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Phonological Processes Of 2.6 To 6 Years Old Typically Developing Tamil Speaking Children

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Abstract: ***The present study aimed at identifying phonological processes in 2.6 years to 6 years typically developing Tamil speaking children. Thirty typically developing Tamil speaking children, age ranged from 2.6 years to 6 years participated in the present study. They were divided into 3 groups with 10 children in each group divided in one year interval. Totally 160 meaningful di-syllabic and tri-syllabic words in combination of 18 consonants, 10 vowels and two dipthongs in initial, medial and final positions were used to assess. Results revealed that thirty seven phonological processes were observed in children. The present study identified substitution processes was the highest occurrence than other processes. Although the processes and occurrence of the process was found to decreased with increase in age group.***

Keyword: Phonological processes, typically developing children

I. INTRODUCTION

Speech is the primary mode for the expression of language. Speech is a system in the sense that it consistently and usefully relates the meanings of a language with the sounds by which the language is communicated. All children embark on the development of their phonological systems from the same beginnings (Stampe, 1979). Children possess a full understanding of the underlying representation of the adult phoneme system. They however have difficulties with the peripheral motor realization of the phonetic surface form which are perceived as articulation errors. When children's speech is analyzed, clear systematic patterns are found in their erroneous approximations to adult target words (Yavas, 1998). These error patterns are uniform across children and languages. One of the most common ways of describing these error patterns that has been used since a very long time is with reference to phonological processes. Phonological processes are regularly occurring deviations from the adult speech patterns; may occur across a class of sound, a syllable shape or syllable sequence (Hodson & Paden, 1983).

All the phonological processes operate to simplify adult targets. Various classification systems of phonologic processes have been devised but they share some common features (Hodson, 1980; Ingram, 1981; Khan, 1985). Phonological Processes can be broadly described on the basis of occurrence of the Phonological Processes present during the production of consonants and vowels. According to Grunwell (1985), phonological processes can be characterized into three major categories: syllable structure processes, substitution processes and assimilation processes. This classification system acts as a comprehensive device for identification of the relationship between the adult target and the child's erroneous productions.

There has been little research directed toward determining the age, or age range, at which the various processes are present in the speech of normally developing children. The findings of various longitudinal studies involving single subjects or small groups of children and few cross sectional studies with larger subject populations (Crary et al., 1981; Hodson and Paden, 1982) provide a broad picture of the use of phonological processes at various chronological ages. Although there is considerable individual variation, phonological process occurrence can be divided into two major categories: Processes that disappear by the age of 3 and those that persist beyond 3 years of age (Stoel – Gammon,C., & Dunn, C.(1985).(Table.1).

Abundant research in western languages focuses on phonological development and various processes seen in developing children (Grunwell (1985); Ingram (1981); Shriberg and Kwaitkowski (1980). On the other hand several Indian studies focused on the similar area in a variety of Indian Languages like Telugu, Tamil, Kannada, Hindi and Malayalam (Vasanta, 1990; Bharathy, 2001; Ramadevi & Prema 2002; Rahul, 2006; Sameer, 1998).

Studies on phonological processes in normal children in Indian languages are very few. There have been very few studies conducted on normal phonological processes and disordered phonological processes. Balachandran and Nirmala (1978) study has been reported on the Assimilatory processes across 3 Indian languages (Tamil, Telugu & Hindi). Total 13 children, out of which 1 Bilingual (Tamil- Telugu), 4 Telugu and 8 Hindi speaking children in the age range of 1 to 5 years were studied. Results indicated that the consistent and regular patterns of assimilation among consonants clusters were: Nasals, Stops, Affricates, Fricatives, Laterals, and Flap/Trill. Dental Assimilation, Voice Assimilation, and Nasal Harmony were common in all the three languages, in addition to Vocal Harmony, Nasalization of Vowels and Devoicing of Final consonants. However, Vasanta (1990) had designed a Telugu Test of Articulation and Phonology (TTAP), which has been reported in her article "Maximizing phonological information from a picture- word Telugu Articulation test", published in ISHA test battery (1990). She emphasized on the usage of phonological processes analysis, as it yields more information for planning remedial programmes than the traditional analysis procedures.

