Advances in Life Science and Technology
ISSN 2224-7181 (Paper) ISSN 2225-062X (Online)
Vol.23, 2014

Development of Phonological Processes in Typically Developing 3-4 Year Old Indian Bilingual Children

Prathamesh Bailoor Maithily Rai Lavanya Krishnan
Nitte Institute of Speech and Hearing, Nitte University,
Mangalore, India - 575018
E-mail: prathameshbailoor@yahoo.com

ABSTRACT

INTRODUCTION: Phonological processes are variations in the way phonemes are combined. Study of bilingualism in children is important for our understanding of language development. There is evidence that number of children who are acquiring a second language sequentially is increasing (Brice, 2002). Duchar & Clark (1992) stated that a Spanish-English bilingual child, who studied languages between the ages of 1.7 year & 2.3 years, developed separate voicing systems for two languages. Yavas (1995) studied the first 50 word period of his Portuguese/Turkish bilingual son. A study by Campbell & Sais (1995) on Italian-English bilingual preschool children shows their competency was nearly equal in both the languages.

In India, a study on simultaneous bilinguals was done by Chengappa & Thirumalai (1972) on a Kodava-Kannada bilingual child who shows that the vowel contrasts were similar in Kodava and Kannada. Mala (2001) studied development of phonological processes in 3-4 year old Tulu – Kannada normal bilingual children. In countries like India, children are often exposed to more than one or two languages. There is a scarcity of studies on normative information on development of phonological processes in bilingual children in Indian context. Hence, there is a need of the present study.

AIMS

- To study the development of phonological processes in typically developing 3-4 year Kannada- English bilingual children.
- To compare the obtained results with the reports of monolingual Kannada speaking children of the same age group.

METHOD: Ten typically developing Kannada- English speaking bilingual children in the age range of 3-3.6 & 3.6 to 4 years, served as the subjects. Mother-tongue of the children was Kannada (L1) and the second language, English (L2). All children attended English Medium School for their kindergarten education, but the speaking language at home was Kannada. All children were exposed to English all the time at school by teachers and their peer group. Also children had a regular exposure to English programs on Television. Spontaneous speech samples of ten minutes were collected in both the languages (L1 & L2). The tasks were; General conversation, Story narration and Picture description tasks were given where the clinician used picture books and asked the child to describe what was happening in the presented picture. Clinician showed some flash cards of lexical items and children were asked to identify it and express the target lexical items. Articulation tests, Kannada Articulation Test (Ratna & Bettagiri, 1972) & Goldmann Fristoe Articulation Test (English) [Goldman & Fristoe, 1986] were administered. Spontaneous speech samples obtained both in L1 & L2 was analyzed to study various types of phonological processes and the frequency of their occurrence.

RESULTS: Results revealed a total of 14 phonological processes have been identified to be occurring. The most commonly occurring processes were fronting, cluster reduction, Epenthesis, initial consonant deletion, affrication, metathesis and final consonant deletion. The least occurring processes were medial consonant deletion, backing of stops, alveolar assimilation, stopping & backing of fricatives, and vowel unrounding. Medial consonant deletion, stopping and alveolar assimilation were the unique processes found only in one subject each. Further, results of the present study were compared with previous findings on Tulu-Kannada bilinguals (Mala, 2001) & Kannada monolingual speaking children (Sunil, 1995) of the same age group. One sample t-test was carried out and results revealed that there was a significant difference seen in Kannada-English bilinguals and Tulu-Kannada bilinguals for fronting, cluster reduction, affrication, medial consonant deletion and epenthesis. On comparing Kannada-English bilinguals and Kannada monolinguals, there was a significant difference seen in fronting, cluster reduction and final consonant deletion.

DISCUSSION: Results of the present study on commonly occurring phonological processes are in agreement with the study done by Stoel-Gammon (1985), Roberts & Foot (1990), Louke (1990) & Mala (2001). As the age advanced from 3 -4 years, Fronting, cluster reduction, initial consonant deletion and final consonant deletion persisted even at the age of 4 years because the clusters are acquired at a later age and also the acquisition of all phonemes is not complete by 4 years of age. As the age advances, the phonological process decreases because the acquisition of affricates and stops occur. Most of the phonological processes were less often in bilingual children than in monolingual children of the same age group. This supports the findings of Flege et.al (1992),

Cambell & Sias (1995), Bruck & Genesee (1995), Bailystock (2001) & Mala (2001) on monolingual & bilingual comparative studies, where the bilinguals performed better in the phonological tasks.

