CHAPTER ONE
INTRODUCTION

1. Background

This research presents the essential elements of Nepali sign language (NSL), also known as the basic parameters that are involved to form signs in NSL. In comparison to other well studied sign languages, NSL has similar phonological structure i.e. basic parts of a sign such as, handshapes, place of articulations, orientations, movements, and non-manual characteristics, and also there are constraints on NSL during sign formation.

Sign language refers to the language used by the Deaf community as a mother tongue. It is a visual language produced by the hands and perceived through eyes. Many linguists such as, Kyle & Woll (1998), and Johnson & Schembri (2007) argue that sign languages are articulated by both hands, body and face, and perceived by eyes. It is a natural and independent language with a complex linguistic features and expressive dimension. Stokoe (1960) was the first person who claimed that signs could also be analyzed exactly in the same manner that the units of spoken language can be analyzed (Valli and Lucas 2000). Linguists argue that different sign languages used by different people in different countries exhibit similar and grammatical properties, however they are mutually unintelligible, for instance, neither the users of British sign language can understand Australian sign language nor can the users of Indian sign language understand Chinese sign language, and so on.

Nepali sign language, like other sign languages of the world, is a language used by the Deaf people as their primary means of communication in Nepal. It has emerged some years ago in order to break the language barrier within predominantly Nepali speaking community. The first school for deaf people in Nepal was established in 1966. Green (2009) argues that NSL has developed almost 40 years ago following the establishment of oral school for the Deaf in Kathmandu valley in 1966 which now follows a policy of 'total communication'. Sharma (2003) states that, in the initial days, the oral method was used in teaching medium for the deaf students, due to the lack of the development of proper signs. The first NSL manual was published in 1967 and the first NSL dictionary was published in 1989 (Sharma 2003). In that sense, the development of NSL (in terms of the time duration) can be divided into two stages. The establishment of deaf school, attraction for sign, publication of NSL manuals and dictionaries etc. began in the first stage (1966 to 1989), and broadcasting NSL news, playing

dramas, making documentaries, conducting research, organizing seminars, publishing NSL manuals and dictionaries, and many more are seminal achievements of the second stage i.e. 1990 onwards (Sharma 2003). Like spoken languages, sign languages also have their language family. Thus, Woodward (1993) puts Nepali Sign Language into the South Asian sign language family similar to the Indo-Pakistani Sign Languages. In addition, NSL has one handed fingerspelling system comparing to other sign languages across the world. The fingerspelling in NSL is used for the code switching i.e. to spell Nepali word, and for the development of new signs.

Though some studies have been carried out on NSL, there are plenty of fields such as, phonetics, phonology and so on which are hitherto undiscovered in comparison with the well studied sign languages like British Sign Language, American Sign Language, Australian Sign Language, Indian Sign Language, and so on. Thus, based on Brentari's Prosodic Model (1998), this study provides general information about NSL handshapes (finger setting), locations, orientations (palm and knuckle orientation), movements (type, direction and speed), and non-manual characteristics.

1.1 Phonological representation

1.1.1 NSL phonological components

In comparison to other developed sign languages, NSL has five basic phonological components that have vital role in sign formation such as, handshape (HS), Place of Articulation (POA), orientation (O), movement (Mov), and non-manual (NM) characteristics. Among these five components, first four are considered as the basic phonological components to the formation of every signs, whereas, non-manual characteristics do not have any role in sign formation, however, these are still considered as an independent phonological component.

1.1.2 Overall model

With respect to the sign formation mechanism, Brentari (1998) presents a prosodic model where she states, "It is clear that both place and articulator can be established as auto segmental tiers" (1998:98). Linguists such as, Anderson and Ewen (1987), and Van der Hulst (1993) declare that The Prosodic Model follows Dependency Theory where each node divided into two branches and each branch contains a head and dependent where head is more intricate in comparison to dependent. Thus, based on dependency theory, Brentari

represents hand configuration and place as simultaneous phenomena. Instead of associating handshape to all three segments and place to the two outer segments, Brentari (1998) associates everything to a root which is the sign level. Two parallel feature nodes connect to the root (sign) node in this method. 'IF' node incorporates specifications for the place of articulation (POA), and for the articulator (hand). The Articulator node also contains the nodes for manual and non-manual articulators. Whereas PF node includes the specifications for sign movement and it is the PF node through which feature configuration for signs connect to the prosodic structure.

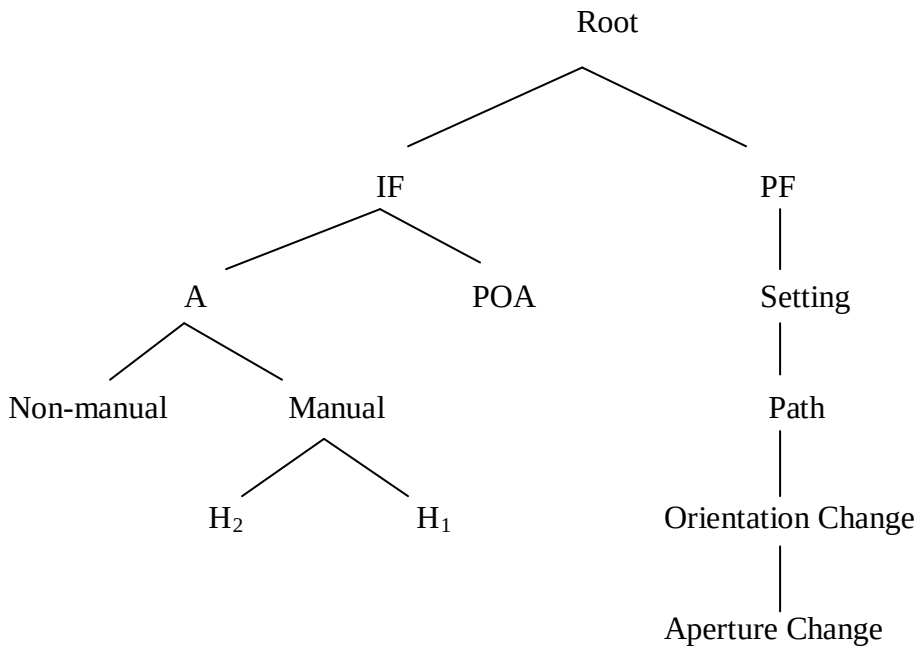


Figure1.1 The Inherent and Prosodic Feature Model (Brentari 1998)

The root node divided into two branches, to an inherent features branch and to a prosodic features branch. In this way, the sign carries two types of information at the sub lexical level. All of the simultaneous phenomena in a sign belong to the inherent features branch, whereas, the sequential phenomena occur into the prosodic features branch. Brentari views handshape and the place of articulation (POA) or location, as stable in a sign, thus she captures both under the inherent features node. Setting i.e. movement within POA, as well as handshape change that are not predictable, come under the prosodic features node. She associates the prosodic features branch to a timing tier in order to capture the sequential changes in a sign.

1.1.3 Three dimensional space

We can find the notion of ‘signing space' in traditional studies of sign formation. Lacy (1974) defines signing space as the space in front of the signer's body which expands vertically i.e. from the top of the head to just below the waist, as well as horizontally i.e. signer’s utmost right to the signer’s utmost left. Signs can be articulated either in the neutral space in front of the body or in contact with some parts of the body. She further explains, "Few signs are made over the head, behind the ear, or below the waist" (Lacy 1974). This idea of signing space can be cleared from the following figures.

Figure 1.2 Signing space (Brentari 1998)

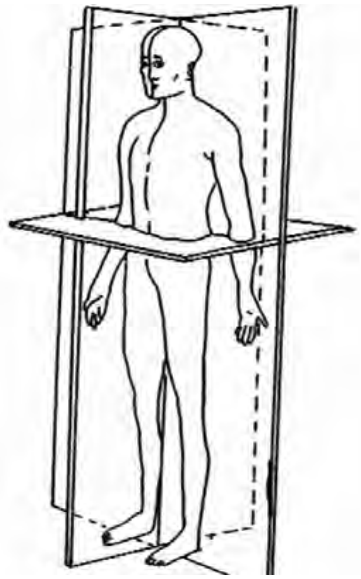


Figure 1.3 Three planes of the body (Brentari 1998)

For the phonological analysis of sign language, Brentari uses planes in space for the analysis of both inherent and prosodic features. She states, "The frontal (ventral, x) plane divides a human into front-back. The horizontal (transverse, y) plane divides a human into top-bottom. The midsaggital (z) plane divides the body into left-right" (Brentari 1998).

1.2 Statement of problem

The phonetic and phonological study of NSL has not been carried out. Thus the problem of this study is to present the phonological parameters in NSL in terms of:

1. What are the phonological parameters in NSL?
2. How these parameters combine to form a sign?

3. What are the consequences of the change in any one of these parameters into meaning of the sign, grammatical function, or to produce another sign?

1.3 Objectives of the study

The main objective of this study is to present the phonological parameters in NSL. The specific objectives of the study are as follows:

1. To discover the phonological parameters in NSL.
2. To discover the process of sign formation in terms of the combination of those parameters.
3. To discover the consequences of the change in any parameters into the meaning, and grammatical function of the sign or to produce another sign.

1.4 Review of literature

Some of the studies have been done on NSL in Nepal. Among them, limited studies have been dealt with the grammar and the sociolinguistic phenomena, and rest of other are primarily about the history and development of NSL in brief which are quite significant to this study. These are as follows:

Yadava and Regmi, (2003) recognizes NSL as a language and valorize it as spoken language. They try to give a general overview on sign language and NSL such as their status, history, development, sign system, and grammar. They talk about the phonology of NSL which is similar to other sign languages of the world. Hand shape, movement, location and orientation are important for the formation of any sign and if change occurs in any one of them the meaning gets differ. Similarly, they discuss about the morphology of SL and NSL to argue the formation of signs. There are certain processes of sign formation such as, compounding, reduplication, borrowing, and so on. They also talk about syntax of NSL such as, tense, aspect and mood, gender, person, number, honorificity and so on, in brief. Furthermore, they deal with the dialects of NSL i.e. cultural dialect and historical dialect. However, despite being the first attempt on NSL, it has some limitations. This study explains NSL for certain purpose, it is preliminary study of NSL. Likewise, it overlooks the phonetic aspect of NSL i.e. how signs are articulated and so on. In spite of its loopholes, this study motivates me to conduct a detailed study about the phonetic and phonological patterns of NSL.

Sharma (2003), deals with the sign languages of world in general and NSL in particular. Regarding NSL, she focuses on the history, its development and its pattern in brief. She talks about the ways of using NSL with appropriate examples. Similarly, in her book, she tries to give the answer of certain questions such as how NSL is used? How words or signs are formed in NSL? How one sign differs from another sign and so on. However, the study has some pitfalls. The primary focus of this study is the history and the development of NSL. The study is based only on general perspective of NSL. It somehow deals with the morphology and syntax of NSL, which is not sufficient.