After studying phonological processes in 30 Malayalam speaking children in the age range of 3- 4 years, Sameer (1998) came to the conclusion that persisting processes of final consonant deletion, epenthesis, Apicalisation and Affrication. Decreasing processes were the deaffrication, stopping, stridency deletion, fronting, reduplication, palatalization, atypical with reduction, medial consonant deletion, backing of fricatives, denasalized and articulatory shifts. However, Sunil (1998) conducted a study on 3-4 year old Kannada speaking normal children. Results indicated that children used several phonological processes during the speech sound production and these processes tend to persist even after 4 years of age. The results also revealed that as age advanced from 3-4 years, some phonological processes persisted (fronting and cluster reductions), while other phonological processes decreased (medial consonant deletion, final consonant deletion and affrication). On the other hand, Jayashree (1999) studied phonological processes in 30 Kannada speaking children in the age range of 4-5 years using Kannada Articulation Test as test stimuli. Results indicated that the cluster reduction, fronting and stopping were found to be the persisting processes, whereas metathesis, epenthesis, prevocalic voicing, and palatalization were decreasing processes.

Moreover, Bharathy (2001) studied the development of phonological processes of 3-4 years old normal Tamil speaking children. 30 children, 10 each, in the age ranges of 3- 3.4 years, 3.5- 3.8 years, and 3.9- 4.0 years. She used Tamil Articulation Test (Usha, 1986) for the study. The results indicated the occurrence of 15 phonological processes such as unstressed syllable deletion, cluster reduction, epenthesis, gliding, stopping of liquids, stopping of fricatives, nasal assimilation, voicing assimilation, metathesis, initial consonant deletion, final consonant deletion, backing, fronting, deaffrication and affrication. Epenthesis, cluster reduction, unstressed syllable deletion, gliding, nasal assimilation, voicing assimilation, deaffrication, initial consonant deletion, backing and affrication declined markedly after the age of 3.9 years. Final consonant deletion faded after the age of 3.5 years. Affrication was present till the age of 3.8 years and disappeared thereafter. By the end of 4 years, most of the processes were reduced and only a few processes such as epenthesis, cluster reduction and stopping of liquids were evident. The results revealed a decrease in phonological processes with increase in age.

The knowledge of phonological development has significant value in the clinical population to determine whether a child is phonologically disordered and needs intervention. However, a limited understanding of phonological development and a scarcity of data to evaluate difference between the language conditions seen in children might lead to a risk of misdiagnosis. Further, Speech Language Pathologist (SLP) assesses and treats children with communication disorders (Shipley & McAfee, 2004). SLP should have knowledge about normal phonological process development of Tamil speaking children for assessing and treating children with phonological disorders. Hence, the present study focuses on identifying phonological processes in Tamil speaking children.

II. AIM OF THE PRESENT STUDY

The present study was aimed at identifying patterns of phonological processes in 2.6 to 6 years old typically developing Tamil speaking children.

METHOD

SUBJECTS

Thirty typically developing Tamil speaking children, age ranging from 2.6 years to 6 years participated in the study. They were divided into 3 groups with 10 children in each group divided in one year interval as shown in Table 2. The children were screened for age appropriate speech and language skills based on history, clinical observation and assessment tools (Extended Receptive and Expressive Emergent Language Scale (REELS; Bzoch & League, 1979). Other inclusionary criteria of children included typical development of speech and language, normal hearing status and negative history of medical, developmental or neurological deficits as reported in a parental interview. All subjects belonged to middle socio-economic status and their parents had minimum educational qualification from 10th grade to master level. All participants were native speakers of Tamil. They were exposed to Tamil language at home and Tamil as well as English in the school.

STIMULI

Phase 1: 5000 words in combination of 18 consonants, 10 vowels and two dipthongs in initial, medial and final positions were developed.

Phase 2: These 5000 words are validated with five BASLP intern students and five speech language therapists to see familiarity, meaningful 500 words.

Phase 3: These 500 words validated with investigator and guide and came to 380 words further these words are reduced to 160 words meaningful, easy, familiarity and so that children can produce easy with short duration.

Phase 4: These 160 words are administered in 3 typically developing children Tamil speaking childern to see the duration of test.

Phase 5: Final test tool was finalized after using in 3 typically developing children.

Totally 160 meaningful di-syllabic and tri-syllabic words in combination of 18 consonants, 10 vowels and two dipthongs in initial, medial and final positions were used to assess. These words are specifically developed among 5000 words. All these words are selected from the basic tamil picture book to categorize phonological processes in children. All these words are easy, simple familiar, picturable and meaningful.