CONCLUSION: Hence, present study on development of phonological processes described the various phonological processes occurring in 3-4 year old bilingual children and also showed that the occurrence of phonological processes in bilingual children is less often than in monolingual children of the same age group. In order to build a normative data base for the development of phonological processes in bilingual children, further studies need to be carried out among different age groups and different languages. This building up a normative data would help Speech Language Pathologists to look at the deviant patterns of of phonological processes in language disordered population.

INTRODUCTION

Phonological processes are regularly occurring deviations from standard adult speech patterns, which may occur across a class of sounds, a syllable shape or syllable sequence. Phonological development implies the acquisition of a sound system intricately connected to the child's overall growth in language (Hodson & Paden, 1983). Phonological processes are the variations in the way phonemes are combined. The articulatory and phonological development range from the babbling stage of a child's so called pre-linguistic development to the near completion of the child's phonological system during the early school years.

The study of bilingualism in children is important for our understanding of language development. Research on bilingualism in children is also of clinical value. There is evidence that number of children who are acquiring a second language sequentially is increasing (Brice, 2002). Therefore, professionals working with these children need information as to what should be expected at different stages of development. This information is needed because identification of language learning difficulties is ultimately dependent on what is known about typical development. Most research in the area of phonological development in L2 learners has been conducted with adult speakers (Ioup & Weinberger, 1987; Major, 2001). Nevertheless, the last two decades have seen an increase in the study of phonology in children who are acquiring two languages (Goldstein & Washington, 2001; Holm & Dodd, 1999; Nair, 1991; Paradis, 2001; Yavas, 1995). Such studies have been conducted with two distinct populations. First, children who are acquiring two languages from birth (i.e. bilingual L1 acquisition). Second, children who are learning L2 after the basic phonological structure of the L1 has been established (i.e. child second language learners).

Although more than 40 different processes have been identified as occurring in child phonology, only a handful occur with any frequency. Those processes that commonly occur developmentally in normal children across language are called natural processes. Processes that never occur or occur rarely in normal child phonology are called unusual processes. Phonological processes provide a means for describing but not explaining the error patterns evident in young children's speech. The most common error patterns are grouped into three major categories; a) Processes that modify the syllable structure of the target word. b) Processes that substitute one sound for another c) processes that assimilate one sound to another. Nearly all the processes simplify the adult form in one way or the other. In many cases, simplification results in loss of phonemic contrast. The description is limited to those processes that have been reported to occur commonly in the speech of young children.

Some of the most common simplification patterns observed in developmental phonology (Shriberg & Kwiatkowski, 1980; Stampe, 1979) include either cluster reduction, final consonant deletion, final consonant devoicing, stopping, velar fronting, palatal front, liquid simplification, labial assimilation and weak syllable deletion. The data from the studies cited above, indicated that children acquiring a diverse number of languages exhibited similar simplification patterns. Although a number of simplification patterns were exhibited in many languages, sounds that substituted for the target sound varied greatly across languages. Examples of uncommon phonological patterns include unusual cluster reduction, initial consonant deletion, and liquid nasalization, frication of stops, backing, nasal gliding and delabialization.

Studies have examined the phonological patterns in normally developing bilingual children (Gildersleeve, Davis & Stubbe, 1996) and bilingual children with a suspected "speech disorder". Dodd, Holm & Wei, (1997) indicated that children in both groups exhibited patterns different from matched monolingual peers. These studies concluded that, compared with their monolingual peers, normally developing bilingual children and bilingual children with phonological disorders showed an overall lower intelligibility rating, more overall errors were seen (on both consonants and vowels), distorted more sounds and produced more uncommon error patterns. More specifically, bilingual children exhibited error patterns found in both languages (e.g., cluster

reduction) as well as those, like liquid gliding, that were typical in one language (English) but atypical in the other (Spanish) [Gildersleeve et al., 1996].