Green (2009) studies NSL from the sociolinguistic approach and claims that NSL is in contact with Nepali language in Nepal. She states,"… in some situations or when using certain varieties, signers incorporate Nepali grammatical features, mouth Nepali words, and use the NSL manual alphabet to spell Nepali words." In comparison with other studies, this is rather detailed study of NSL from the perspective of sociolinguistics. Green talks about how words are borrowed in NSL from Nepali, and how they are nativized in NSL. However, it is away from the various aspects of NSL such as NSL sign systems, articulation of sign in NSL, NSL sentence structure and many more.

Green (2014) discusses about the different areas in deaf Nepal, focusing on the fundamental relationship between communication and sociality. She represents the social and institutional process through which NSL has emerged and spread, and how their understanding of language, communication and sociality strengthen them to campaign against the derogatory term *lato*. She further talks about the types of signs like home sign and village that Nepali deaf mostly use besides NSL which she called the local sign. Similarly, she also discusses about the difficulty of being deaf due to the lack of access of deaf people into NSL, which arises not-understanding or misunderstanding. She states,'…a result of repeated frustrations and communicative failures, (some) signers are considered to be unreliable narrators, even liars, and that negative evaluations of communicating in sign leak into general conceptions of what it is to be deaf.' Moreover, to talk about deaf-hearing relationship, she claims that the language is the cornerstone of social and cultural process however people can communicate without a fully shared language only if they are willing to do so.

Dilloway (2016) observes the relationship between the emergence of Nepali Sign Language and deaf sociality with the social and historical context of Nepal during the last decades before the Hindu Kingdom became a secular republic. She states that the adoption of an

ethno-linguistic model interacted with the polluted ritual model, which considers deafness is the results of bad karma. Thus, she studies the negative understanding of deafness in terms of the signers who adopted deafness as an ethnic identity, home signers whose ability to adopt that identity is hindered by their difficulties in acquiring Nepali Sign Language, and hearing people who interact with Deaf signers.

Sharma (2017) analyzes NSL in terms of grammatical perspective. Like spoken languages, compounding is one of the word formation processes found in NSL. She claims that, there are three types of compounds found in NSL such as first headed, middle headed and final headed. Among them, some compounds form from alphabets which are very rare in spoken language.

Sharma (2022) observes NSL from general perspective. In her study, she tries to give the information regarding the history of NSL, and its development, system of sign formation and its grammar. She states, ' Sign Language can be recognized as a systematic language which is expressed through handshape, location, and movement used by the Deaf community as their mother tongue.' According to her, the units of sign such as, handshape, location, and movement can be called as chereme which have minimal pair contrasting property. NSL also has gender, number, person, honorificity, tense, aspect, mood, and many more which are less complicated in comparison with spoken language. In NSL, verb and adjective are not inflected in sign on the basis of gender and number, rather noun can be inflected into the sign with the help of plural marker and feminine symbol. Likewise, NSL has only one sign for first, second, and third person respectively. Adverb and auxiliary verb indicate tense in NSL. Similarly, facial expression or non-handshape elements can be used in order to ask question, to denote negation or to present exclamation.

1.5 Methodology

This study has been based on the following methodologies:

1.5.1 Sources of data

In this study, both primary and secondary sources have been used for the data collection. For primary source, the researcher has recorded the conversation of NSL native signers, the topics of the conversation has been suggested in order to guide the deaf signer's discussion so that the most relaxed and spontaneous signing should be recorded for the analysis whereas,

available dictionaries, texts, videos, and research papers on NSL have been used as the secondary sources.

1.5.2 Tools for data collection

In the beginning, NSL dictionaries published by National Association of the Deaf and Hard of Hearing (NADH), and National Federation of the Deaf Nepal (NDFN) has required for this research. During the data collection, all the data have been scanned from both primary and secondary sources.

The study has followed the theoretical framework from A Prosodic Model of Sign Language Phonology (1998) by Diane Brentari.

1.5.3 Analysis of the data

To explore the inventories presented here, the researcher discovered the total handshapes from the NSL dictionaries as well as analyzed the short recorded signed conversation of the Deaf signers. Besides, the researcher analyzed all the signs from the NSL dictionary for the primary data. Similarly, for the name of the handshapes, the researcher used names based on the ASL fingerspelling system along with certain numerals. Finally, researcher used HamNoSys i.e. Hamburg Notation System in order to transcribe sign data. All the parameters in this notation system are arranged chronologically as handshape, orientation, location, movement and non-manual characters.

1.6 Significance of the study

The present study is the first phonological study of NSL. In the beginning, the study has discovered the inventories of handshapes, POAs, orientations, movements, and the partial inventory of non-manuals as well. This is an important contribution in the description at phonological level of NSL. Further, the identification of minimal pairs will helpful to understand the language in detail. Though the study will focus only on NSL phonology, it will help to descriptive study of NSL. In addition, it will help those who are interested for the further research on NSL. Also it will help to support deaf community in their attempt to developed and promote NSL.

1.7 Limitations of the study

Though the present study is significant to the Nepali sign language, it has some limitations. The sample data taken in the study is from Kathmandu valley, NSL sign used in other areas of Nepal has not been covered in the study. This study focuses on dominant hand only. The non-dominant hand in asymmetrical two handed signs is not included here. There are two Deaf signers, one male and one female, from the Kathmandu valley in the data.

1.8 Organization of the study

There are five chapters in this study. The first chapter is the introduction of the study. Chapter second related to inherent features. The third chapter of this study is about the prosodic features. Chapter four dealt with minimal pairs and constraints. And finally, chapter five contained summary and conclusion of the study. References and appendices are in the last pages.

CHAPTER TWO
INHERENT FEATURES

2. Introduction

The inherent features refer to the intrinsic and inseparable qualities and characteristics of all the languages either speech or sign. In sign language, the Inherent Features structure divides into the handshape parameters and place of articulation (POA) which will be discussed in detail in the sections below. The following figure helps to understand the inherent features apparently.

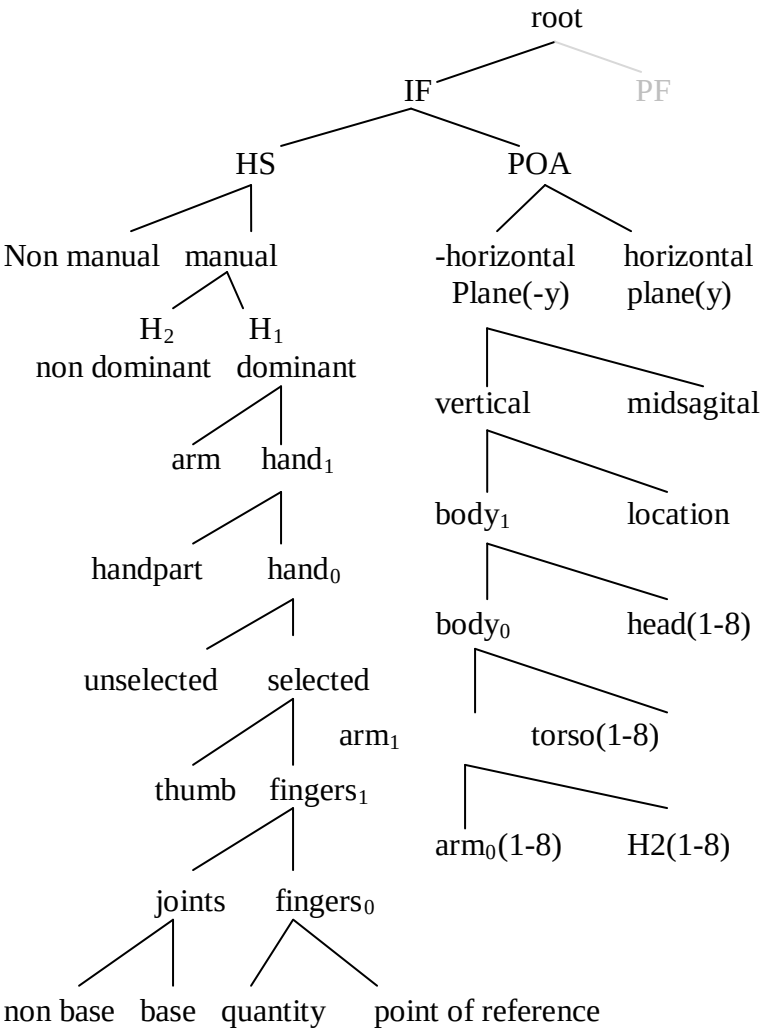


Figure 2.1 Inherent Features Structure (Fenlon et al. 2017)

The preceding figure shows that each node is divided into two branches in which, one is primary and the other is secondary branch. Primary branch is further splits into two branches frequently where as secondary branch remains un-split. For instance, handshapes node is

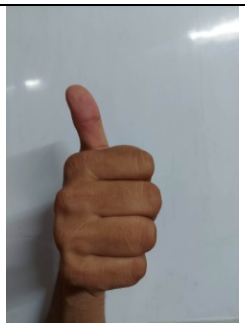
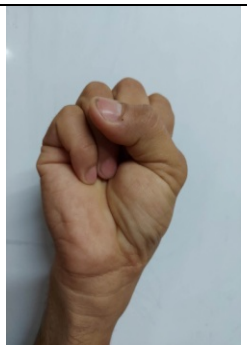
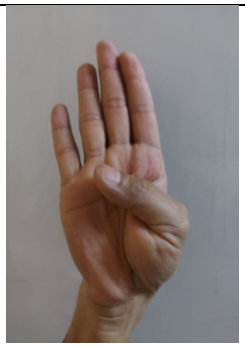
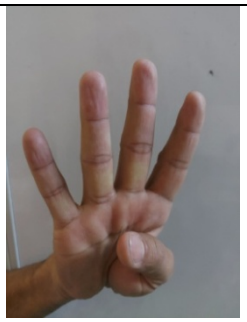
divided into non-manuals and manuals, where non-manuals is secondary node and manuals is primary. Thus, only manuals node mapped in non-dominant and dominant hand (which is further splits) and non-manuals node remains unmapped. The upcoming sections come up with the comprehensive analysis of inherent features of sign language (SL) in general and NSL in particular.

