

Impacts of Cognitive Phonology in Hindi Word- Utterances

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Abstract:- With being taught, school going children who learn Hindi as a Second Language (L2) tend to deviate from accurate Sound –Pattern Processing (SPP) resulting in phonological process. These include deletion, addition and mutual exchange of segment(s). Seldom do they recognize these type deletions or additions are unintentionally processed in their word- articulation. The present study has made an attempt to highlight and discuss impact of cognitive phonology recorded in 2400 utterances of 240 students of two- groups: namely G1(age range is 10-11) and G2 (age range 11-12) in selected ten Hindi words classified as ‘known’. Objectives of the undertaken study are 1) to examine variations in individually recorded utterances 2) to discuss major observed distorted pattern which are unconsciously processed. Towards the end, the paper throws some evidences based on data for the researcher’s claim that second language learner of Hindi disregards ‘explicit phonology’ and resorts to ‘independently developed phonology (cognitive phonology) for pattern processing. This is evident in derived outputs in Hindi-word utterances.

Keywords:- Cognitive Phonology, Hindi, Sound Pattern Processing.

I. INTRODUCTION

Sound Pattern Processing of a second language learner during word articulations is rather complex in terms of two principles; first the way an L2 learner deviates from known and appropriate patterns, and secondly whether or not subconscious knowledge of phonology plays a significant role in the process of word –articulation. This paper presents role of cognitive phonology impacted deletions in the Hindi-word articulations of two-hundred and forty pre-teen second language of learners of Hindi.

➤ *Hindi Language - The Third most-Spoken Language in the World*

Hindi is the official language of India. Hindi is also widely spoken in and out of India. As a first language Hindi is primarily used for day to day formal and informal communication in northern states; Rajasthan, Haryana, Uttar Pradesh, Uttarkhand, Madhya Pradesh, Chhattisgarh, Himachal Pradesh, Jharkhand and Bihar. There are significant number of Hindi speakers in South Africa, Mauritius, Fiji, Suriname, Guyana, Trinidad & Tobago and Nepal, Meena (2015). According to 2011 Indian census

report, 528 million people of aforesaid Indian states (43.7% of the population of India) are regarded as native Hindi speakers. Hind language is taught at early stage of schools located in India and abroad. Teaching –learning process in Hindi begins at the primary lever in one of southern Indian states of India, Kerala where the present study was carried out. Many schools in Kerala have recently adopted a curriculum that prescribes teaching Hindi to kindergarten going students (LKG and UKG divisions) with an objective to develop multi-lingual proficiency in the walkway of students’ life in years to come and achieve goals of Kendriya Hindi Samiti and the Hindi Salahkar Samiti.

➤ *Hindi- Orthography*

Orthography of Hindi is mainly in the Devanagari script. It differs from the orthography of Arabic. Both phonetic and phonological awareness of the language is incorporated in orthography of Hindi whereas orthography of Arabic depends on both phonological and lexical awareness (Pandey, 2014). On 14 September 1949, the Constituent Assembly of India adopted Hindi written in Devnagri script as the official language of the Republic of India (Choudhry, Khosla, Mehta, 2016).It is worth understanding that writing system of Hindi language is often termed as alpha-syllabic. Alpha-syllabic is a combination of alphabetic and syllabic systems. Units of writing system represent vowels and consonants in *alphabetic* system(e.g., English). Writing system is syllabic, if units of orthography stand for a syllable (e.g., Korean).

➤ *Modern Standard Hind (MSH)*

Modern Standard Hindi (MSH) is referred to as a Standard form of Hindiustani (Paul, 2005). Modern Standard Hindi is based on the Khariboli dialect, mostly spoken in northern India, which came to replace earlier prestige dialects such as Awadhi, Maithili (sometimes regarded as separate from the Hindi dialect continuum) and Braj. Modern Hindi and its literary tradition evolved towards the end of the 18th century (Kumari, 2021)

• *Phonology of MSH*

Some of works done on the Hindi language between 1950s and 1980s are Schoolberg (1955), Vajpeyi (1957), Tiwari (1961), Dixit (1963), Bhatia (1964) , and Kellog, (1965). S Mehrotra (1980) has given a comprehensive discription on syllabification while the former prioritized generative phonology. Kelkar (1968) had well attempted to provide a detailed description of the word phonology of

‘Hirdu’ or Hindi-Urdu. Srivastava (1979) primarily worked on the Hindi language and contributed to the ‘generative phonology

• *Vowel Phonemes of MSH*

There are ten vowels in MSH as shown in Table 2.. The vowel /æ / occurs only in in English Loans (Ohala, 1983).Vowel phonemes such as /i:/, /a:/, and / ʊ:/ have their longer counter parts /i :/, /a:/, and / u:/ in MSH. On the other hand vowel like /e:/, /ɛ:/, / o: / and /ɔ:/ are usually treated not short vowel but longer vowels in MSH as they stand for ‘a little length of sound’. /i/ can be described as short half

close (high) front unrounded vowel while its long correspondent /i:/ as a long close front unrounded vowel.