PROCEDURE

An informed oral consent was obtained from the parents/ caregivers of all the subjects. The outcome of the pilot study showed that speech samples of these words are taken 10-15 minutes. The speech sample was recorded from each child in a quiet room at home or school environment. Subjects were seated comfortably and rapport was build up with the child before eliciting the target speech sample. Each child was presented with words and child has to repeat it back. The responses of every child were recorded. Hence, speech sample was recorded using a Transcend MP330 8GB recorder and were stored in a compact disk. All the subjects speech samples were transcribed using broad transcription International Phonetic Alphabet (IPA revised edition, 2005). These were further subjected to analysis.

ANALYSIS

From the transcribed speech sample, different phonological processes in the speech were analyzed and classified into syllable structure, substitution, assimilation and vowel processes. The definition of phonological processes given by Ingram (1981) was followed for classification of the phonological processes present in the sample. In cases where the errors could not be classified using the list of processes given by Ingram (1981), the errors were described using the definition of phonological processes given by Grunwell(1987). The phonological processes were tabulated and total number of occurrence of each process was noted.

III. RESULTS AND DISCUSSION

The present study aimed at identifying the phonological processes in 2.6 – 6 years old typically developing Tamil speaking children. In the present study, data obtained from speech sample was analyzed to enumerate the common phonological processes in children (Table 3**)**. Qualitative analysis was done to report the findings. The results have been discussed with respect to common phonological processes. The investigation revealed 37 phonological processes which occur most commonly in children between 2.6 to 6 years of age.

It reveals that the most common type of processes were those of substitution followed by syllable structure, vowel processes and assimilatory processes (Table.3).

SYLLABLE STRUCTURE PROCESSES

Table 4 depicts the number of children demonstrating the syllable structure processes in the three age groups. The number in parenthesis represents the range of the number of times a process occurred among the children who demonstrated the process.

Syllable structure processes including initial consonant deletion, medial consonant deletion, final consonant deletion, initial syllable deletion, medial syllable deletion, final syllable deletion and metathesis were demonstrated by all children. However, the processes occurred less in number of instances in the age group of 4.6 years to 6 years as compared to younger age group. The maximum number of instances of occurrence across processes ranged from three to seventeen. Further, frequencies of occurrences are very less in children in the age group of 4.6 years to 6 years compared to younger age group (2.6 years- 3.6 years). The occurrence of final consonant deletion was present in all ten children in the age group of 2.6 to 3.6 years and five children demonstrated in the age group of 3.6 – 4.6 years. This finding is concurrence with study done by Bharathy, 2001 that the FCD was more prevalent in the age group 3-4 years. Medial consonant deletion (MCD) was observed in all three age groups and number of occurrences ranges from 1-6. However, number of occurrence was reduced in older age group. Overall syllable structure processes are more commonly occurred in the age group of 2.6 years to 3.6 years and the frequency of occurrence of each processes are more compared to other two age groups. The results indicates that the decrease in phonological processes with increase in age. Minimally occurred phonological processes are initial consonant deletion, initial syllable deletion, final syllable deletion and metathesis in the age of group of 3.6 years to 4.6 years.

SUBSTITUTION PROCESSES

Substitution processes demonstrated by 2.6 years to 6 years Tamil speaking children. However, maximally occurred processes are bilabial backing, alveolar fronting, palatal fronting, velar fronting, retroflex fronting, liquid gliding, liquid stopping, stop gliding and glide stopping. On the other hand minimally occurred processes are dental fronting, dental backing, palatal backing, retroflex backing, stop liquiding,

glide liquiding and fricativization. More number of children and more number of occurrences were demonstrated in the age group of 2.6 -3.6 years. As the age increases processes were reduced among children. As noticed from the Table 5, fronting stopping, backing and gliding were more predominant process observed between 2.6 to 4.6 years of age. Fronting process was most predominant amongst the other type of processes and remains consistent with respect to number of occurrences in 2.6 years to 4.6 years of age. On the other hand a less number of occurrences were observed after the age of 4.6 years. Roberts et al., (1990) reported that fronting was a common process between 2.6 years to 4 years of age investigations in Indian languages has revealed fronting to be a decreasing process. These include Malayalam (Sameer, 1998), Hindi (Ranjan, 1999) and Tamil (Bharathy, 2001).