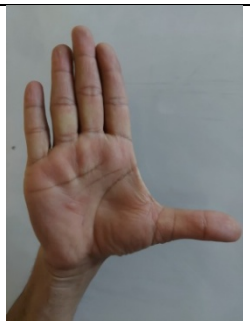
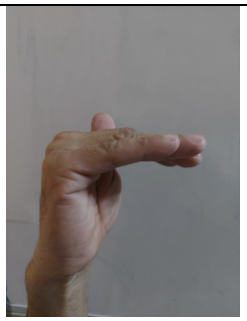
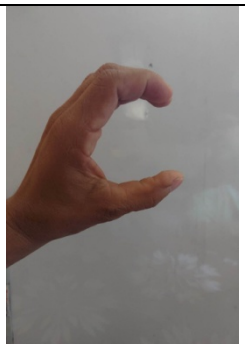
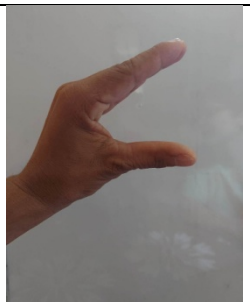
2.1 Handshape

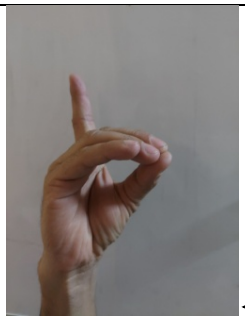
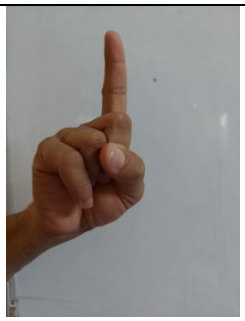
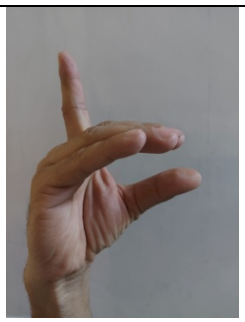
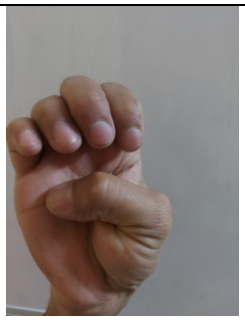
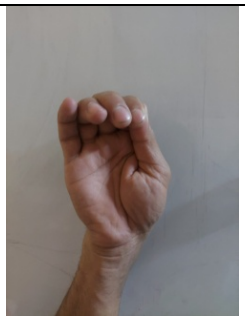
The Prosodic Model identifies the various nodes and features for the specifications of handshape. Sinha (2012) states handshape is a particular distinct configuration assumed by the manual articulator (s), and that can be of one hand or two hands. It is possible to have both ‘selected’ and ‘unselected’ fingers for each handshape. Selected fingers can be specified for different joints i.e. base and non-base joints, and fingers and thumb positions and that will be involved in handshape change. Unselected fingers can be either extended or flexed, and do not change their settings during a sign.

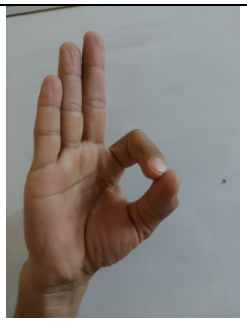
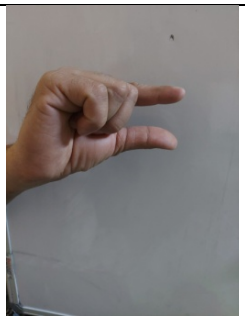
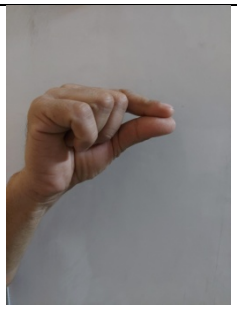
While talking about the handshape, it is necessary to talk about the types of fingerspelling alphabets that are used in NSL. One handed fingerspelling alphabets are used in Nepali Sign language. However, there is an exception in the number alphabet i.e. to express billion and 100 billion, we have to use two hands together. There are different alphabets for vowels, consonants, and numbers in NSL. There is the contrast between fingerspelling, hand configurations and the handshapes actually used in lexical signs. In this study, 62 different handshapes have been recorded in NSL, among them 44 occur in the manual alphabet. There are 22 basic handshapes and rest are their variants. However, more research on NSL is needed to ascertain the accurate handshapes and their variants in NSL. Several handshapes listed in the table below might be the variants of other handshapes. For instance, HS s-l could be the variant of HS l. Likewise HS flat- k could be the variant of HS x-k. Thus, it is possible that, the handshapes list presented in table 2.1 may not be the final inventory of handshape of NSL. There are phonetically distinct handshapes found in NSL as presented in the following inventory. Each handshape is given its name based on ASL alphabets. Additionally, the following prefixal attributes (Sinha 2012) have been used to denote features of handshapes such as: 'x' is used for extended, 'c' for compact, 'adj' for adjacent, 'b' for bent, 'th' for thumb, 's' for small, and 'd' for distant.

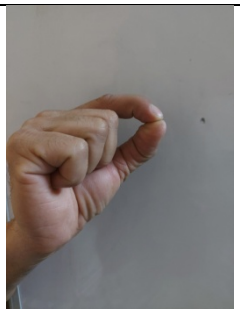
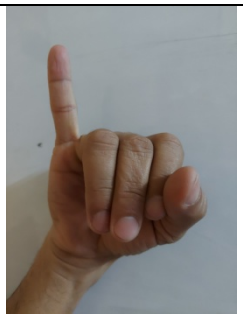
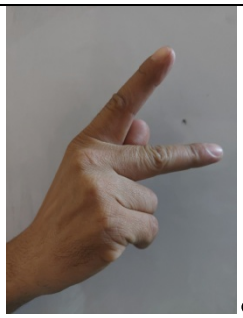
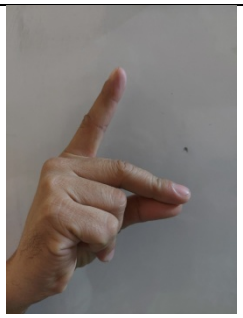
Table 2.1 The handshapes inventory of NSL.

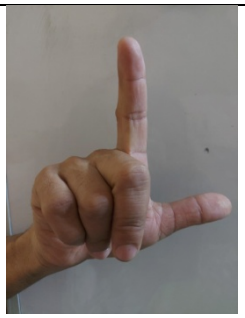
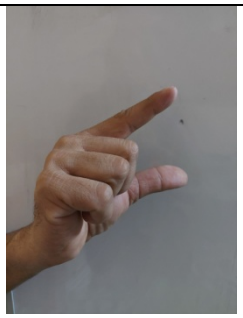
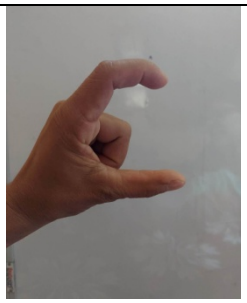
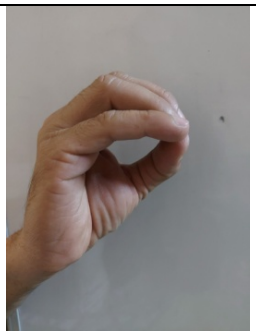
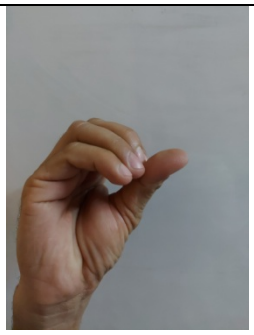
Picture	**Name**	**Handshape Description**
	x-A	Vowel 'ਅ' [a] consonant 'ਜ' [ja], number '6' in NSL alphabet chart.
	c-adj-A	All fingers bent at base and non-base joints and compact and adjacent to each-other.
	B	NSL consonant 'ਬ' [ba] in NSL alphabet chart.
	x-B	Finger extended and spread and thumb bent at base. Number '4' in NSL alphabet chart.

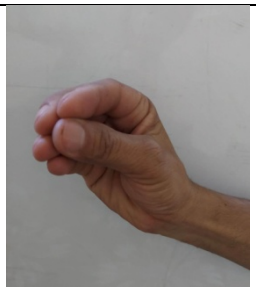
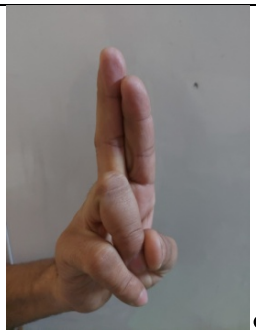
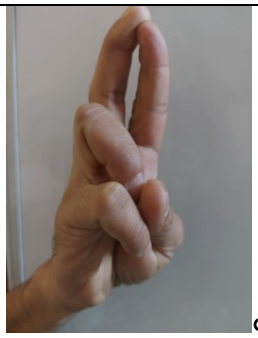
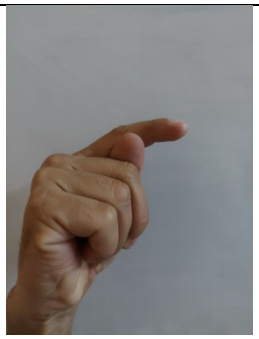
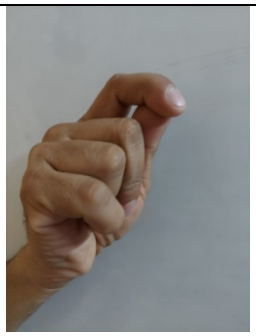
	th-x-B	Fingers adjacent but the thumb is extended e.g. consonant 'ਲ [la] in NSL alphabet chart.
	th-x little finger bent-B	Palm flat, fingers spread and adjacent with little finger bent at non-base. Number '9' in NSL alphabet chart.
	x- th-b-B	Fingers bent at base joint and adjacent to each other. Consonant 'ਤ [ta] in NSL alphabet chart.
	C	'ਸ਼ [ri] in NSL vowel chart.
	x-C	*Consonant 'ਯ* [ya] in NSL alphabet.

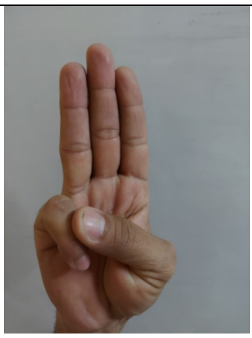
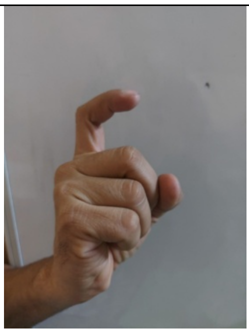
	D	Consonant 'थ [th] in NSL alphabet chart.
	c-D	Number '1' and vowel 'ए' [e] in NSL alphabet chart.
	x-D	Consonant 'ट' [ta] in NSL alphabet chart.
	E	All fingers bent at non-base joints except thumb and adjacent to each other. For instant, EL Salvador, Equador, Electrovalent.
	x-adj-thumb-E	Fingers bent at non-base joints except thumb which is extended and adjacent to other fingers. Consonant 'स [sa] n NSL alphabet chart.