• *Consonat Phonemes of MSH*

MSH has five nasal sounds as indicated in Table 1MSA consonant chart. All stops of MSH have their aspirated counterparts like /p/- /p^h/, /b/-/ b^h/, /t/-/ t^h/,/d/-/ d^h/ and / g/- g^h/ .

Similarly affricates have aspirated versions like /dʒ/-/ dʒ^h/ and /tʃ/-/ tʃ^h/ . MSH is characterized by retroflex sounds which are articulated with ‘curled tip of the tongue’.

Table 1 Consonant Phonemes of Standard Hindi

Manner of Articulation		Place of Articulation								
		Bi-labial	Labio-dental	Dental	Alveolar	Post-alveolar	Retroflex	Palatal	Velar	Glottal
Stop	voiced	b b ^h ब भ		d d ^h द ध			ɖ ɖ ^h ड ढ		g g ^h ग घ	
	voiceless	p p ^h प फ		t t ^h त थ			ʈ ʈ ^h ट ठ		k k ^h क ख	
Fricative	voiced				z ज़					
	voiceless		f फ़		s स	ʃ श	ʂ ष			h ह
Nasal	voiced	m म			n न		ɳ ण	ɲ य	ŋ ङ	
Affricate	voiced					dʒ dʒ ^h ज झ				
	voiceless					tʃ tʃ ^h च छ				
Lateral	voiced				l ल					
Tap	voiced				r र					
Glide	voiced		v व					j य		

Table 2 The Vowel Phonemes of Standard Hindi

Height	Front		Central		Back	
	Short	Long	Short	Long	Short	Long
High	i/ɪ इ	i: ई			ʊ/u उ	u: ऊ
High-Mid	e ए	ɛ: ऐ	ə		o: ओ	ɔ: औ
Low			ɑ अ	ɑ: आ		
Diphthongs	aɪ			oʊ		

• *The Hindi Syllable Structure*

The following type syllabic CV structures can be found in words of Hindi

- ✓ CV e.g., /ab / ‘now’
- ✓ VC e.g., /o tʰ/ ‘rise’
- ✓ VCV e.g., /o tʰo:/ ‘get up’ (order)
- ✓ CVC e.g., /bʰi:d/ ‘crowd’
- ✓ CCVC e.g., /pra:n/ ‘life’
- ✓ CCVCC e.g., /pra:n t̪/ ‘province’

➤ *Cognitive Phonology*

Bates, Bretherton, & Snyder (1990), Moore (1973), MacNamara (1972) and Piaget (1954) argue that a language is a subordinate part of cognitive development, dependent on the attainment of various concepts. These various concepts are explored by cognitive linguists providing increased research interests in cognitive phonology. These interests range from sub-disciplines of phonology like cognitive phonology, developmental phonology etc.

• *Phoneme – A Mentally Constructed Image*

As we are aware that phonology deals with selection and patterns of distribution sounds. Speech. Phoneme in phonology is instrumental and cognitively plays a crucial role for the rest of phonological process. Phonemes are perceived mental images, have their shapes as specific images in the brain which are processed in sound forms (Shafeek, 2022). Courtenay (1972) pointed out phonemes were ‘mental images of sounds that speakers systematically deformed in the ongoing process of speech. There have been views on ‘phoneme’ which is by-product of psychological drive based on experience and thought. Cognitive linguists like Courtenay, Nathan etc. have presented a different view; reflection of by-product of an image- sensory- faculties in

human brain in process- and lead to output. This can be illustrate as in Figure 1.