Backing was observed in all the three age groups. However more number of children demonstrated in the age group of 2.6-3.6 years and gradually decreased in the age group of 4.6-6 years. Backing was observed in bilabials, dentals, palatals and retroflex sounds. In consonance with Bharathys (2001) investigation in 3-4 years old Tamil speaking children, backing was found to be a decreasing process. However, Stopping was observed in all the age group children and seen in liquids and glide sounds. Liquid stopping was observed in 24 children and occurrence of the process was ranged from 1-9. On the other hand glide stopping was demonstrated in 2.6 years to 4.6 years and occurrences ranged from 1-4. Liquid stopping was observed till 5.6 years of age and glide stopping was not observed after the age of 4.6 years. This is in consonance with the findings of Haelsig and Madison (1986) in English, and Bharathy 2001. In English speaking children, Roberts et al., (1990) found stopping to be most common between 2.6 and 4 years. This study found the same although the process was seen to persist till 5.6 years.

More over gliding was demonstrated in all age groups in liquids and stops. The frequency of occurrence was ranged from 1-13. Stop gliding was not observed in the age group of 4.6 years to 6 years. It was found to persist till the age of 5 years and is therefore termed a persisting process. This was also reported by Grunwell (1982, Khan and Lewis (1986), and Bernthal and Bankson (1990).

ASSIMILATION PROCESS

Table 6 depicts that Assimilation processes like Nasalization, Denasalization and Nasal assimilation were observed in the age group of 2.6 years to 4.6 years. However, more number of children demonstrated in younger age group then 3.6 years to 4.6 years. Assimilation processes are not observed in the age group of 4.6 – 6 years. Denasalization and nasalization was more frequently occurred in younger age group than other age groups. Although the frequency of occurrence of this process decreased with age, it was found to persist till the age of 5 years. This declination and persistence is in consonance with findings in English Haelsig and Madison, 1986, Tamil Bharathy 2001.

VOWEL PROCESSES

The number of vowel processes was examined vowel fronting, vowel backing, vowel raising, vowel lowering, vowel lengthening, vowel shortening, dipthongation, monophthongation, initial vowel deletion, medial vowel deletion and final dipthong deletion in the age group 2.6 years – 6 years (Table 7). However, vowel fronting, vowel lowering, vowel shortening, dipthongation and and monophthongation were observed in all the age groups compared to other process.

Among this four main categorization of processes highest number of occurrence was observed in substitution, SSP, vowel processes and assimilation in younger age group than older age group (Fig.1). Overall, this study found thirty seven processes to be exhibited in the Tamil speaking children in the age range of 2.6 years to 6 years. It was noticed that the processes are decreases as the age increases in children and frequency of occurrences also decreased in older age group. The declining use of phonological processes with increasing age has been reported in across languages including English (Grunwell, 1982; Hodson and Paden, 1983; Haelsig and Madison, 1986; Preisser et al., 1988; Roberts et al., 1990), Malayalam (Sameer, 1998; Anilsam, 1999), Kannada (Sunil, 1998; Jayashree, 19990. In this investigation, a phonological process was said to be persisting even if present in a single child. Additionally, a phonological process was defined as persisting if it occurred even once in the speech of the child. Lowe (1994) suggested the presence of a single occurrence of a process qualifies its presence.

IV. CONCLUSION

The study provided preliminary evidence for differences in the development of phonological processes in typically developing Tamil speaking children. The present study identified totally thirty seven phonological processes and among these substitution processes was the highest occurrence than other processes. Although the processes and occurrence of the process was found to decreased with increase in age group.

V. TABLES AND GRAPHS

Processes disappearing by 3 years of age	Processes persisting after 3 years of age
Unstressed syllable deletion	Cluster reduction
Final consonant deletion	Epenthesis
Doubling	Gliding
Diminutization	Vocalization
Velar fronting	Stopping
Consonant assimilation	Depalatalization
Reduplication	Final devoicing
Prevocalic voicing	

Table1: Phonological processes that are expected to disappear and persist beyond 3 years of age

Age group	Age range	Male	Female	Total No. of Subjects
1.	2.6 - 3.6	6	4	10

2.	3.6 – 4.6	4	6	10
3.	4.6 - 6	7	3	10

Table 2: Distribution of subjects across age groups

Syllable structure	Substitution	Assimilation	Vowel
ICD	Bilabial backing	Nasalization	Vowel fronting
MCD	Dental fronting	Denasalization	Vowel backing
FCD	Dental backing	Nasal assimilation	Vowel raising
ISD	Alveolar fronting		Vowel lowering
MSD	Palatal fronting		Vowel lengthening
FSD	Palatal backing		Vowel shortening
Metathesis	Velar fronting		Dipthongation
	Retroflex fronting		Monophthongation
	Retroflex backing		IVD
	Liquid gliding		MVD
	Liquid stopping		Final dipthiong deletion
	Stop liquiding		
	Stop gliding		
	Glide stopping		
	Glide liquiding		
	Fricativization		

