

STUDY OF PHONOLOGICAL PROCESSES IN NORMAL KANNADA SPEAKING CHILDREN: 1.6 – 2 YEARS

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In the recent years, the study of phonological development in children has shifted from the analysis of individual speech sound errors toward the analysis of phonological processes that are rule-governed simplifications of adult speech. Therefore phonological process analysis is fast emerging as a popular technique to meet the demand for a more comprehensive means of assessing children who exhibit multiple speech sound production errors. Results obtained thus can provide examiners with a profile of the underlying rules a child uses and can serve as a basis for planning remediation.

Traditional analysis of speech sound development in children has treated phonemes as separate, individual entities in terms of acquisition. However, Ingram (1976) revealed that there seem to be a simplifying process, which is in operation during children's incorrect productions that affect entire classes of sounds, rather than one particular phoneme. In other words, children are not haphazard in their mispronunciations of words, but they are in fact quite systematic in their production. Stampe in 1973, first introduced the concept of phonological process and according to him learning of sound system requires suppression of a number of innate simplifying processes and simultaneously increasing number of contrast sounds. Hodson and Paden (1983) defined phonological process as regularly occurring deviation from standard adult speech patterns that may occur across a class of sounds, a syllable shape or syllable sequence. According to Lowe (1996) phonological processes are systematic simplified adult production of children. In short, processes are description of regularly occurring patterns observed in child's speech, which operate to simplify adult targets.

Literature reports that there are more than forty such different processes operating during children's phonological development (Hodson, 1980). Stoel-Gammon and Dunn in 1985 reviewed the studies of occurrences of phonological processes and identified the processes which were deleted by three years of age as unstressed syllable deletion, final consonant deletion, consonant assimilation, reduplication, velar fronting, diminutization and prevocalic voicing. And the processes, which persist after three years, were identified as cluster reduction, epenthesis, gliding, vocalization, stopping, de-palatalization and final

devoicing. Haelsig and Madison (1986) studied 50 children in the age group of 3-5 years in Native American English and reported that gliding of liquids, cluster reduction and weak syllable reduction to be the most frequently occurring processes in this age range. However the percentage of occurrence of each of the processes declined with age. They also reported that the greatest reduction in the use of phonological processes occurred between 3 and 4 years of age. Roberts, Burchinal and Footo (1990) found that liquid gliding, fronting and de-affrication were dropping between 2.6 and 3 years and cluster reduction between 3.6 and 4 years based on their analysis of the sample of 145 children. The age at which a process occurred in less than 10% of the sample was interpreted as the age at which the process had dropped out for the group.

There are several reports of phonological process analysis in languages other than English also. Becker (1982) studied 10 monolingual Spanish children aged four years and found that de-affrication, /r/ deficiencies, cluster reduction, epenthesis, weak syllable deletion and alveolar assimilation to be the most used processes in these children. Later Martinez (1986) reported Tap/Trill deficiencies, consonant sequence reduction, de-affrication, stopping, affrication, fronting, assimilation and sibilant distortion in 3-year-old Spanish children. Topbas (1997) studied the phonological acquisition in Turkish children and reported that from a cross linguistic perspective, the phonological patterns exhibited coincide broadly with universal tendencies, although some language specific patterns were also evident. In Turkish children /r/ was substituted by /l/, i.e. liquid realization of another liquid where as in English, the /r/ is usually replaced by /w/ or /j/ a gliding process. The same finding is reported in Italian also (Bonoleni and Leonard, 1991). This is explained on the basis that some phonemes are more common where as some are rare in some languages. For example /w/ and /j/ are rare in Turkish and Italian where as they are more frequent in English.

Paulson (1991) studied 30 normal developing children of Mexican descent in the age range of two to five years. She found that the 2 year olds used phonological processes most frequently and the 4-year olds least often. Her subjects used syllable reduction, consonant sequence reduction, prevocalic singleton omission, strident deficiencies, and /r/deficiencies. And miscellaneous error patterns were stopping, gliding, vowel deviation, epenthesis, substitution of /l/ for /r/ and sibilant distortions. Hua and Dodd (2000) studied the phonological acquisition in Putonghua language (Modern Standard Chinese) and suggested that vowels and syllable final consonants were mastered earlier than syllable initial consonants.