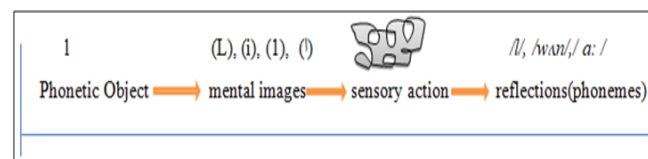


Fig 1 Mentally Constructed Images of ‘l’

II. METHODOLOGY

The present study is based on 2400 Hindi word-utterances of 240 students of two aged groups classified as Group 1/G1 and Group 2/G2. The age range of G1 (hereafter G1) is between 10-11 and of group 2 (G2) is 11-12. Words used in the tool were selective and already learnt. Selected words been taught to them or they have heard their teacher say in their Hindi language teaching - learning process. Words consist of di and poly syllables. Students involved in the study were chosen randomly from 6 CBSE syllabus run schools located in Malappuram district of Kerala state. Participants began learning Hindi as L2 from primary stage. The ratio of boys and girls in both G1 and G2 is 1:1. Each participant was personally interviewed either in physical or virtual mode on presented a sheet which consisted ‘printed 10 Hindi known words. He/she was required to pattern sounds only once in the given words. Recordings of utterances were done using electronic devices that included ICD PX 470 (sony voice recorder) and mobiles. In addition, phonetic transcriptions of utterances at once were made. Both recorded data and phonetic transcriptions were examined and analysed to finalize data.

III. SOUND PATTERN PROCESSING (SPP) OF G1 AND G2- 2400 WORD UTTERANCES

➤ *The following Type Words- Classified as Known Hindi Words- were Presented to G1 and G2.*

Table 3 Type Words- Classified as Known Hindi Words

Sl	Known words	Syllabification	Gloss
1	मटका [matʰ.ka]	CVC-CV	‘pitcher’
2	नुकसान [nok.sa:n]	CVC-CVC	‘loss’
3	साहस [sa:.has]	CV-CVC	‘courage’
4	मेंढक [me:n.dʰak]	CVC-CVC	‘frog’
5	गाना [ga:na]	CV-CV	‘song’
6	आज़ादी [a:za:di]	VCV-CV	‘freedom’
7	झोपड़ी [dʒʰ o:paɖi]	CV-CCV	‘hut’
8	अचरज [a tʃ.radʒ]	VC-VCC	‘surprise’
9	भीड़ [bʰi:d]	CVC	‘crowd’
10	गुजरना [gu.dʒar.na:]	CV.CVC.CV	‘to pass on’

When 240 speakers of G1 and G2 are required to utter separately and individually on the above 10 words, accurate as well as inaccurate or distorted patterns got processed.

A. Phonological Patterns

Pattern Processing in word articulations of two groups has resulted in various changes to segments. These include deletions (apheresis, syncope, and apocope), insertions of a segment, transposition of a segment, substitution of a segment and alternation of a segment

➤ *Deletion of a Phoneme- A Cognitive Phonological Process*

In phonological process, ‘deletion’ is classified as three;

- *Type 1: Apheresis- A Process of un-Pronouncing an Initial Segment of a Word i.e., the First Segment of a Word Goes Deleted in Sound Pattern Processing.*

✓ e.g. ‘psyche’ > /saiki / = /p/ is unpronounced.

- *Type 2: Syncope – A Process of un-Pronouncing a Medial Segment in a Word- Utterance*

✓ i.e, non-initial and non-final segment goes unpronounced.

✓ e.g. ‘subtle’ > /sat.l / = /b/ is unpronounced

- *Type 3: Apocope- A Process of un-Pronouncing the Final Segment in the Stream of a Word- Utterance.*

✓ e.g., ‘tomb’ > tu:m = /b/ is elided

All SPP- impacted deletions were presented under ‘derived processes’. A ‘.’ is used to indicate syllable boundary in the phonetically transcribed texts. A ‘-’ ‘under segmental change’ stands for a segment of the word that remains unchanged. Notice that ‘-’ is used to show segmental sequence of a derived process. For instance the first word [ma^h.ka:] is a di syllabic (syllable boundary is marked with a ‘.’), and consists of five segments. Thus we five unchanged ‘-’ under ‘segmental change’. A ‘Ø’ stands for a deleted segment of the derived processes.

IV. RESULTS

➤ *Syncope in मटका [ma^h.ka:]*

Table 4 Syncope in मटका [ma^h.ka:]

S No.	Derived Processes	Syllable Structure	Segmental Change
1	[ma ^h .ka:]	CVC.VC	---. ---.
2	[ma. ^h a:]	CV.CV.	-. - Ø -.