Table 3: Classification of phonological processes in Tamil speaking children

Syllable structure processes	2.6 – 3.6 years N= 10	3.6 – 4.6 years N=10	4.6 – 6 years N=10
ICD	5 (2-4)	2(1-2)	1(1)
MCD	6(2-6)	8(1-5)	6(1-3)
FCD	10(1-17)	7(1-5)	4(1-2)
ISD	4(1-3)	1(1)	1(1)
MSD	7(1-5)	5(1)	3(1)
FSD	2(3)	1(2)	--
Metathesis	----	1(1)	---

Table 4: Number of children demonstrating syllable structure processes in the three age groups

ICD-Initial consonant deletion, MCD- Medial consonant deletion, FCD- Final consonant deletion, ISD- Initial syllable deletion, MSD-Medial syllable deletion, FSD- Final syllable deletion

Substitution processes	2.6 – 3.6 years N= 10	3.6 – 4.6 years N=10	4.6 – 6 years N=10
Bilabial backing	5(1-4)	2(1-2)	3(1)
Dental fronting	2(1-2)	1(1)	----
Dental backing	2(3)	6(3-8)	3(1)
Alveolar fronting	5(1-2)	7(1-2)	4(1-2)
Palatal fronting	5(2-17)	4(1-12)	4(1)
Palatal backing	1(1)	---	----
Velar fronting	4(1-13)	---	---
Retroflex fronting	7(1-3)	4(2-3)	1(1)
Retroflex backing	1(1)	---	1(1)
Liquid gliding	9(1-13)	4(1-5)	1(2)
Liquid stopping	10(1-9)	7(3-7)	7(1-6)
Stop liquiding	2(1-2)	4(1-5)	1(1)
Stop gliding	4(1-6)	4(1-4)	---
Glide stopping	6(1-4)	4(1-3)	----
Glide liquiding	1(1)	2(1)	---
Fricativization	2(1-8)	1(6)	----

Table 5: Number of children demonstrating substitution processes in the three age groups

Assimilation processes	2.6 – 3.6 years N= 10	3.6 – 4.6 years N=10	4.6 – 6 years N=10
Nasalization	7(1-6)	1(3)	---
Denasalization	9(1-7)	6(1-4)	1(1)
Nasal assimilation	2(1-2)	1(1)	

Table 6: Number of children demonstrating assimilation processes in the three age groups

Vowel processes	2.6 – 3.6 years N= 10	3.6 – 4.6 years N=10	4.6 – 6 years N=10
Vowel fronting	3(1-3)	1(1)	1(1)
Vowel backing	3(1)	1(1)	---
Vowel raising	4(1-2)	4(1-2)	---
Vowel lowering	6(1-11)	6(1-3)	3(1-3)
Vowel lengthening	1(1)	---	---
Vowel shortening	2(1)	2(1-3)	1(1)
Dipthongation	3(1)	2(1)	2(1)
Monophthongation	8(1-4)	3(1)	3(1-2)
IVD	2(3-4)	---	1(2)
MVD	---	---	1(1)
Final dipthiong deletion	1(1)	---	2(1-2)

Table 7: Number of children demonstrating vowel processes in the three age groups

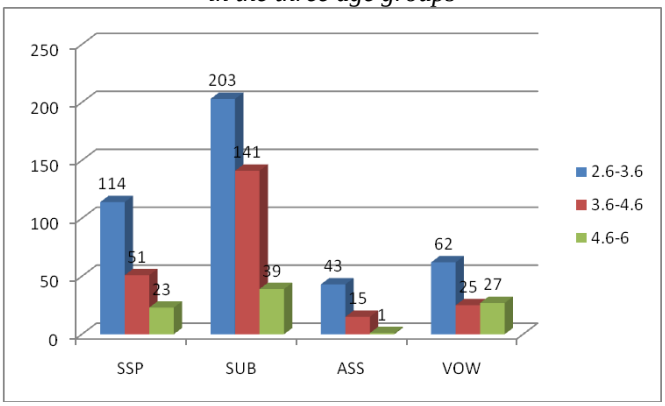

Figure 1: Indicating frequency of occurrence in SSP, Substitution, Assimilation and Vowel Processes in three age groups

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