The literature on phonological processes is mostly from the Western studies and is inadequate in Indian languages. Therefore, we know relatively little about the phonological development in Indian languages. However, in the recent past a number of such studies have been attempted in several Indian languages focusing on the normal phonological process usage and these have been briefly reviewed in the table below.

	Author	Language	Age Group	Common processes seen
1	Sunil (1998)	Kannada	3-4 years	Fronting, Cluster reduction, Initial consonant deletion and Affrication
2	Jayashree (1999)	Kannada	4-5 years	Fronting, Cluster reduction and Stopping
3	Ramadevi (2001)	Kannada	5-6 years	Stridency deletion, De-aspiration and Retroflex fronting
4	Sreedevi, et al (2005)	Kannada	2-3 years	Retroflex fronting, Trill deletion, Depalatalization, Affrication, Stopping, Cluster reduction etc
5	Sameer (1998)	Malayalam	3-4 years	Cluster reduction, Final consonant deletion, Epenthesis and De-affrication
6	Bharathy (2001)	Tamil	3-4 years	Epenthesis, Cluster reduction, Gliding, Nasal assimilation, Voicing De-affrication & Fronting.
7	Santhosh (2001)	Hindi	3-4 years	Cluster reduction. Epenthesis, Fronting, Gliding, Metathesis Nasalization etc
8	Rajeev Ranjan (1999)	Hindi	4-5 years	Cluster reduction, partial reduplication and aspiration

The present study intended to analyze the speech sample of very young Kannada speaking normal children (1.6 to 2 years) to identify the type of phonological processes which operated mainly in their utterances.

METHOD

Subjects: The subjects in this study were 8 children, 3 boys and five girls aged between 1.6 to 2 years. All subjects were from monolingual Kannada speaking homes. They had normal hearing acuity and normal cognitive and motor development (assessment based on a check list). No child was included in the study whose parents or caretakers reported concern about speech and language development. Subjects were obtained from daycare centers and individual homes.

Test Material: 50 simple Kannada words, which commonly occur in the utterance of normal young children, were selected for the study. Most of the test words used were bisyllabic except a few trisyllabic ones. The target words were picturized on white cards of 4 x 6" size in colour. The picture words were arranged in order as per the sequence of Kannada alphabets. The target words included a number of blends also.

Procedure: An informal interaction with the subject was initiated to develop rapport. Later speech samples were recorded from each child individually showing the picture cards one by one. Recording was done using a high fidelity portable Sony tape recorder.

Data Analysis: The data obtained from both the groups was transcribed using broad and narrow IPA transcription. Following this a qualitative analysis was carried out for each group separately. Each word utterance of the subjects was analyzed sound-by-sound. Based on the sound changes occurring, the phonological process operating was identified. Further, frequency of occurrence of the various processes was determined. The qualitative analysis of each child's speech sample was carried out using the following format:

Target word	Phonemic structure of target	Response of the subject	Phonemic Structure of the response	Phonological process used

RESULTS AND DISCUSSION

Table 1 shows the 25 various phonological processes identified in children aged 1.6 to 2 years speaking Kannada. The processes identified are listed in descending order of occurrence based on the percentage of occurrence. Percentage of occurrence of a phonological process was computed by the following formula (Newman & Creaghead, 1988).

$$\frac{\text{Number of times a process occurred}}{\text{Total number of words spoken}} \times 100$$

Percentage of occurrence of 5% or more was considered high, following Newman & Creaghead, 1988. The descriptions of the processes seen are given in Appendix.

Out of all the 25 processes observed, retroflex fronting was the most dominant one (18%). This can be attributed to the complexity in its production, which involves curling the tongue to contact the palate.