Duchar & Clark (1992) stated that a Spanish-English bilingual child, who studied languages between the ages of 1 year 7 months and 2 years 3 months, developed separate voicing systems for the two languages. Yavas (1995) studied the first 50 word period of his Portuguese/Turkish bilingual son, found avoidance patterns that were clearly language independent. For example, regardless of the language, words with initial fricatives or initial liquids were avoided. Such examples support an undifferentiated system that prefers less marked phonological patterning at the stage of development regardless of the language. Flege et.al (1992) has pursued the acquisition of phonology in second language learners who have begun learning the language at different ages. He concluded that the young language learner can create a new phonological category for the foreign sound irrespective of its relation to the known sounds in the first language.

Bruck & Genesee (1995) compared monolinguals & beginning bilinguals longitudinally from kindergarten to first grade on a variety of tasks. They found an advantage for the bilingual children on onset time segmentation in kindergarten but it disappeared in grade one. Bailystock (2001) says that phonology is a relatively transparent feature of spoken language that is, in terms of its structural significance and the fact that two spoken languages are based on different phonological structures may be irrelevant in building children's awareness of language.

A study by Campbell & Sais (1995) on Italian-English bilingual preschool children shows their competency was nearly equal in both the languages. In India, a study on simultaneous bilinguals was done by Chengappa & Thirumalai (1972) on a Kodava-Kannada bilingual child who shows that the vowel contrasts were similar in Kodava and Kannada. It was seen that there was mainly substitution and mixing of Kodava words with the Kannada word. Mala (2001) studied the development of phonological processes in 3-4 year old Tulu – Kannada normal bilingual children and concluded that bilinguals have fewer phonological processes in some patterns such as affrication, fronting, cluster reduction, initial consonant deletion , medial consonant deletion & stopping whereas monolingual had fewer phonological processes in other categories such as vowel unrounding , final consonant deletion and also found that some processes were not found in bilinguals and some were not seen in monolinguals.

In countries like India, children are often exposed to more than one or two languages. As evident from the review, there are no studies done which gives the normative information on development of phonological processes in normal bilingual children in Indian context. Hence, there is a need of the present study.

AIMS

- To study the development of phonological processes in typically developing 3-4 year Kannada- English bilingual children.
- To compare the obtained results with the reports of monolingual Kannada speaking children of the same age group.

METHODOLOGY

Subjects

Ten typically developing Kannada- English speaking bilingual children in the age range of 3-3.6 & 3.6 to 4 years, served as the subjects. Mother-tongue of the children was Kannada (L1) and the second language, English (L2). All children attended English Medium School for their kindergarten education, but the speaking language at home was Kannada. All children were exposed to English all the time at school by teachers and their peer group. Also children had a regular exposure to English programs on Television. All subjects were screened for the structural and functional integrity of the oral speech mechanism, hearing loss and only with those adequately functioning oral speech mechanisms were considered for the study.

Procedure

Spontaneous speech samples of ten minutes were collected in both the languages (L1 & L2). The tasks were; General conversation, which involved the topics such as Name of the child, his/her daily routines, hobbies of the child, about the parents occupation, about other family members of children and their friends. Articulation tests, Kannada Articulation Test (Ratna & Bettagiri, 1972) & Goldmann Fristoe Articulation Test (English) [Goldman & Fristoe, 1986] were administered. Story narration task was carried out in both L1 & L2, where the children were asked to narrate the story of their choice. Picture description tasks were given where the clinician used picture books and asked the child to describe what was happening in the presented picture. Clinician

showed some flash cards of lexical items and children were asked to identify it and express the target lexical items.

A quiet sound treated room was selected for recording purpose. The subjects were seated comfortably on the chair at a distance of 1 feet from the laptop placed on the table. Each child's speech was recorded individually using a standard laptop computer with inbuilt microphone with the help of the Praat voice recording and analysis software 5.1 Version (Boersma & Weenick, 2009). Sampling rate was 44100 Hz and quantization level set at 16 bits. The collected samples of ten minutes were transcribed and analyzed for the different phonological processes.