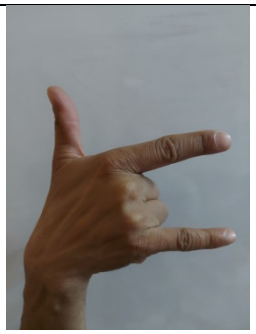
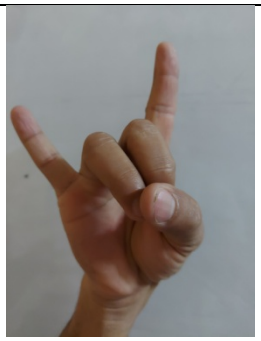
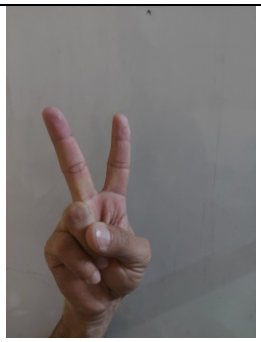
	F	Consonant 'ব' [wa] and vowel 'ঊ' [oo] in NSL alphabet respectively.
	adj-F	Consonant 'ধ' [dha] in NSL alphabet chart.
	cross-F	Thumb and index fingers cross and compact while other fingers spread. Consonant cluster'শ্র' [shra] in NSL alphabet chart.
	G	Consonant 'ঞ' [na] and 'ণ' [na] in NSL alphabet.
	flat-G	Fingers bent at base joints, and thumb and index finger flat and adjacent

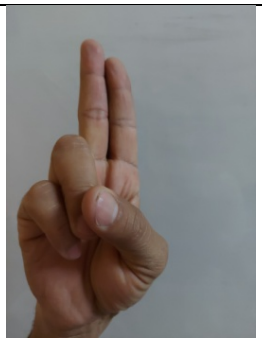
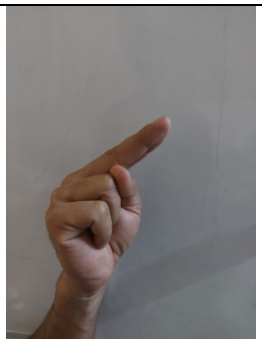
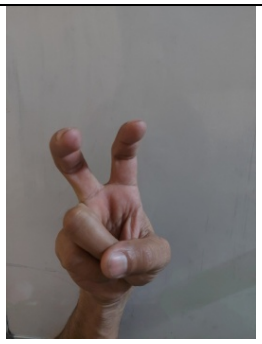
 ◌	pinched-G	Fingers bent at base joints, and the thumb and index finger lax and touched each other. Consonant 'क्ष' [ksha] in NSL alphabet chart.
 5	I	Vowel 'ओ' [o] in NSL alphabet chart.
 2 \ 3	K	Consonant 'श' [sha] in NSL alphabet chart.
	x-K	Consonant 'त्र' [tra] in NSL alphabet chart.
 3	flat-K	Index finger extended where as thumb and middle fingers flat and adjacent and as ring and little fingers bent at base.

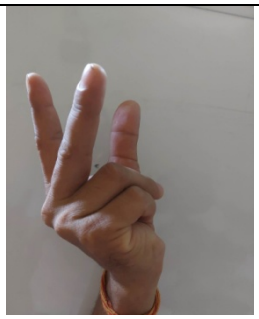
	L	Consonant '*ज्ञ*' [gyan] and number '7' consonant in NSL alphabet chart.
	s-L	Consonant '*ख*' [kha] in NSL alphabet chart.
	b-L	Thumb and index finger bent at non base joints where as rest are bent at base.
	O	Number '0' from the NSL number chart.
	c- O	Consonant '*प*' [pa] *i*n NSL alphabet.

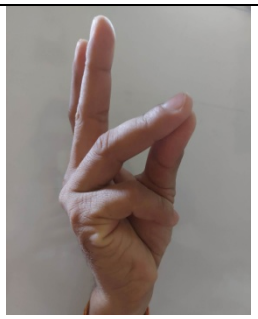
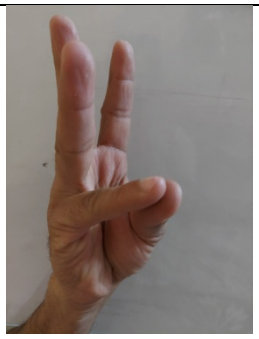
	pinched-O	Finger flexed at base and non-base joints, and all finger tips touch each other.
	R	Consonant 'ਰ' [ra] in NSL alphabet chart
	d-R	Index and middle fingers crossed but distant and other fingers folded.
	T	Consonant 'ਕ' [ka] in NSL alphabet chart.
	bent-adj-c-T	Thumb and index finger fully bent and compact at non base joints and adjacent where as other fingers are bent at base.

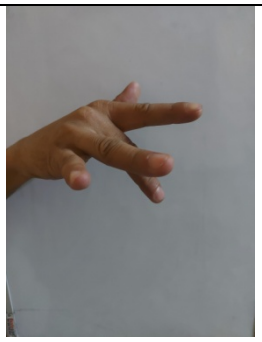
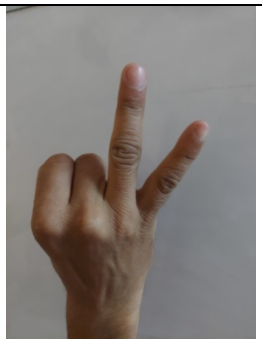
 5	W	Vowel 'उ' [u] and number '3' in NSL alphabet chart respectively.
 5	adj-W	Consonant 'घ' [gha] and 'म' [ma] in NSL alphabet chart.
 5 2 3 4	b-x-W	Fingers extended and bent as none-base joints while thumb and little finger bent at base. Example:1000
	X	Consonant 'ग' [ga] and vowel 'अं' [am] in NSL consonant chart.
 5	Y	Consonants 'ङ' [nga] and 'ड' [da] in NSL alphabet chart.

 2 5	compounding y+l	Thumb, index, and little fingers straighten and extended, and middle and ring fingers bent at base joints and adjacent to the palm. Vowel 'ॐ ' [om] in NSL alphabet chart.
 2 5	extended compounding y+l	Thumb, index and little fingers remain same as in compounding y+1 but the index and middle fingers extended.
 3 4	flat compounding y+l	Flat thumb, middle and ring fingers touch each other whereas index and little fingers extended.
 2 5	th-b-compounding y+l	Thumb, middle and ring fingers bent at base where as index and little fingers spread and extended. Consonant 'झ' [jha] and 'फ' [pha] in NSL alphabet chart.
	2	Vowel 'ऐ' [ai] and number '2' in NSL alphabet chart.

	adj-2	Consonant 'झ' [bha] in NSL alphabet chart.
	th-crossed- adj-2	Fingers bent at base and while thumb crossed to the index and middle fingers and adjacent. Consonant 'थ' [tha] in NSL alphabet chart.
	b-2	Fingers bent at base joint while index and middle fingers bent at non-base, e.g. vowel 'अः' [ah] in NSL alphabet chart.
	3	Number '8' in NSL alphabet chart.
	adj-3	Consonant 'च' [cha] and vowel 'इ' [i] *and* 'ई' [ee] in NSL alphabet respectively.

	bent-adj-3	Consonant 'द' [da] in NSL alphabet chart.
	small-compact 3	Thumb, index and middle fingers spread and compact where as others are bent at base.
	5	Number '5' in NSL alphabet chart
	adj-5	All fingers adjacent as in consonant 'छ' [chha] in NSL alphabet chart.
	bent-5	Fingers spread and bent at non-base joints.

	small-compact-5	Palm compact and fingers spread.
	lax-5	Fingers spread and lax.
	lax- 5 flat-adj th- ring	Fingers lax with flat and adjacent thumb and ring fingers like in NSL third.
	lax- 5 flat-adj th- little	Fingers lax with flat and adjacent thumb and little fingers like in NSL forth.
	7	Ring finger bent at base where as other fingers spread and extended. Consonant 'श' [sha] in NSL alphabet chart

 3	8	Thumb and middle fingers bent at base and touched each other whereas others are extended.
 3	x- 8	Middle finger bent at base where as others are extended
 4 5	ulnar side -2	Fingers bent at base joint except ring and little fingers which are extended. Vowel 'ঔ' [au] *i*n NSL alphabet chart.

2.2 Place of Articulation (POA)

The three planes in space are useful in description of places of articulation (POA) in neutral space. The frontal plane, also known as x-plane, is base for the body plane which has more precise POA specifications than the neutral space. Brentari (1998) divides the human body into four major reasons, and then again re-divides each reason into eight parts. The major regions and their sub divisions for NSL will be presented in the following table.

Table 2.2 Eight divisions in 4 regions

Region/ division	**Head**	**Arm**	**Body**	**Hand**
1	top	upper	neck	palm
2	forehead	elbow	front shoulder	fingers front
3	eye	elbow back	clavicle back	palm
4	cheek/bone	forearm back	torso-top	back finger
5	upper lip	forearm front	torso-mid	radial finger
6	mouth	ulnar	torso-bottom	ulnar finger
7	chin	wrist back	waist	tip of finger/thumb
8	under chin	wrist	front hips	heel of hand

Source: Wilbur et al. (2006)

Each and every signs are articulated in the interpersonal space for instance, either on the signer's body or in the neutral signing space i.e. in front of the signer, and they (signs) are formed with contact to the specific body parts of the signer or to the neutral space. The location that is on signer's body is called body location, and the location that is in front of the signer's body is called spatial location. All the POAs detected in this study are presented in the various sections in the table below.