Therefore most often a retroflex sound was substituted by an easier dental sound, which is more frontally placed with better visual clues and which also requires relatively lesser exertion of the tongue. As per literature retroflex sounds are mastered after 3 years (4.6 years - Templin, 1956; 3.6 years - Babu, Bettagiri & Rathna, 1972, and so on).

Table 1: Shows the phonological processes in 1.6 – 2 years

	Phonological process observed	Total %
1	Retroflex fronting	18 %
2	Initial consonant deletion	12.5 %
3.	Vowel lowering	10.5
4.	Trill Deletion	9.5 %
5.	Cluster reduction	7 %
6.	Dental for trill	6 %
7.	Stopping	5.5 %
8.	Final vowel Deletion	4.5 %
9.	Affrication	2.5 %
10.	Liquid for glide (/l/))	2.5 %
11.	Lateral for trill (/l/r)	2 %
12.	Vowel raising	2 %
13.	Monothongization	1.5 %
14.	Devoicing	1.5 %
15.	Backing	1.5 %
16.	Velar fronting	1.5 %

17.	Nasal for lateral	1.5 %
18.	Initial consonant addition	1 %
19.	Initial vowel deletion	1 %
20.	Voicing	1 %
21.	Labial for semivowel	1 %
22.	Nasal for semivowel (n/j)	1 %
23.	Nasal deletion	0.5 %
24.	Nasal for trill	0.5 %
25.	Semivowel for nasal	0.5 %

Retroflex fronting was followed by initial consonant deletion (12.5 %). In Western literature this is an unusual process which occurs in deviant speech. But Indian languages like Kannada have more occurrence of ICD. This is in consonance with other studies in Kannada (Ramadevi, 2001). The next significant processes in order were Vowel lowering (10.5 %), Trill deletion (9.5 %), cluster reduction (7%), dental for trill (6.5 %) and stopping (5.5%). Trill deletion had relatively high occurrence. This is because; trill is also a tongue tip sound and requires much precise muscular co-ordination. As per the literature reports, it is also a much later acquired sound, i.e. by five years (Arit, 1976) or beyond that. However, the recent clinical observations are that trills are mastered before 5 years but not as early as before 3 years of age. Cluster reduction was relatively less contrary to the expectations. This is probably because the sample contained less number of words with clusters.

In addition to trill deletion, trills were substituted by dental plosives and lateral /l/ which are easier to produce. Stopping or substitution of a stop for a fricative was considerably less where as in the Western reports even children of older age groups show higher occurrence of stopping. There were several other processes which had a percentage of occurrences less than the crucial 5 %. They were Final vowel deletion, Affrication, liquid for glide, lateral for trill, Vowel raising, Monothongization, devoicing, Backing, Velar fronting, Nasal for lateral, Initial consonant addition, Initial vowel deletion, Voicing, Labial for semivowel, Nasal for semivowel, Nasal deletion, Nasal for trill, and Semivowel for nasal.

The overall results indicate that only seven out of 25 processes were significantly operating in this group of children albeit the individual variations. The rest of the processes sparingly occurred perhaps with a few more repetitions probably the child would have self corrected the errors. The prominent processes seen

were not similar to the ones reported frequently in Western languages. This is because of structural differences across the languages.

To conclude it can be said that this study will augment our understanding of child phonology in the critical early language learning period. Also, the present investigation reveals that the phonological processes seen in Indian languages, are exceptionally different from the Western languages. And this necessitates establishment of phonological norms in our languages.

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	Phonological process observed	Sub 1	Sub 2	Sub 3	Sub 4	Sub 5	Sub 6	Sub 7	Sub 8	Total %
1	Retroflex fronting	6	7	10	2	1	2	6	2	18 %
2	Initial consonant deletion	1	1		5	3	3	7	5	12.5 %
3.	Vowel lowering									10.5
4.	Trill Deletion	2	3	3	4	2	1	2	2	9.5 %
5.	Cluster reduction									7 %