RESULTS:

Spontaneous speech samples obtained both in L1 & L2 was analyzed qualitatively for the various types of phonological processes and the frequency of their occurrence.

Table 1: Development of phonological processes in Kannada – English typically developing 3-4 year bilingual children

S.I no	Fr	CR	BkF	ICD	MCD	FCD	BkS	St	Af	A1A	Ep	DCA	VoU	MET
1	*	*			*		*		*		*		*	
2	*	*	*					*	*	*			*	
3	*	*		*		*					*			*
4	*	*		*								*		*
5	*	*		*		*								*
6	*	*		*		*			*					
7	*	*	*	*		*	*							
8	*	*				*					*			
9	*	*							*		*	*		
10	*	*				*			*					*

Note: **"*"** refers to the presence of disfluencies in each subject.

Af- affrication, Fr- fronting , CR-cluster reduction , FCD- final consonant deletion, VoU- vowel unrounding , St- stopping, BkF- backing of fricatives ,Ep-epenthesis, BkS- backing of stops, DCA- deaffrication, ICD- initial consonant deletion, MET-metathesis, MCD- medial consonant deletion, A1A- alveolar assimilation.

A total of 14 phonological processes have been identified to be occurring. The most commonly occurring processes were fronting, cluster reduction, Epenthesis, initial consonant deletion, affrication, metathesis and final consonant deletion. The least occurring processes were medial consonant deletion, backing of stops, alveolar assimilation, stopping & backing of fricatives, and vowel unrounding.

Medial consonant deletion, stopping and alveolar assimilation were the unique processes found only in one subject each. Also children expressed some words in Kannada only when the tasks were given in both the languages. For example, English words such as 'duck' and 'mouse' were used even in the L1 task, instead of using Kannada word. Similarly, the Kannada word 'Jinke' (Deer) is used in the English task.

The frequency of occurrence of different phonological processes were noted in the present study and were compared with the findings of Mala (2001) on Tulu-Kannada 3-4 year bilingual children and also with the findings of Sunil (1995) on monolingual Kannada speaking 3-4 year old children. Present study shows that most of the phonological processes were less often in bilingual children than in monolingual children of the same age group.

In order to compare the results of the present study (I.e. Kannada-English Bilingual children) with the previous findings in Tulu-Kannada Bilinguals and Kannada Monolinguals, statistical analysis procedure was carried out. One sample t-test was used to compare the results between Kannada-English Bilingual children with Tulu-Kannada Bilinguals and Kannada Monolinguals separately. Results are provided in the table below.

Table 2: Phonological processes compared between Monolingual & Bilingual children

Mean & Standard Deviation for Kannada-English Bilingual children			**T-VALUE**		**LEVEL OF SIGNIFICANCE**	
			t-value of comparison of KEB & TKB	**t-value of comparison of KEB & KM**		
Phonological Processes	**MEAN**	**S.D.**			**KEB-TKB**	**KEB-KM**
FR	4.5	1.95	6.41212845	5.65300997	S	S
CR	3.4	1.4	6.12621328	5.30791042	S	S
Af	1	0.94	3.15285585	1.14039467	S	NS
BKf	0.6	0.96	0.98198051	1.11291124	NS	NS
Bks	0.7	0.82	1.9205532	-	NS	--
ICD	0.9	1.28	1.22884788	0.14746175	NS	NS
MCD	1.1	0.73	4.02857143	1.28571429	S	NS
FCD	1.2	0.91	1.96150452	2.89063825	NS	S
St	0.4	0.69	1.08544084	0	NS	NS
DCA	0.3	0.48	-	1.76756491	---	NS
MET	0.7	0.94	1.66666667	-	NS	--
Ep	1.1	0.73	3	-	S	--
VoU	0.8	0.91	1.96150452	2.20239105	NS	NS

Note : Af- affrication, Fr- fronting , CR-cluster reduction, FCD- final consonant deletion, VoU- vowel unrounding , St- stopping, BkF- backing of fricatives ,Ep-epenthesis, BkS- backing of stops, DCA- deaffrication, ICD- initial consonant deletion, MET-metathesis, MCD- medial consonant deletion, A1A- alveolar assimilation.
S.D. – Standard Deviation , KEB- Kannada – English bilingual children, TKB- Tulu- Kannada bilingual children (Mala, 2001), KM - Kannada Monolingual Children (Sunil, 1995).