Table 2.3a. POA Head

Region/ division: Head	**NSL Gloss**
Over the head	*ʌlmʌllinu* 'confuse'
Top of the head	*tel* 'oil'
Front head	*rani* 'queen'
Back Head	*dʰãʈ* 'liar'

Forehead	*prʌhʌri* 'police'
Temple	*sʌmdzʰʌnu* 'remember'
Eye	*dekʰnu 'see'*
Eye cone	*kumari* 'goddess Kumari'
Ear	*sustʌ sʰrʌwʌɳ* 'hard of hearing'
Ear lobe	*sun* 'gold'
Behind ear	*kʰʌbʌr* 'news'
Tip of Nose	*gʌɪ̃ɖa* 'rhino'
Upper Nose bridge	*nam* 'name'
Lower Nose bridge	*idzdzʌt* 'prestige'
Nostril	*keɽi 'girl'*
Cheek/ bone	*sʌunibar* 'saturday'
Lip	*nun*' salt'
Upper lip	*keɽa* 'boy'
Lower lip	*bʰʌnnu* 'say'
Teeth	*seto* 'white'
Mouth	*sũgur* 'pig'

Chin	*gʌte* date
Under Chin	*nʌ* 'negation marker'
Face	*pʌritsʌj* 'introduction'

Table 2.3b. POA Arm

Region/ division: Arm	**NSL gloss**
Upper	*sʌmdzʰaunu* 'convince'
Elbow Front	*ʌpaŋgʌta* 'disability'
Elbow Back	*gʌrib* 'poor'
Forearm Back	*kãkra* 'cucumber'
Forearm Front	*kʌrkʌlo* 'taro'
Ulnar	*ʈewa* 'support'
Wrist Back	*haɖ* 'bone'
Wrist Radial	*rʌgʌt* 'blood'

Table 2.3c. POA Body

Region/ division: Body	**NSL gloss**
Neck	*rʌhʌr* 'desire'

Side Neck	*marnu* 'kill'
Shoulder	*uttʌrdaittwʌ* 'responsibility'
Clavicle	*mala* 'garlands'
Torso-top	*mero* 'my'
Torso-mid	*kʰʊsi* 'happy'
Torso-bottom	*bʰok* 'hunger'
Waist	*bʌdzar* 'market'
Below waist	*kʌʈʈu* 'half pant'
Hips	*ɖuŋga* 'boat'

Table 2.3d. POA H_2

Region/ division: H_2	**NSL gloss**
Palm	*ʈʰaũ* 'place'
Back palm	*mʌtstsʰʌɖ* 'mosquito'
Fingers front	*talika* 'table'
Back finger	*bʰuĩkʌʈʌhʌr* 'pine apple'
Radial finger	*tsʌppʌl* 'slippers'

Ulnar finger	*Krʌmʌsʌ* 'continuous'
Tip of finger	*bʰeʈnu* 'meet'
Tip of thumb	*aitʌbar* 'sunday'
Heel of hand cheese	*gʰarsʌɳ* 'friction'

2.3 Orientation

Another important phonological parameter in SL is hand orientation which consists of two types, they are, palm orientation and the fingertips or knuckles orientation. Orientation is traditionally regarded as a minor parameter since there are fewer minimal pairs based on orientation alone (Brentari, 2012, as cited in Fenlon et al., 2017). Stokoe (1960) did not consider orientation as an important parameter like handshape and POA. For him, it is a feature within handshapes, thus he did not acknowledge it as a separate parameter. However, because of its property of lexical contrast, Battison (1978) added orientation as an independent parameter of signs. In this way, both Stokoe and Battison analyze orientation based on palm or the fingertips/ knuckles direction. However, Brentari (1998) has different view. She describes orientation in terms of the relationship between articulator and with POA. The following figure helps to understand Brentari's idea.

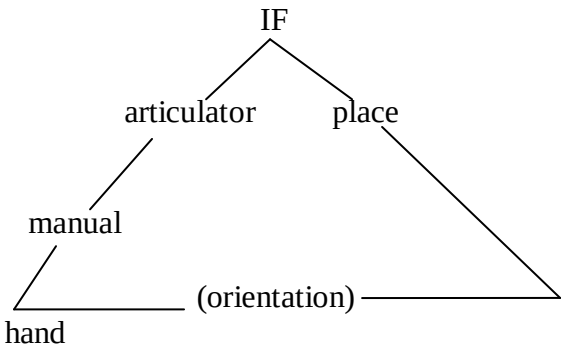


Figure 2.2 Orientation as a two-place relation (Brentari 1998:125)

To this extent, Prosodic Model of SL claims that the basic orientation refers to the relation between handpart and the place of articulation. In this regard, there are six possible

orientations for both, palm and the fingertip/ knuckle, such as, up, down, left, right, forward and backward.

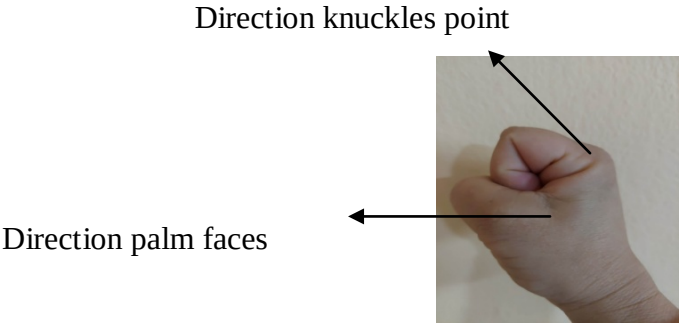


Figure 2.3 Palm and knuckles orientation

In NSL, signs can also be differed with respect to the palm or fingertips/ knuckles orientation. For instance, signs *may be* and *compare* have same handshape, location, and movement but they differ in terms of the palm orientation i.e. sign *may be* has palm up and the sign *compare* has palm down orientation, as a result, meaning of both signs differ with each other. Similarly, in the sign *fingerspelling,* all the fingers along with thumb oriented forward whereas, fingers oriented backward in the sign *autism,* and because of the orientation of the fingertips these signs have different meaning. Thus, the above examples demonstrate that the meaning of each sign varies on the basis of horizontal plane, a hand part specification and a movement feature ([direction] or [tracing]) (Brentari: 1998). The hand part specification comes from the eight divisions of the hand. It is chosen according to its parallel relationship with the higher part of the horizontal plane. Considering that fact, NSL signs involve many different handpart specifications during the production of signs. For example, NSL sign *b^{h}agnu* 'run away' has hand part specified as palm, whereas the sign *muni* 'under' has hand part specified as back of the hand.

bʰagnu 'run away' muni 'under'

Figure 2.4 Distinctive orientation: 'run away' palm down, 'under' palm up (NSL dictionary)

The signs above have the specified handpart which is parallel to the higher surface of the horizontal plane. Besides, a plane of articulation (Wilbur et al. 2006) is also specified in the inherent features. Both of the NSL signs *run away* and *under* have path movement which specified in the Prosodic Features branch as having movement within the specified plane i.e. tracing, or movement perpendicular to the specified plane i.e. direction. Together these three specifications indicate the basic orientation of a sign, the plane of its articulation, and its movement's direction. The movement in both NSL signs i.e. *run away* and *under*, is identical to the specified plane which is also indistinguishable. However, this idea differs from Brentari only on the basis of specified handpart. By using the eight possible handparts as specifications, Brentari's analysis allows for more precise specification of orientation.

There are six basic orientations for hands on the basis of palms or knuckles facing directions, such as, upward, downward, leftward, rightward, forward, and backward. All these orientations are identified in NSL for palms, and only five are found for knuckles. The backward palm orientation i.e. towards the signer, is the most recurrent palm orientation. Likewise, the regular knuckle orientation in NSL is forward i.e. away from the signer.

Table 2.4 Orientation of Palm

Palm Orientation	**NSL gloss**
Upward	*panidzʌhadz* 'ship'
Downward	*sʌhʌnu* 'tolerate'
Leftward	*bʰʌnda* 'than'
Rightward	pʌntsʰaunu 'to remove'
Forward	*bʌndʌ gʌrnu* 'to close/ to shut'
Backward	*pʌdʰnu* 'to study'

Table 2.5 Orientation of Knuckle

Knuckle Orientation	**NSL gloss**
Upward	*sʌtsib* 'secretary'
Downward	*gʌruŋgo* 'heavy'
Leftward	*kam* 'work'
Rightward	-
Backward	*sʌmadz* 'society'

2.4 Summary

The most important aspect of this chapter is a detail analysis of the structure of inherent features tree according to which the major division of inherent features into handshapes and place of articulation. However, because of its property i.e. lexical contrast, Battison acknowledged orientation as an important phonological parameter. Later, Brentari incorporated it as one of the important parameters of the Inherent Features.

Handshape is a significant minimal pair contrasting unit. There are 62 different handshapes discovered in NSL among which 44 handshapes are from manual alphabet. Additionally 22 handshapes in NSL are detected as basic handshapes. Similarly, place of articulation (POA) is another major unit in SL which has vital role in sign change or minimal pair contrast. NSL signs are articulated from the four major regions of the body such as, head, arm, body and hand that are further divided into eight parts. Signs articulated rarely from over the head, behind the ear, and below the waist (Lacy 1974) across the globe. However in NSL, there are signs such as, *ʌlmʌlliu* 'confuse', *kʰʌbʌr* 'news', *kʌʈʈu* 'half pant', that are articulated from over the head, behind the ear, and below the waist respectively. And finally, unlike Stokoe, Brentari incorporates orientation as an important parameter which is known as minimal pair contrasting unit. The basic hand orientations found in NSL based on the palms or knuckles facing directions are upward, downward, leftward, rightward, forward, and backward. All these six orientations are found in NSL for palms and only five are found for knuckles.

CHAPTER THREE
PROSODIC FEATURES

3. Introduction

Basically, prosody in any language either speech or signing, refers to the study of rhythmic structure, intonation, stress, and related attributes in conjunction with syntax. Regarding sign language, it includes: duration of sign, pause, eye aperture, facial expression, and use of sign space. Brentari's Prosodic Model as discussed in previous chapter, identifies two major branches i.e. IF branch and PF branch. The PF branch has several nodes such as, setting change, path, orientation change, and aperture change which has discussed below in detail.

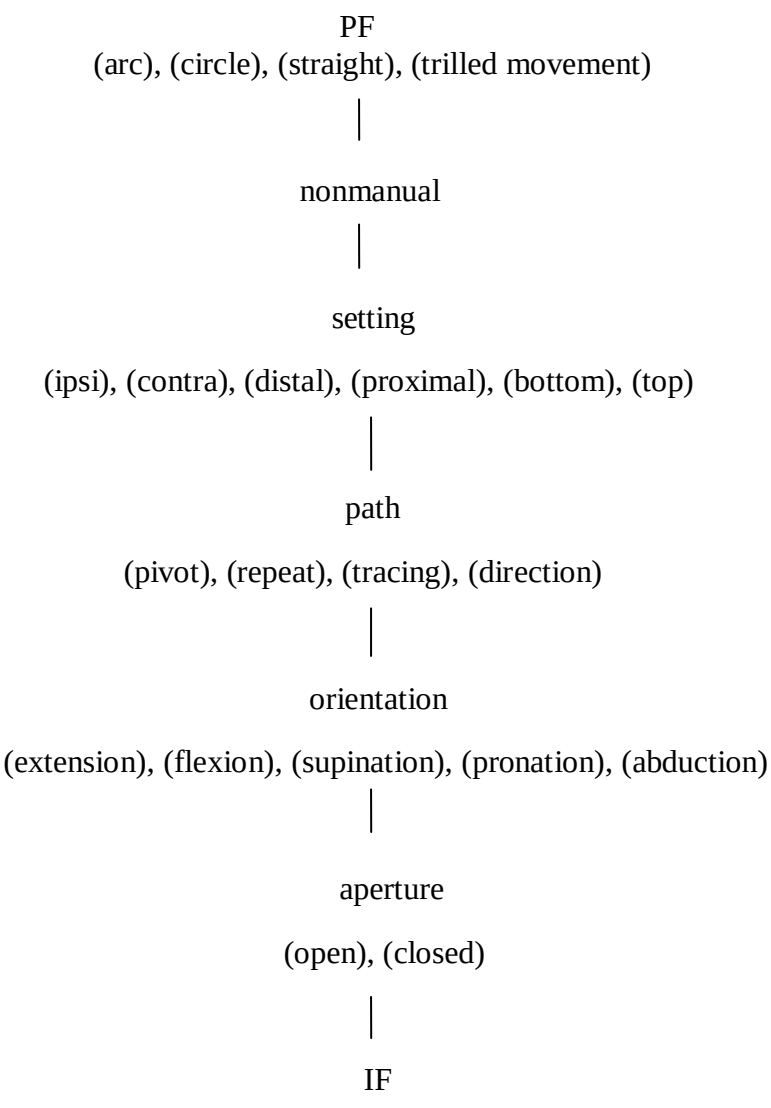


Figure 3.1 Prosodic Features branch of structure (Brentari 1998)

There are four general prosodic features such as, arc, circle, straight and trilled movement (TM), which may combine to the features existing within each node. Each node contains a unique set of prosodic features which may change during the production of core ASL lexemes; that is, they are realized sequentially in time (Brentari 1998). The following figure shows that how different movements produced during signing process.

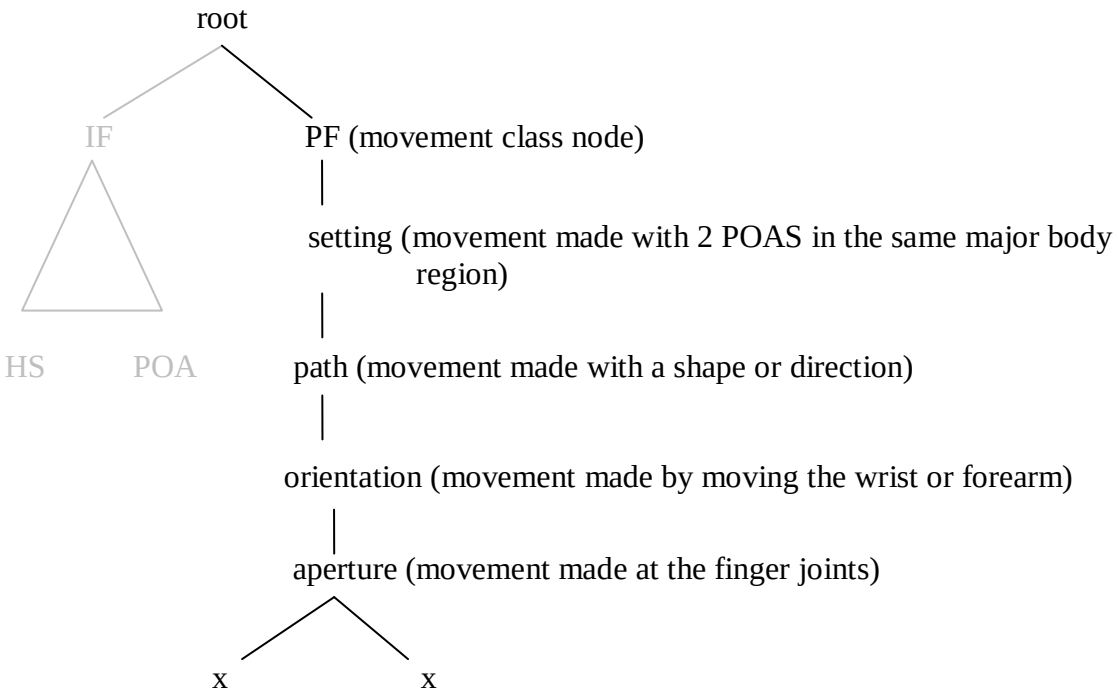


Figure 3.2 Prosodic Features representation within the Prosodic Model (Fenlon 2017).

As mentioned in the previous chapter, the root node divides between inherent features and prosodic features. Figure 3.2 gives a specific description about the organisation of the prosodic features structure. The dynamic elements of sign are specified within the prosodic features structure. Due to their particular nature, i.e. they can change within a sign, the dynamic elements deviate from inherent features such as handshape and POA. Furthermore, the segmental structure or timing units is derived amid prosodic features branch. Additionally, the prosodic features are realized sequentially where as inherent features are realized simultaneously.

3.1 Analysis of prosodic features tree

3.1.1 Setting change

According to Brentari (1998) setting change refers to the ‘movement between two values in a plane in which the articulator can move.’ The movement features such as, top-bottom, distal-proximal, and contra (lateral)- ipsi (lateral), related to the setting value. In this regard, the frontal plane having front-back value, consists of significant features such as contra-ipsi and top-bottom. Similarly, the horizontal plane having top-bottom value, consists of features such as distal-proximal and contra-ipsi. And the midsaggital plane having left-right value, consists of features such as, top-bottom and distal-proximal.

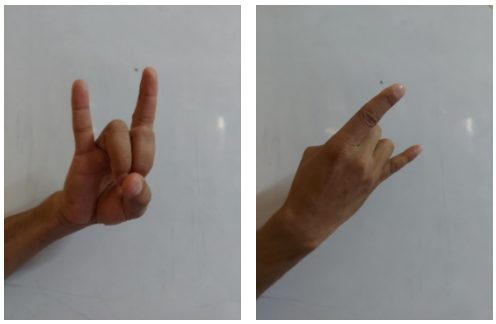
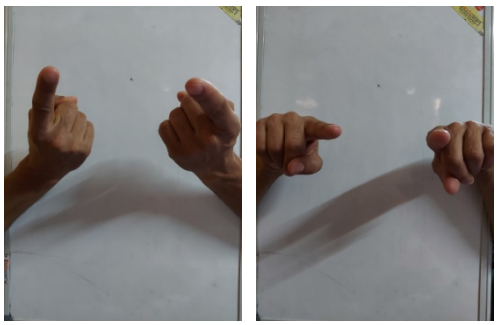
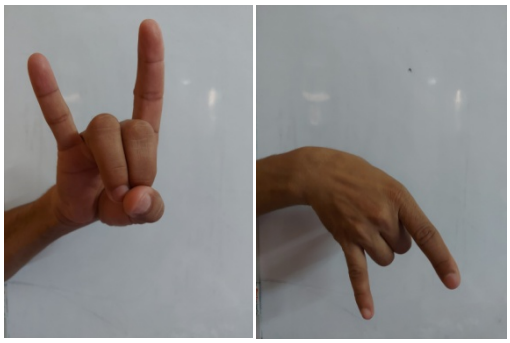
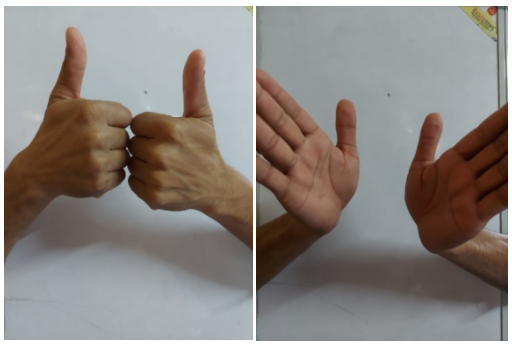
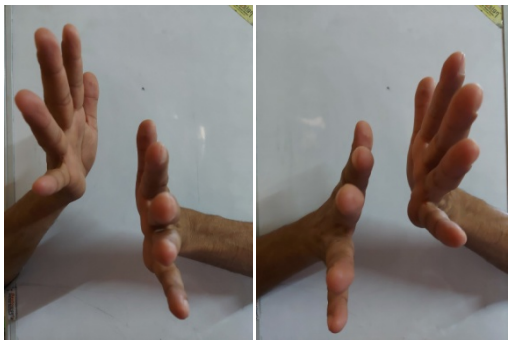
3.1.2 Path

The three planes of the body are also relevant to the specification of path features, i.e. movement perpendicular to the plane of articulation, incorporate the movements such as, direction, tracing, pivot, and repeat. All these movements have found direction feature. Tracing feature represents the movement within a plane. It can be merged with the shape features namely, straight, circle, and arc, and possibly develops the shapes such as zigzag, triangle, and so on. Similarly, the pivot movement claims that the elbow is fixed while signing. This sort of movement found in rotation system.

3.1.3 Orientation change

According to Brentari (1998:96), orientation change is a type of movement, the features of which are expressed in the prosodic features branch of structure, they are: supination, pronation, flexion, extension, and abduction. All these movements contain rotation system including the rotation of palm or the rotation of wrist. Supination movement refers to the movement where palm rotates from down to up. Similarly, in pronation movement, the palm rotates from up to down direction. Flexion is another movement in which the wrist rotates from straight to the bent. And abduction is another movement where palm or hand rotates from side to side.

Table 3.1 Types of orientation change movement.

Supination	pʰeri 'again'	
Pronation	bʰag 'divide'	
Flection	pʰirta 'return'	
Extension	kʰulla'open'	
Abduction	sʌŋket 'sign'	

3.1.4 Aperture change

The open or closed variants of handshapes specify by aperture change. In IF, the fingers that are actually move are specified as 'selected fingers' which should move together as a set. In this way, when both index and middle fingers are specified as selected finger with aperture features open and closed, then both fingers tend to move together from open to closed position in IF. Thus, the specification of a movement is split into IF and PF branch.

3.2 NSL movements

From the analyzed data of NSL, 3 movements are found and recorded and are listed in Table 3.2 together with their glosses. There are different articulators for movements like, whole arm, the whole hand, or only the fingers which is the reason that many NSL signs contain more than one movement. Simple signs contain one movement whereas compound signs i.e. the combination of path and local movement contains two.

Table 3.2 Movements in NSL

Movement	**Sign gloss**
Upward	*dzivʌn "life"*
Downward	*bidzuli tsʌmkeko* 'lightning'
Upward-downward	*tsunab* 'election'
Upward- arc	*bʌqʰi* 'much/more'
Downward- arc	*muni* 'under'
Side to side long	*pʌni* 'also'
Side to side short	*ɖakʈʌr* 'doctor'
Side to side shake	*hʌrijo 'green'*

Diagonal	*bahun* 'brahmin'
Towards the signer	*prʌbʰab* 'effect'
Apart from the signer	*sutʌna* 'information/notice'
Bent (at wrist)	*'aunu* 'come
Alternating	*kʰelnu* 'play'
Upward palm rotation	*mʌtlʌb* 'meaning'
Downward palm rotation	*tsʰopnu* 'to cover'
180 degree rotation movement	*dinbʰʌri* 'whole day'
360 degree rotation movement	*ʌnuhar* 'face'
Getting near	*sʌmbʌndʰʌ* 'relation'
Sending apart	*parpatsuke* 'divorce
Grabbing	*ʌduwa* 'ginger'
Crossing	*disa* 'direction'
Entering	*bʰitrʌ* 'in'
Finger interlace	*hʌru* 'pural marker'
Repeated finger interlace	dʰerʌi 'many'
Pointing	*tjo* 'that'

Wrist Pivot	*tsʰʌinʌ* 'no'
Fluttering the fingers	*hidzdze* 'spelling'
All fingers open to close (touching tips)	*sʌbʌi* 'all'
Closed fist to fingers open and spread	*ratbʰʌr* 'whole night'
Wavelike movement	*pʌhaɖ* 'mountain'
Bending finger/ Fingers at knuckle	*bʰoli* 'tomorrow'
Repeated opening and closing of spread fingers	*tara* 'star'
Hitting the hands together	*durgʰʌʈʌna* 'accident'
Fast-forward (straight)	*sʌpʰa* 'clean'
Slow-forward (straight)	*bistarʌi* 'slowly'

3.3 Non-manual characteristics

In 1960, William Stokoe discussed about the significance of non-manuals. He discovered that the negative headshakes might carry the grammatical information i.e. negation marker in sign languages independently. Later on, many researchers like, Anderson & Reilly (1998), Bahan (1996) Baker-Shenk (1983), Wilbur (1991, 1994a, b, 1997) also argue that the non-manuals characteristics such as, face, head, and body have the significant contribution to the sign language linguistics (Wilbur et al. 2006). The non-manual characteristics found in NSL sign described in following table have been divided into seven categories such as, mouth shape, position of eyebrows, blink, head movements, head nods and head shakes, body movement, as well as body lean.

Table 3.3 The non-manual characteristics in NSL

Non-manual Characteristics	**Discovered Forms**
Mouth gesture	Mouthings Articulation imitation of Nepali word simultaneously while signing. of a whole Nepali word or partial articulation, simultaneously with a NSL sign Pursed lips, rounded lips, stretched mouth.
Eyebrows Position	Upward Downward
Head movement	Upward Downward Leftward Rightward
Head nod/shake	Once or twice
Movement of the body	Leftward Rightward
Body lean	Forward Back Right Left Left-right Shrugs

3.4 Summary

This chapter presents a detail analysis of the structure of prosodic features. Generally, prosodic features of any language, spoken or sign, involve rhythmic structure, intonation, stress, and related attributes in conjunctions with syntax. In sign language, the prosodic features refer to the duration of sign, pause, eye aperture, facial expression, and the use of signing space. The prosodic features branch includes various nodes like setting change, path,

orientation change, and aperture change. Each node contains its own unique features which can change during sign production.

The movements include various articulators namely the whole arm, the whole hand, or only the fingers due to which many NSL signs contain more than one movement. There are 35 movements found in NSL sign on the basis of analyzed data. Simple signs contain one movement whereas compound signs i.e. the combination of path and local movements contain two. Similarly, the non-manual characteristics in NSL signs have been divided into seven categories such as, mouth shape, position of eyebrows, blink, head movements, head nods and head shakes, body movement, as well as body lean.

CHAPTER FOUR
MINIMAL PAIRS AND CONSTRAINTS

4.1 Minimal pairs

All the sign languages carry lexical information through phonological features such as, handshapes, place of articulations, orientations, movements, and non-manual characteristics. Every signs must contain all 4 manual components but not all signs contain a non-manual component. Whenever two signs that vary by only one feature that is called minimal pairs. Klima and Bellugi (1979) for the first time discovered the minimal pair contrastive units such as, handshape, location, and movement in sign language and provided minimal pairs based on those units. Likewise, Milković (2005) further provided minimal pairs for orientation in ASL. Minimal pairs in NSL are signs that differ only by one manual parameter. Based on those findings, the researcher attempted to provide minimal pairs in terms of handshape, place of articulation, movement and orientation in this research. For instance, the signs *suru* 'start', *bjadz* 'interest', and *lʌgani* 'invest' have the same place of articulation, orientation, movement but different handshapes.

suru 'start', *bjadz* 'interest', *lʌgani:* 'invest'.

Figure 4.1 Different handshapes, but same POA, orientation and movement.

Similarly, the signs that can differ only in terms of POA are, *sʌdʌssjʌ* ‘member’ and *mʌuka* ‘chance’ which are formed at the front palm and back palm, correspondingly. Further, signs

that differ in terms of POA are *lobʰi:* ‘greedy’ and *rati:* ‘night’, with *lobʰi:* at the chest and *rati:* at the temple.

sʌdʌssjʌ ‘member’ *mʌuka* ‘chance’

lobʰi: ‘greedy’ *rati:* ‘night’

Figure 4.2 Different POA, but same handshape, orientation and movement

4.2 Constraints on sign formation

There are restrictions in all the sign languages on the basis of features combinations which may occur in a developed sign simultaneously. For instance, some handshapes are incompetent to participate in specific movements, some movements are incompetent to be made in specific locations. Signs that are involve two body place of articulations are limited to the second place of articulation. Battison (1974) observes constraints on two-handed signs and divides those signs into three groups, i.e. (1) both hands contain same shapes and same movements; (2) both hands contain same shapes but only dominant hand moves; and (3) both

hands contain different handshapes where only dominant hand moves. The handshapes on non-dominant hand are excluded to a basic set of handshapes. Additionally, Battison (1978) analyzes morpheme structure constraints in sign language, they are of two types, (1) Symmetry Condition, and (2) Dominance Condition. In symmetry condition, when both hands involve in the articulation of a sign, then both hand should share same handshape, POA, and same movement simultaneously or in alternation, and the orientation for both hands can be either symmetrical or identical.

Similarly, in dominance condition, if both hands participate in the production of a sign but they have different handshapes then one hand considers as passive hand and the other is dominant hand. The dominant hand specifies for movement whereas the passive hand is restricted to the basic set of handshapes. Later on, Napoli and Wu (2003) analyzed and modified Battison's symmetry and dominance conditions and presented a new condition which is known as expanded dominance condition. In this condition, when two hands involve in the articulation of a sign and have different shapes, then the handshape in the non-dominant hand considers as unmarked shape.

4.2.1 Movement symmetry condition

The constraints that are mentioned above deals primarily with the handshapes, but later, Napoli and Wu (2003) came up with a new idea called the movement symmetry condition which is the modification of Battion's symmetry condition. According to movement symmetry condition, in the articulation of two-handed signs both hands should have same shape and movement along with the positions of both hands which should be identical, or inverse. The term 'symmetry' is obvious in linguistics, nevertheless, Napoli and Wu describe symmetry in more detail. Any structure that has mathematical transformations can produce symmetry such as, reflection symmetry, rotation symmetry, translation symmetry, glide reflection symmetry, and dilation symmetry among them only four are relevant to ASL except dilation symmetry. Napoli and Wu further discuss about the four types of symmetrical conditions they are, reflection condition, rotation condition, translation condition, and glide reflection condition that are similar to Nepali sign language as well.

1. Reflection Condition: In this condition a sign does not change upon undergone reflection because in such signs both hands must have same position along with relevant paths at relevant time.

Figure 4.3. Reflection symmetry on vertical plane: NSL *prʌgʌti* 'progress'

2 Rotation Condition: The rotation symmetry of a sign explains that when the hands rotate on their own axis to form a sign, the shape of the both hands looks the same. In rotation signs, both hands must touch the beginning and ending points of the movement and must show inversion.

Figure 4.4 Rotation symmetry: NSL *sʌmadz* 'society'.

3 Translation Condition: When a sign has undergone a movement without any reflection or rotation in a specified direction through a specified distance is called translation symmetry. In this condition, the angles within the sign, the shape, and size of the sign remain unchanged. The only thing that will change throughout the process is location of the sign as it can moved right or left, up or down and so on. Both hands, in a translation sign, remain at the same point on a single path or on the relevant parallel paths.

Figure 4.5 Translation symmetry: NSL *lʌkʰeʧnu* 'chase'

4 Glide Reflection Condition: This condition is the combination of reflection condition and translation condition. In a glide reflection sign, the hands must always be on the same position along their respective paths at the relevant times. In such signs, one hand goes slight away from the signer however both hands move simultaneously.

Figure 4.6 Glide reflection condition: NSL *pʌŋkt̪i* 'line'.

4.3 Constraints on two-contact signs

Different signs require different contact with the body. Some signs involve single contact with the body, for instance, NSL 'work', 'responsibility' 'luck', 'independent', and so on. Likewise, some signs involve double contact with the body as in NSL 'deaf', 'body', 'porter', Astrologer, and many more. In regard to the double contact signs, Battison, Markowicz & Woodward (1975) noted that some locations which allow first contact followed by the second contact have constraints. For example, when the body is divided into four parts i.e., head/

neck, chest/trunk, arm, and hand then the second contact is less prior comparing to the first contact, for instance, a sign can be articulated from head to hand but not hand to head. Similarly, when both first and second contacts appear in the same area of the body, then the first contact can occur in different places of the body while on the contrary, the second contact can occur only in the central part of the body. Constraints are significant property of the sign languages that can help in perception and production of signs. Since NSL is an open field to study linguistically, research should explore more constraints on location during the production of NSL signs.

4.4 Summary

This chapter deals with the minimal pairs and the constraints on NSL. Minimal pairs in SL are signs that differ only by one manual parameter among all the phonological parameters. For instance, the NSL signs *birami* 'sick' and *mero* 'my' contain identical handshape, orientation, movement but they have different POA. Similarly, all the sign languages have restrictions on the basis of feature combinations which occur simultaneously during sign production. For instance, some handshapes are incompetent to participate in specific movements, and some movements are incompetent to be made in specific locations. Additionally, two-handed signs may vary on the basis of the movements as well as on the basis of handshapes of each hand. Likewise, some signs involve double body contacts during their articulation. When both first and second contacts appear in the same area of the body, then the first contact can occur in different places of the body while on the contrary, the second contact can occur only in the central part of the body.

CHAPTER FIVE
SUMMARY AND CONCLUSION

This research presents the essential elements of Nepali sign language (NSL), also known as the phonological parameters that are involved to form signs in NSL. In comparison to other well studied sign languages, NSL has similar phonological structure i.e. basic parts of a sign such as, handshape, place of articulation, orientation, movements, and non-manual characteristics. Based on A Prosodic Model of Sign Language Phonology (Brentari 1998) this study organized features of NSL into two types i.e. inherent features, and prosodic features. During sign production, the inherent features remain unchanged whereas the prosodic features can change. Besides, there are constraints on NSL during sign formation based on Battison (1978) and Nepoli and Wu (2003).

Firstly, the most important aspect of this study is a detail analysis of the structure of the inherent features tree according to which the major division of inherent features into handshapes and place of articulation. However, Battison acknowledged orientation as an important phonological parameter because of its property i.e. lexical contrast. Later, Brentari incorporated it as one of the important parameters of the inherent features branch. The present study found out the exhaustive list of NSL handshapes. There are 62 different handshapes discovered in NSL among which 44 handshapes are from manual alphabet since NSL make use of one handed alphabet. Additionally, 22 handshapes detected as basic handshapes in NSL. Similarly, place of articulation (POA) is another major unit in SL which has vital role in sign change or minimal pair contrast. NSL signs are articulated from the four major regions of the body such as, head, arm, body and hand. Signs articulated rarely from over the head, behind the ear, and below the waist across the globe. However in NSL, there are signs such as, *ʌlmʌlliu* 'confuse', *kʰʌbʌr* 'news', *kʌʈʈu* 'half pant', that are articulated from over the head, behind the ear, and below the waist respectively. Likewise, orientation is an important parameter which is known as minimal pair contrasting unit. The basic hand orientations found in NSL based on the palms or knuckles facing directions are upward, downward, leftward, rightward, forward, and backward. All these six orientations are found in NSL for palms and only five are found for knuckles.

Secondly, this study deals with a detail analysis of the structure of prosodic features. Generally, prosodic features of any language, spoken or sign, involve rhythmic structure,

intonation, stress, and related attributes in conjunctions with syntax. In sign language, the prosodic features refer to the duration of sign, pause, eye aperture, facial expression, and the usage of signing space. The prosodic features branch contains various nodes such as, setting change, path, orientation change, and aperture change. Each node consists of its own unique features that may change during sign formation. There are different articulators for movements like the whole arm, the whole hand, or the fingers only which is the reason that many NSL signs contain more than one movement. There are 35 movements found in NSL sign on the basis of analyzed data. Simple signs contain one movement and the compound signs i.e. the combination of path movement and local movement include two movements. In addition, the non-manual characteristics in NSL signs have been divided into seven categories such as, mouth shape, position of eyebrows, blink, head movements, head nods and head shakes, body movement, as well as body lean.

Finally, this study discusses with the minimal pairs and the constraints on NSL. Minimal pairs in SL are signs that differ only by one manual parameter among all the phonological parameters. Similarly, all the sign languages have restrictions on the basis of feature combinations which occur simultaneously during sign production. For instance, some handshapes are incompetent to participate in specific movements, and some movements are incompetent to be made in specific locations. Additionally, two-handed signs may vary on the basis of the movements as well as on the basis of handshapes of each hand. Likewise, some signs involve double body contacts during their articulation. When both first and second contacts appear in the same area of the body, then the first contact can occur in different places of the body while on the contrary, the second contact can occur only in the central part of the body.

This research identifies the major phonological parameters that are found in Nepali sign language. In addition, it introduces those parameters and analyses the system they have. Besides, this study helps to introduce NSL as an independent language and to conduct further research on NSL phonetics, phonology, as well as on NSL grammar.

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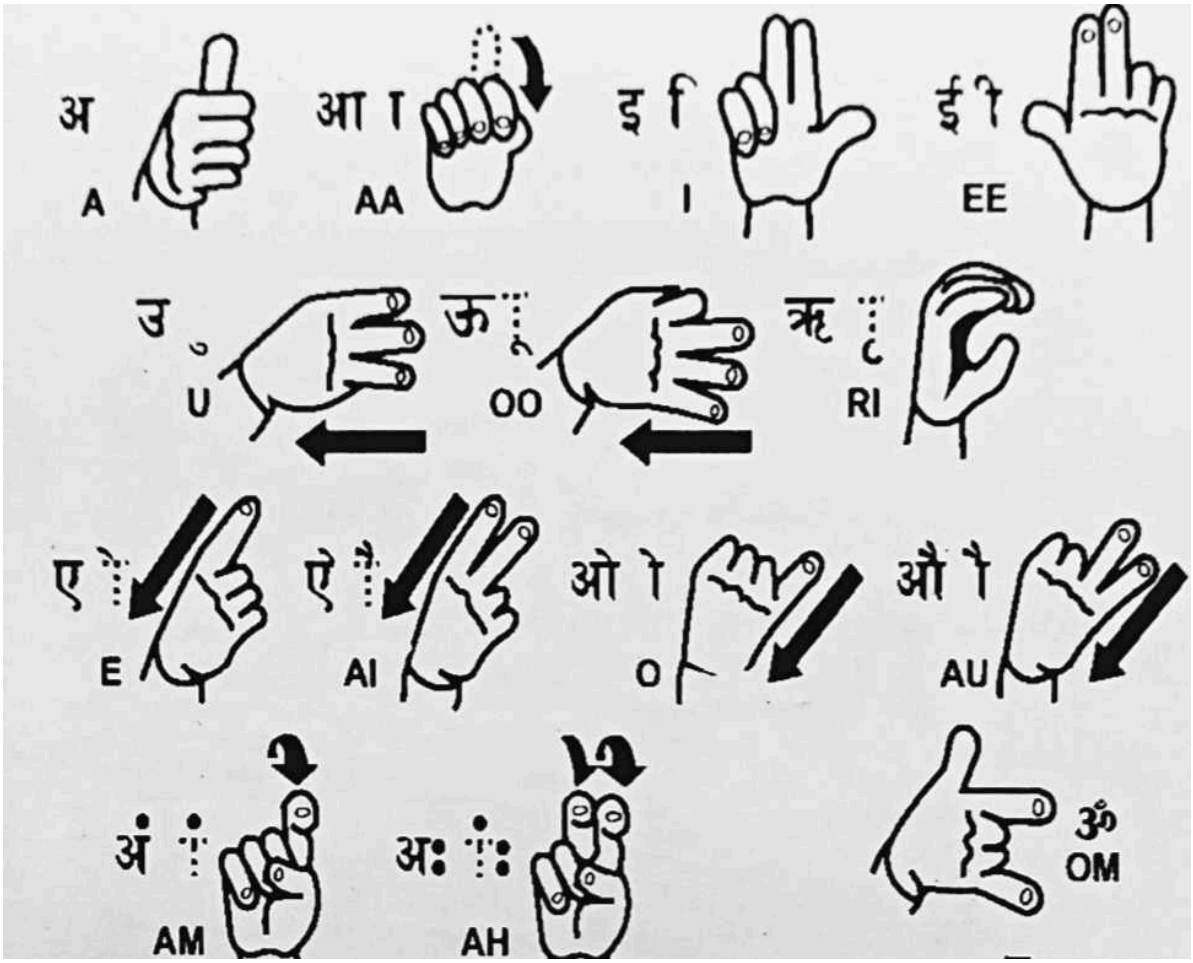
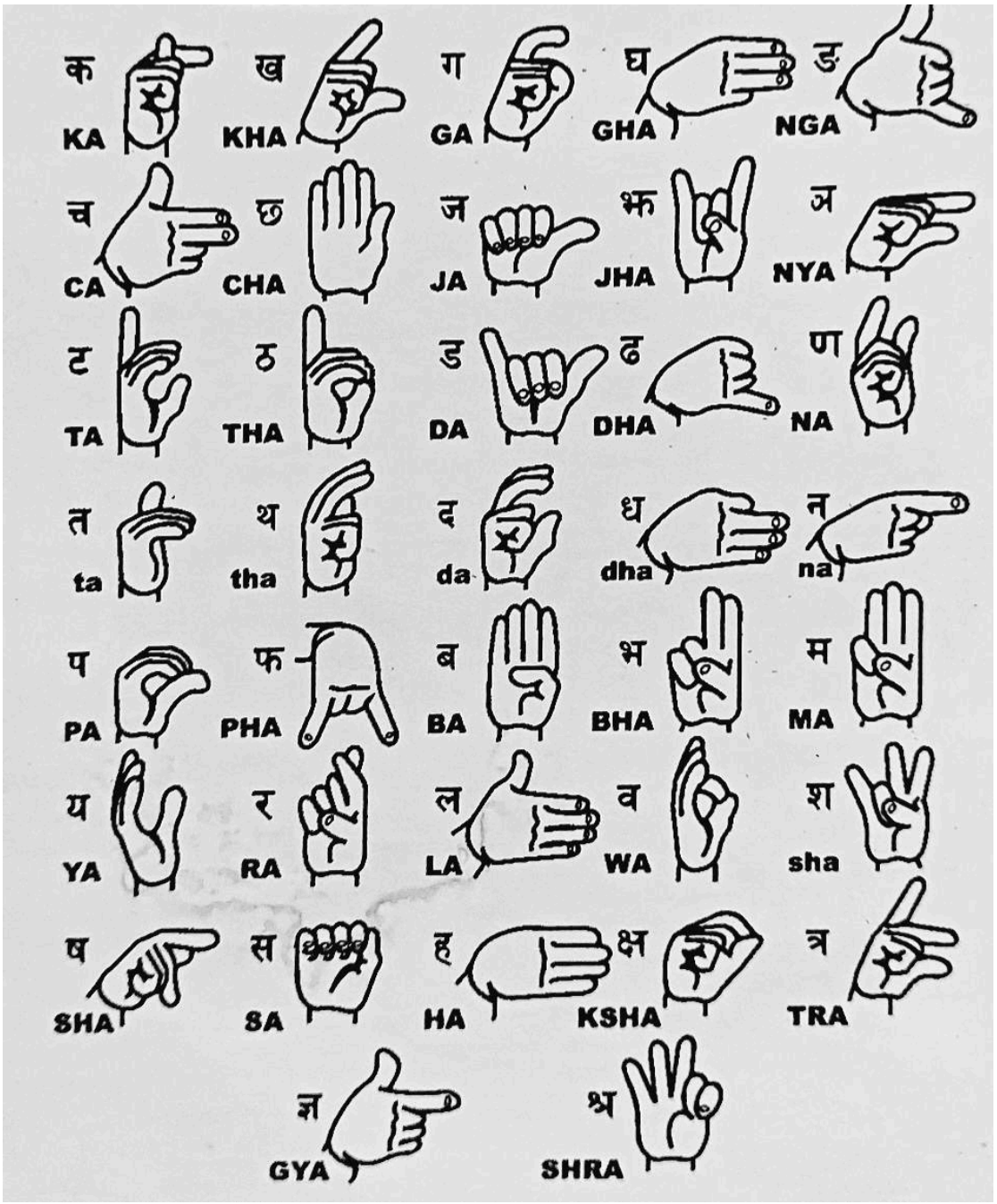
APPENDIX 1: NSL MANUAL ALPHABET: VOWELS



(NADH 2014)

APPENDIX 2: NSL MANUAL ALPHABET: CONSONANTS



(NADH 2014)

APPENDIX 3: NSL NUMBERS

(NADH 2014)

APPENDIX 4: Minimal Pairs in terms of Orientation

'झ' [jha]

'फ' [pha]

kʌpʈi: 'mean'

lobʰi: 'greedy'

APPENDIX 5: Minimal Pairs in terms of movement


: ⌒ ↓ ↓

prʌjog 'to use'



: ⌒ → ↓ ← ↓

pʌsʌl 'shop'

pesa 'profession'

bjʌwʌstʰa 'system'