Two processes were derived due to SPP in the Hindi word ‘मटका’ [ma^h.ka:]. Voiceless velar plosive sound /k/ is elided in the stream of the represented word utterance shown as 4.1 (b). It is thus syncope process. 4.1(a) is an appropriate SPP made in the word ‘मटका’ of certain speakers in the given word.

➤ *Deletion and Vowel Change in ‘साहस’ [sa:. has]*

L2 speakers have made following alternation and deletion as SPP output

Table 5 Deletion and Vowel Change in ‘साहस’ [sa:. has]

S No.	Derived Processes	Syllable Structure	Segmental Change
1	[sa:. has]	CV.CVC	---. ---.
2	[sa:. hʊs]	CV.CVC	-. - ʊ -.
3	[sa:. his]	CV.CVC	-. - i -.
4	[sa:. hs]	CV.CVC	-. - Ø -.

Vowel alternations in 4.2 (b) and (c) and deletion of vowel segment in 4.2(d) were resulted –in changes due to SPP in the word notified in 4.2. A number of G1 and G2 speakers have altered the vowel /a/ to the back-rounded vowel /ʊ/ or front high unrounded vowel /i/. Appropriate sound patterning of numerous speakers was too evident in the given word.

➤ *Apheresis and Syncope in झोपड़ी [dʒ^h o:paɖi]*

Table 6 Apheresis and Syncope in झोपड़ी [dʒ^h o:paɖi]

S No.	Derived Processes	Syllable Structure	Segmental Change
1.	[dʒ ^h o:.pa.ɖi]	CV. CV.CV	-. -. ---.
2.	[dʒ ^h o:.pɖi]	CV. CCV	-. -. Ø -.
3.	[dʒ ^h o:.mɖi]	CV. CCV	-. . m Ø -.
4.	[dʒ ^h e.pɖi]	CV. CCV	- e: - Ø. - - .
5.	[e:paɖi]	CV. CCV	Ø e: - - . - .
6.	[i:paɖi]	CV. CCV	Ø i: - - . - .

Changes to segments except [d], the penultimate segment, of the word due to SPP of G1 and G2 include; apheresis plus vowel alternation 4.3(d), (e) and (f), substitution plus syncope as indicated in (c), and deletion of internal vowel phoneme as shown in (b). Accurate phonological pattern like 4.3(a) in the given word was too resulted among speakers.

➤ SPP in 'मेंढ़क' [mɛ:ɳ.dʱak] and Derived Processes

Table 7 SPP in 'मेंढ़क' [mɛ:ɳ.dʱak] and Derived Processes

S No.	Derived Processes	Syllable Structure	Segmental Change
1.	[mɛ:ɳ.dʱak]	CVC.CVC	---. ---.
2.	[mi:.dʱak]	CVV.CVC	- i Ø. ---.
3.	[mɛ:.dʱak]	CV.CVC	-- Ø. ---.

Notice the second vowel /ɛ:/ is altered to /i:/, the high-front- long vowel, before deleting the medial segment [ɳ] in the stream of sounds distributions. However, in 4(c), process of deletion of the same segment was resulted without any change on its preceding ore following vowel. 4.4(c) is purely syncope while 4.4(b) syncope incorporated as it has vowel alternation. 4.4 (a) is an accurate SPP in the word given in 4.

➤ Deletion in Tri-Syllabic गुजरना [gu.dʒar.na:]

This is the only tri syllabic- known Hindi word which was presented for SPP. Two type of deletion processes were evident among G1 and G2 speakers' in the word - utterances.. 1)apheresis, a deletion of initial segment of the word and 2) apocope, a deletion of final segment i.e.,[a]. Following are deletion type of phonological processes.

Table 8 Deletion in Tri-Syllabic गुजरना [qu.dʒar.na:]

S No.	Derived Processes	Syllable Structure	Segmental Change
1.	[qu.dʒar.na:].	CV.CVC.CV	---. ---. ---.
2.	[qu.dʒ.r.na:].	CVC.CVC	-- dʒ. r a: - Ø.
3.	[u.dʒar.na:].	CV.CVC.CV	Ø.--. ---. ---.

Notice apocope in the word utterances as shown in 4.5 (b) was resulted due to SPP. However, partial metathesis, transposition of segments (e.g., /..ar../> /...ar.../ was processed first before deleting [a], the final segment of the word.4.6(c) is apocope where some speakers did not articulate [g], voiced-velar-stop

➤ SPP -Resulted -in Deletions – G1

The following diagram shows a number of SPP affected-deletions that were apparent in G1 girls and boys in 1200 utterances after SPP.