DISCUSSION

Results of the present study on commonly occurring phonological processes are in agreement with the study done by Stoel-Gammon (1985), Roberts & Foot (1990), Louke (1990) & Mala (2001). As the age advanced from 3 -4 years, Fronting, cluster reduction, initial consonant deletion and final consonant deletion persisted even at the age of 4 years because the clusters are acquired at a later age and also the acquisition of all phonemes is not complete by 4 years of age. As the age advances, the phonological process decreases because the acquisition of affricates and stops occur. Medial consonant deletion, stopping and alveolar assimilation were the unique processes found only in one subject each. There are no studies supporting this aspect.

Statistical results revealed that there was a significant difference seen in Kannada-English bilinguals and Tulu-Kannada bilinguals for fronting, cluster reduction, affrication, medial consonant deletion and epenthesis. Where as, for the same group, there were no significant differences seen for backing of fricatives, backing of stops, initial consonant deletion, final consonant deletion, stopping, metathesis and vowel unrounding. When Kannada-English bilinguals were compared with Kannada monolinguals, there was a significant difference seen in fronting, cluster reduction and final consonant deletion. There were no significant differences seen in affrication, medial consonant deletion, epenthesis, backing of fricatives, backing of stops, initial consonant deletion, stopping, metathesis and vowel unrounding.

Thus, present study shows that most of the phonological processes were less often in bilingual children than in monolingual children of the same age group. This supports the findings of Flege et.al (1992), Cambell &

Sias (1995), Bruck & Genesee (1995), Bailystock (2001) & Mala (2001) on monolingual & bilingual comparative studies, where the bilinguals performed better in the phonological tasks.

CONCLUSION

Hence, present study on development of phonological processes described the various phonological processes occurring in 3-4 year old bilingual children and also showed that the occurrence of phonological processes in bilingual children is less often than in monolingual children of the same age group. In order to build a normative data base for the development of phonological processes in bilingual children, further studies need to be carried out among different age groups and different languages. This building up a normative data would help Speech Language Pathologists to look at the deviant patterns of of phonological processes in language disordered population.

REFERENCES

Bialystok, E. (2001). Bilingualism in Development. York University. University Press, New York.

Bruck, M. & Genesee, F. (1995). Phonological awareness in young second language learners. Journal of child language, 22, 307-324.

Campbell, R. & Sais, E. (1995). Accelerated Metalinguistic (Phonological) awareness in bilingual children. British Journal of Developmental Psychology, 13, 61-68.

Dodd, B., Holm, A. & Wei, L. (1997). Speech disorder in preschool children exposed to Cantonese and English. Clinical Linguistic and Phonetics, 11(3), 229-243.

Duchar & Clark (1992). Bilingual Phonology, in M. Yavas. (Ed). Phonology Development and Disorders. 8, 193-232.

Flege, J. E. & Fletcher, K. L. (1992). Talker and Listener effects on degree of perceived foreign accent. Journal of the Acoustical Society of America, 91, 370-389.

Hodson, B. W. & Paden, E. P. (1983). Phonological processes which characterize unintelligible speech in early childhood. Journal of Speech and Hearing Disorders, 4, 369-373.

Mala (2001). Development of phonological processes in 3-4 years old Tulu-Kannada speaking Normal Bilingual Children. Unpublished Master's Dissertation, Mangalore University, Mangalore.

Shriberg, L. & Kwiatkowski, J. (1980). Natural Process Analysis (NPA). New York: John Wiley and Sons.

Stampe, D. (1979). A Dissertation on natural phonology. New York: Garland Publishing.

Stoel-Gammon, C. & Dunn, C. (1985). Normal and disordered phonology in children. Baltimore: University Park Press.

Sunil (1995). Development of Phonological Processes in 3-4 year old Kannada speaking Normal Children. Unpublished Master's Dissertation, Mangalore University, Mangalore.

Yavas, M. (1995). Bilingual Phonology. Phonology Development and Disorders, 8, 193- 232.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar