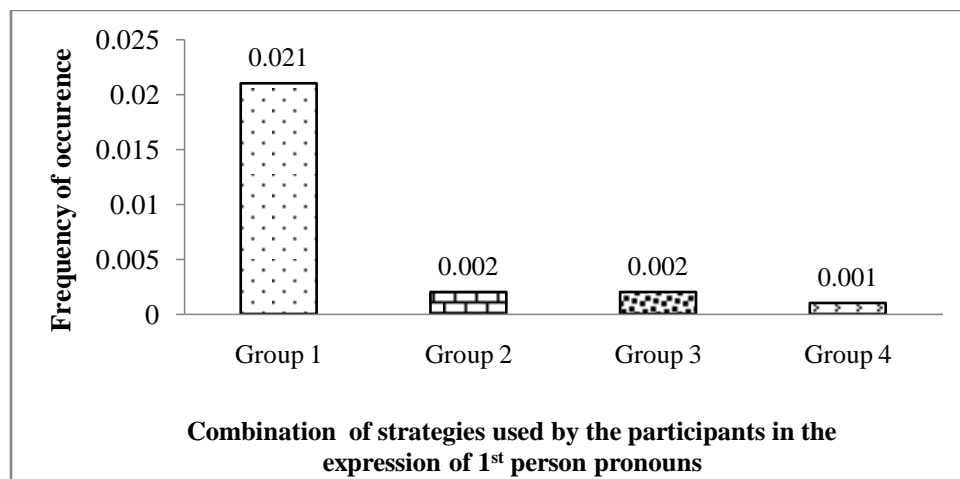
Friedman test revealed a significant difference in frequencies of occurrence [$\chi^2(3) = 14.122, p < 0.05$] across various combination of strategies used to express 1st person pronouns. Pair-wise comparisons of different combination of strategies were carried out using Wilcoxon Signed Rank test and results revealed a significant difference between the following combinations:

a) Combination 1 versus Combination 2

b) Combination 1 versus Combination 3 and

c) Combination 1 versus Combination 4.

The mean frequency of occurrence of combination of strategies used by deaf signers to express the 1st person pronouns are represented in figure 3.



[Combination 1: Pointing to oneself; Combination 2: Pointing to oneself and body leaned forward; Combination 3: Pointing to oneself, head tilted to side, and body leaned forward; Combination 4: Pointing to oneself and head movement in jut position i.e., the chin touching the neck]

Figure 3. Mean frequency of occurrence of different group of strategies used by the participants in the expression of 1st person pronouns.

It was observed that pointing to oneself was the predominant strategy used to indicate 1st person pronoun. Various combinations of non-manual markers and pointing were also used to express the 1st person pronouns by the participants. This confirms the use of 'pronominalization' phenomenon by the participants. Similar observations have also been reported in sign languages such as American Sign Language (ASL) (Friedman, 1975; Padden, 1983), British Sign language (BSL) (Kyle & Woll, 1985; Meier, 1990), Swedish Sign language (Bergman, 1980), Brazilian Sign Language (LSB) (Berenz, 2002) and Croatian Sign Language (HZJ) (Alibasic Ciciliani & Wilbur 2006). It was also observed that the direction of pointing sign in the expression of 1st person pronoun differed from that of pointing sign used in the expression of demonstrative pronouns. The 1st person pronoun was expressed with index finger pointing and moving towards the signer's chest. On the contrary, demonstrative pronouns were expressed with index finger moving away from the signer to a locus in signing space. Thus, in Mumbai-Delhi dialect of ISL, the deaf signers used 'pointing to oneself' as a main strategy to express 1st person pronouns

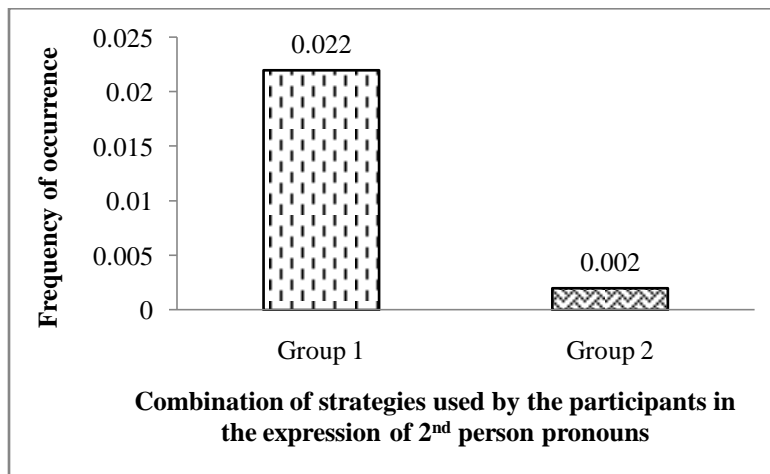
4. Frequency of occurrence of 2nd person pronouns

The frequency of occurrence of 2nd person pronouns was less when compared to frequency of occurrence of proper nouns and demonstrative pronouns. Few instances of 2nd person pronoun form such as 'You' were observed during narration of the story. It was observed that pronominal reference equivalent to 2nd person pronouns were carried out using few strategies such as pointing to space and use of non-manual markers. Various combinations characterizing pronominalization such as manual pointing to space accompanied by non-manual markers such as eye gaze, head bent down, body leaned forward towards referent were used and the mean frequency of occurrence of these is shown in figure 3. Similar observations are reported in several sign languages such as American Sign Language (ASL) (Berenz, 2002; Cormier, 2005, 2007; Hatzopoulou, 2008; McBurney, 2002), British Sign Language (BSL) (Kyle & Woll, 1985; Meier, 1990), Israel Sign Language (ISL) (Meier, 2003), Sign Language of Netherlands, (SLN) (Bos, 1995), Swedish Sign Language (SSL) (Bergman, 1980), and Brazilian Sign Language (LSB) (Berenz, 1996). The group of strategies that were used by deaf signers of Mumbai-Delhi dialect of ISL to express the 2nd person pronouns during the story narration task are as follows:

Combination1: Pointing to space, head bent down and body leaned forward

Combination 2: Pointing to space and eye gaze

The mean frequency of occurrence of combination of strategies used by the deaf signers to express the 2nd person pronouns are represented in figure 4.



[Combination 1: Pointing to space, head bent down & body leaned forward; Combination 2: Pointing to space and eye gaze]

Figure 4. Mean frequency of occurrence of different combination of strategies used by the participants in the expression of 2nd person pronouns.

Friedman test revealed a significant difference in frequencies [$\chi^2 (1) = 4.000, p < 0.05$] across strategies to express 2nd person pronouns. Further, pair-wise comparisons were made using Wilcoxon Signed Rank test to compare

frequencies between combination of strategies used to indicate 2nd person pronouns. There was no significant difference observed between combination 1 and combination 2. The use of other non-manual markers such as Eye gaze, head bent down and body leaning forward in the direction of the locus accompanied by manual pointing were used to augment the semanticity of the 2nd person pronouns. Similar findings have also been reported in other sign languages such as ASL (Bahan & Lee, 2000; Baker & Cokely, 1980; Bellugi & Fischer, 1972; Liddell & Metzger, 1998; Neidle, Kegl, MacLaughlin, Israel Sign Language (Meier, 2003), Brazilian Sign Language (LSB) (Brenz, 2002) and Croatian Sign Language (HZJ) (Alibasic Ciciliani & Wilbur, 2006).

5. Frequency of occurrence of 3rd person pronouns

The participants used 3rd person pronouns such as 'It', 'He' and 'she' during the narration task. The 3rd person pronoun form 'it' was expressed by pointing towards the referent in space (Psp); the signed expression of 'He' involved signing the noun 'Boy'/'Girl' (as per the situation) followed by pointing towards the referent in space (Psp). These 3rd person pronouns (it, He & she) were also signed using non-manual markers such as eye gaze, head bent down, body leaned forward towards the referent, and head turn towards the referent. Similar findings have also been reported in several sign languages such as American Sign Language (ASL) (Brenz, 2002; Cormier, 2005, 2007; Hatzopoulou, 2008; McBurney, 2002), British Sign Language (BSL) (Kyle & Woll, 1985; Meier, 1990), Israel Sign Language (ISL) (Meier, 2003), Sign Language of Netherlands, (SLN) (Bos, 1995), Swedish Sign Language (SSL) (Bergman, 1980), and Brazilian Sign Language (LSB) (Brenz, 1996). The following combinations of strategies were observed in the signed expression of the deaf signers to express the 3rd person pronouns and the same is represented in figure 5.

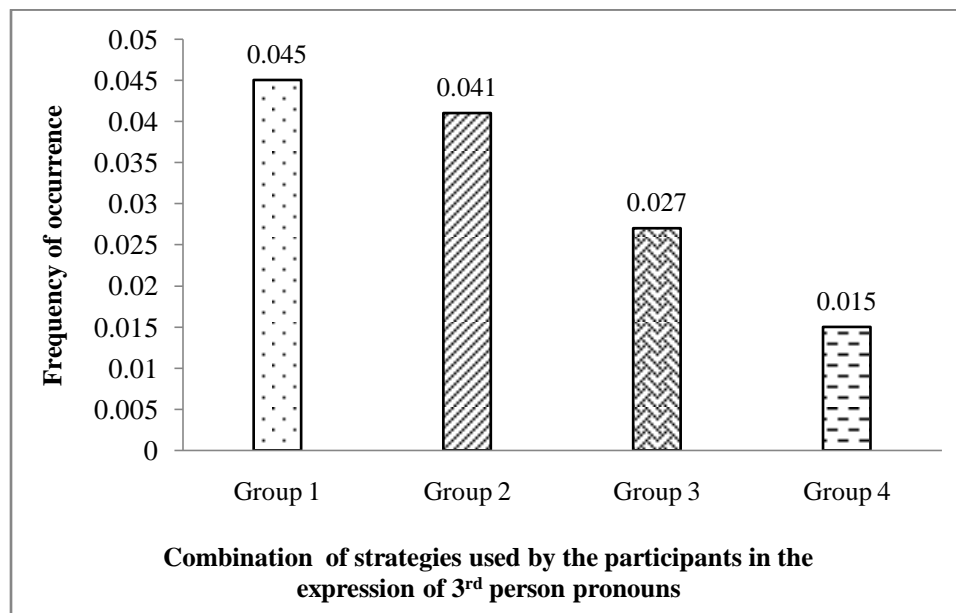
Combination 1:- Pointing to space, eye gaze, Head bent down and body leaned forward towards the referent in combination

Combination 2: Pointing to space and eye gaze in combination

Combination 3: Pointing to space, eye gaze, Head turn towards the referent and body leaned forward towards the referent

Combination 4: Pointing to space, Head bent down towards the referent in combination.

The mean frequency of occurrence of group of strategies used by the deaf signers to express the 3rd person pronouns are represented in figure 5.



[Combination 1: Pointing to space, eye gaze, Head bent down and body leaned forward towards the referent; Combination 2: Pointing to space and eye gaze; Combination 3: Pointing to space, eye gaze, Head turn towards the referent and body leaned forward towards the referent; Combination 4: Pointing to space, Head bent down towards the referent in combination]

Figure 5. Mean frequency of occurrence of different group of strategies used by the participants in the expression of 3rd person pronouns.

The use of non-manual markers in association with the manual pointing sign thereby provided additional semantic cue to the pronoun and the use of these non-manual cues in addition to manual pointing have also been documented in other sign languages such as ASL (Baker & Cokely, 1980; Bellugi & Fischer, 1972; Liddell & Metzger, 1998, Neidle, Kegl, MacLaughlin, Bahan & Lee, 2000), Israel Sign Language (Mier, 2003) Brazilian Sign Language (LSB) (Berenz, 2002) and Croatian Sign Language (HZJ) (Alibasic Ciciliani & Wilbur, 2006). The frequency of occurrence of various combinations of non-manual markers in association with manual pointing used by the deaf signers in the narration of the story to mark the 3rd person pronouns were compared.

The data of 3rd person pronouns was subjected to Friedman's test and the results did not reveal any significant difference in frequencies of occurrence [$\chi^2(1) = 4.000, p > 0.05$] between combination of strategies used to express the 3rd person pronouns. In other words, all these strategies were used equivalently by the deaf signers to refer to 3rd person pronouns.

6. Expression of 1st person possessive pronoun

The 1st person possessive pronouns like 'MY' & 'MINE' were used by the deaf signers while narrating the story. The participants expressed first person pronouns with open hand/palm directed towards the signer's chest (PSe). Similar findings have also been reported in sign languages such as ASL (Cormier and Fenlon 2009), Australian Sign Language (OGS) (Johnston & Schembri, 2007), and Hong Kong Sign Language (HKSL) (Tang & Sze, 2002).

Zeshan et al., (2004) reported that in most sign languages spatial inflections to mark person and number inflections are used; i.e., the pronouns are indicated by pointing to different locations in space to differentiate across person pronoun (first, second and third person pronouns) and possessive pronouns (first, second and third possessive pronouns).

Summary and Conclusions:-

The study aimed to analyze the expression of pronouns by deaf signers using Mumbai-Delhi dialect of Indian Sign language in a story narration task. The results revealed that the signed expression of the deaf signers in the story narration task involved use of proper nouns and different pronoun types such as demonstrative pronouns, 1st person pronoun, 2nd person pronoun, 3rd person pronoun and 1st person possessive pronoun. The proper nouns were expressed by the deaf signers using finger spelling of the noun sign or signing the noun sign. The expression of demonstrative pronoun by the deaf signers involved making a pointing sign in space accompanied by combinations of various non-manual markers such as eye gaze, raising of eye brows, body leaned forward in the direction of the referent, head movements such as head bent down, head turn toward the referent, head tilt to the side etc. The expression of the 1st person pronoun and 1st person possessive pronoun also involved manual pointing but, the pointing sign was directed towards the signers' chest accompanied by non-manual markers. The 2nd person pronoun and 3rd person pronoun also involved making a pointing sign in space accompanied by combinations of various non-manual markers. The expression of pronouns thus confirms the use of 'pronominalization' as a phenomenon in Mumbai-Delhi dialect of Indian Sign language (ISL).

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Annexure 1:-

The functions defined for the three tiers of analysis and coding of the signed expressions for the use of plurals by the participants using ELAN software.

Tiers		Functions
Tier 1	Sign Gloss	Identification of signs representing concepts is transcribed using glosses in 'Sign Gloss' tier.
Tier 2	Identifying types of pronouns	Identify the instances of signed expression of pronouns from the tier one, and the type of pronoun (1 st person pronoun, 2 nd person pronoun, 3 rd person pronoun, demonstrative pronouns, possessive pronouns etc) were identified and coded this tier
Tier 3	Identifying non-manual markers used in the expression of pronouns	Identification of the non-manual markers such as eye gaze, pointing, body and head positions etc as evidenced in the signed expressions of the participants for pronouns was carried out and coded across the tier.

Annexure 2:-

Operational Definition of different types of Pronouns.

	Definition
Pronouns	The part of speech that substitutes for nouns or noun phrases.
Personal pronouns	Pronouns which represents particular person, group, or thing in a phrase or a sentence. E.g. I, Me, You, We, Us, He, She, Him, Her, it, they, them.
1 st Person Pronouns	Pronouns which represents first person in a phrase/sentence. E.g. I, Me.
2 nd Person Pronouns	Pronouns which represents second person in a phrase/sentence. E.g. You.
3 rd Person Pronouns	Pronouns which represents person or thing spoken about. E.g. He, She, Him, Her.
Possessive Pronouns	Pronouns that represents the ownership of the noun in a phrase/sentence. E.g. mine (1 st person possessive pronoun), yours (2 nd person possessive pronoun), hers, his, theirs (3 rd person possessive pronoun).
Demonstrative pronouns	Pronouns that takes the place of particular objects or people. E.g. This, That, These, Those, Here, There.
Indexing/Establishing loci in space to indicate many	The participant points to each loci in the sign space and indicates several loci to indicate several referents.

Annexure 3:-

Operational Definition of Non-Manual Markers

Non-Manual Markers	Definition
Pointing	This involves making an action with an extended index finger or with the open hand to show the referent which can be a person, place or thing.
Pointing to self	Pointing to oneself /Pointing to one's own chest.
Pointing to space	Pointing towards the space to indicate the referent (present/absent) which can be a person, place or thing.
Eye Gaze	It is direction in which one looks at the person, thing, place etc steadily and intently.
Head positions and movement	Includes change in the position and movement of the head, such as head tilt (front/back), head turn (left/right), head movement (nod, side to side headshake, raised and bent down).
Body positions	Includes change in the orientation of the body which includes, body leaned forward/backward, body leaned sideways (right/left) etc.