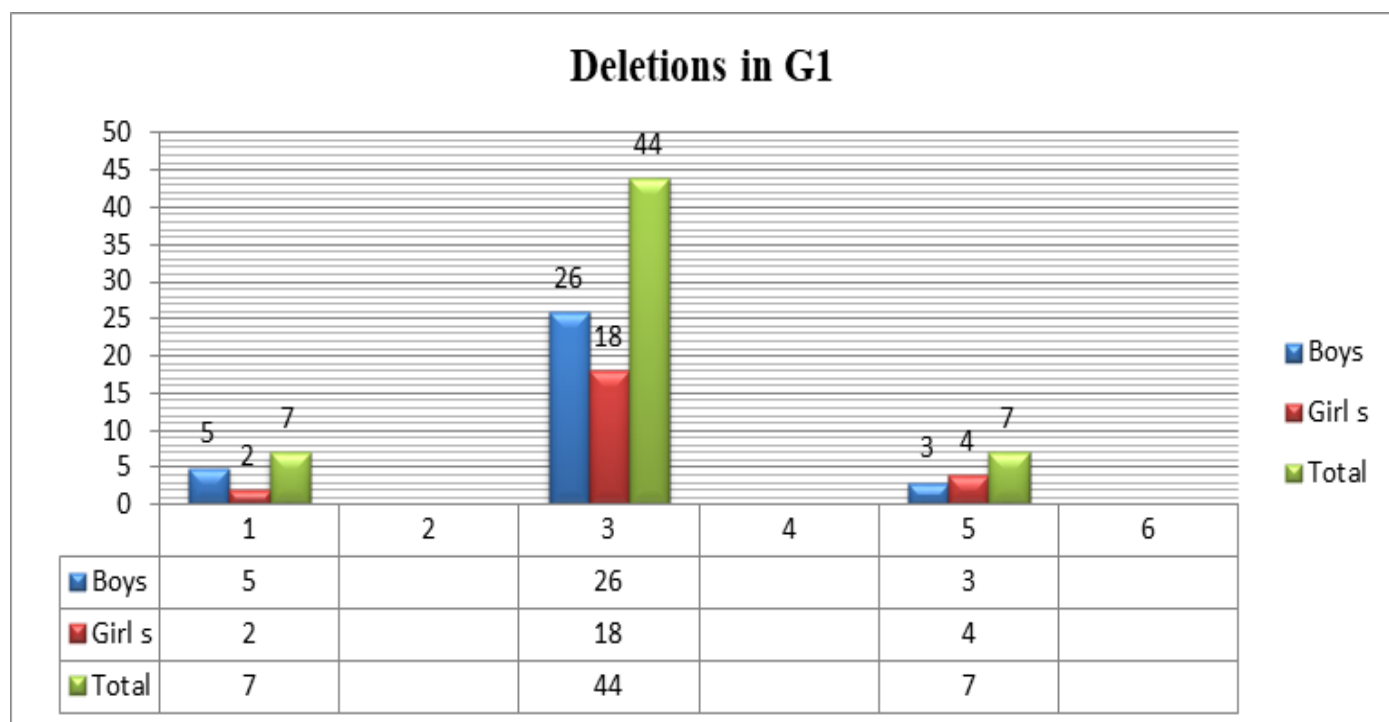


Fig 2 SPP Resulted-in Deletion of G1 in Known Hindi Words

Figure 2 illustrates SPP- affected deletions that were noticed in word utterances of group 1. The highest number of deletions in G1 was the second type, i.e., syncope (44). Of 44 syncope processes, twenty-six boys of G1 had not articulated a medial segment in their SPP whereas eighteen girls of the same group had deleted a medial segment of either of presented 10 word. Apheresis, the first type of deletion and apocope, the third type deletions were minimal and equal in both G1 and G2 (7 each).

➤ *SPP-Resulted –in Deletions – G2*

The following diagram shows a number of SPP affected-deletions of G2 girls and boys in 1200 utterances after SPP.

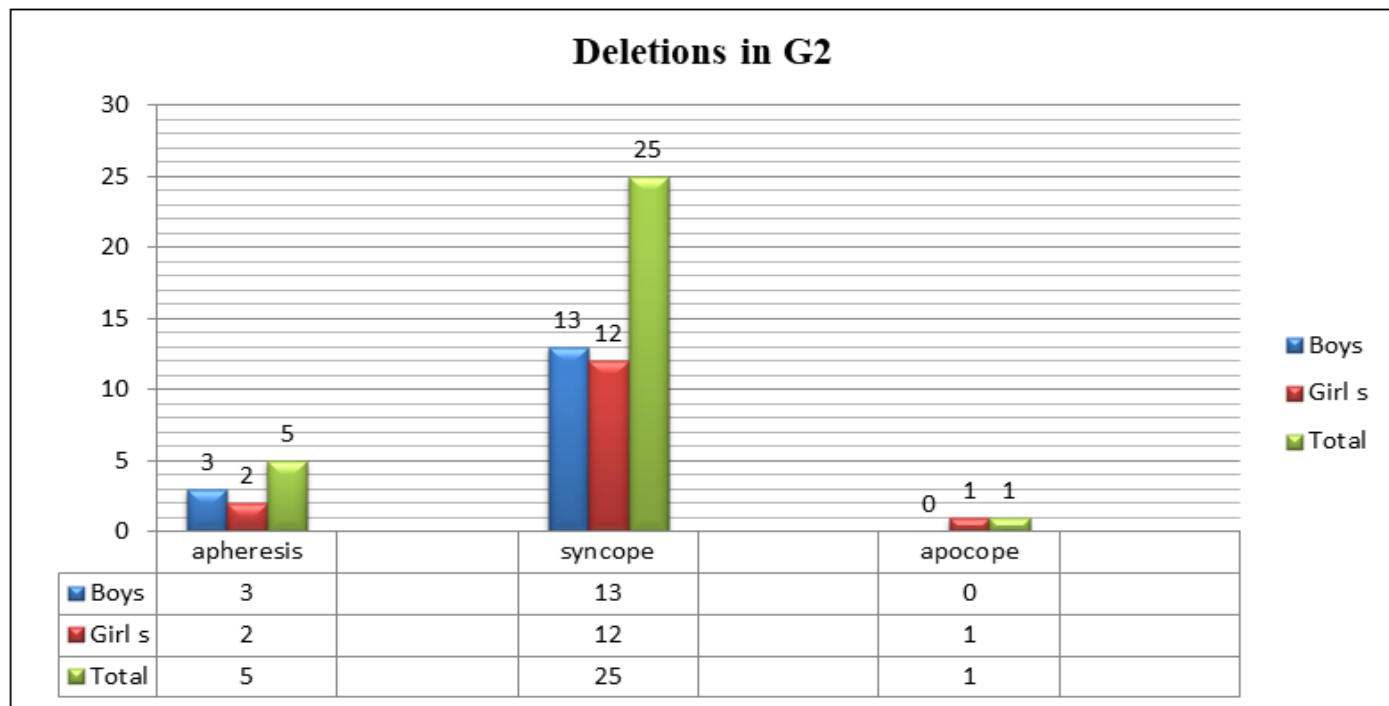


Fig 3 SPP Resulted-in Deletion of G2 in Known Hindi Words

The above illustration is SPP - affected deletions that are evident in group2 (G2). Like G1, the highest number of deletions in G2 were too the second type, i.e., syncope (44). Apocope was the lowest type of deletions that were evident in G2 (only 1). Of 25 syncope-processed utterances, boys and girls were proportional (B:G- 13:12) in un-

pronouncing a medial segment in their SPP. No apocope was evident in G2 boys.

➤ *Comparison between G1 and G2- Known Hindi words*

An illustration of percentage SPP resulted- in deletion that were found in 2400 speech utterances (240x10 known Hindi words=2400 speech utterances) is shown below

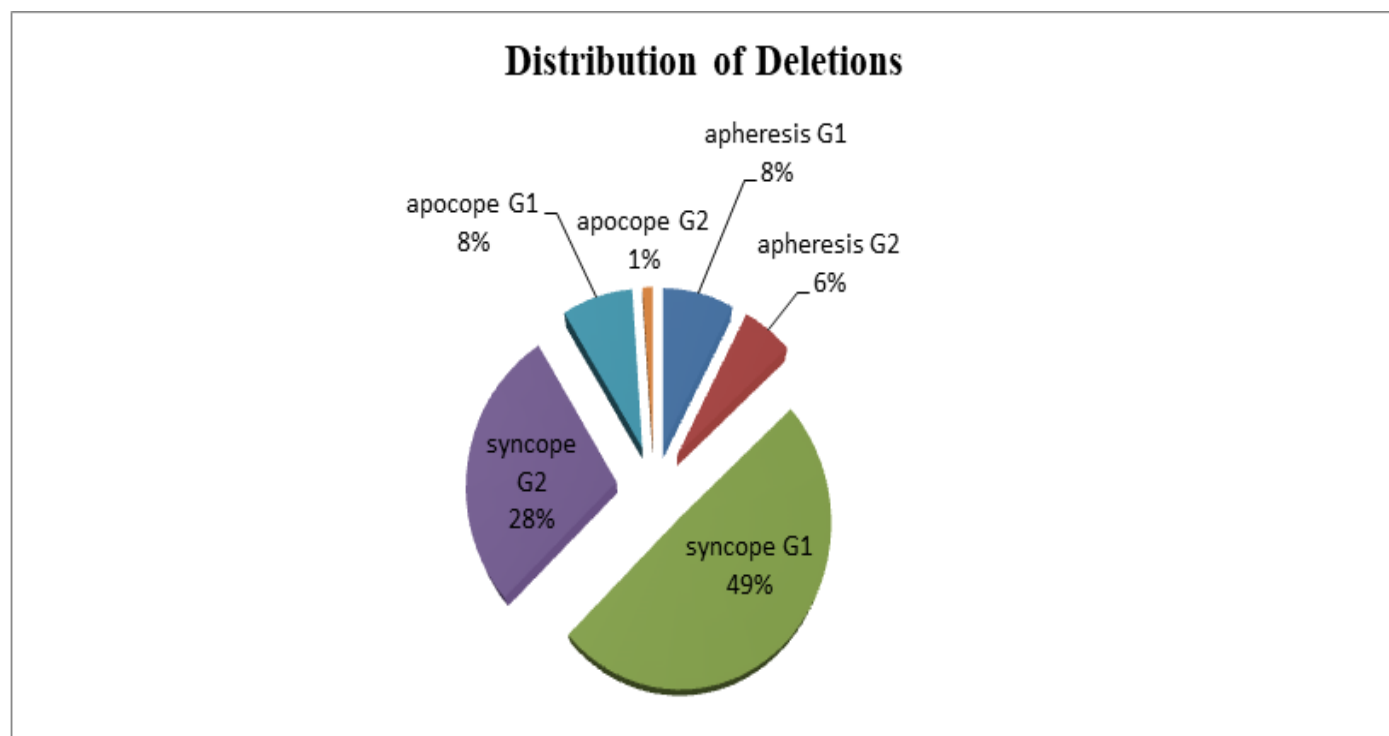


Fig 4 Illustration of % Distribution SPP Impacted Deletions G1 vs. G2 (Total 89 Deletion)

The above is an illustration of cross sectional comparison of three type deletions that were resulted significant phonological processes caused by G1 and G2 is presented in table 4.4. Girls have shown of 'higher SPP driven process. Type 2 deletions – syncope is the highest (49%) in group 1. In G2 SPP resulted-in is 28%. Both, apheresis-deletion of initial segment, and apocope- deletion of final segment of word were 8% in 120 of students (age range 10-11) whereas apocope and apheresis in G2 is 1% and 6% respectively in G2 (120 students of aged between 11-12).

V. CONCLUSION

Observed deletions; apheresis, syncope and apocope, of G1 and G2 in ten Hindi classified words known' have been observed unintentional acts of speakers. It is claimed despite appropriate and acceptable patterns were available to speakers, distorted and segment deleted outputs were recorded in number of speakers of both groups. Hardly did pre-teen L2 learners of Hindi were found conscious enough to 'instructed or implicit phonology'. Rather types of deletions were observed which were due to mental phonological actions. Syncope, type 2 deletion were extremely higher in words that have either retroflex phonemes, (e.g., /mɛ:ɳ.dʱak/ > /mɛ:dʱak/) or a stop+ vowel+ voiced retroflex combination (e.g., /dʒʰo:pa.d i/ > /dʒʰo:pdi/). Apheresis were extremely lower in known Hindi words. Based on evidences discussed 4.1 through 4.9, it is claimed that cognitive phonology overlaps phonology of a particular language. The participated L2 learner/user, being in possession of independent phonology in particular, disregards 'explicit phonology' and resort to the workings of phonology of his/her second language (implicit phonology).

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