

## Emergence of Syllabic Patterns in Babbling

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**Language in India** [www.languageinindia.com](http://www.languageinindia.com) ISSN 1930-2940 Vol. 13:9 September 2013  
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### Abstract

Acquisition of speech sounds during child's development refers to the gradual mastery of speech sounds within a given language. During the initial stages of the infant's life, the vocalizations produced are highly varied from the well formed adult speech. The study aims to investigate the appearances of speech patterns during early vocalizations at the pre linguistic period. The participants included in the study comprise of 8 infants, two boys and two girls each in the age range 4-6months and 10-12months. The participants were selected from native Malayalam speaking families. An informed consent was obtained from parents/ caregivers for the participation of the children. The researcher carried out the audio recording of the babbling utterances. Analyses of the sample were carried out using IPA transcriptions. The data obtained was classified as singleton vowels and consonants, bisyllabic and multisyllabic utterances containing strings of vowels, variegated and reduplicated multisyllabic utterances. The numbers of utterances were higher and varied in the 10-12 month age group compared to 4-6 month age group. Statistical significance was not attained because of the large variations among the individual participants.

**Keywords:** Babbling, Syllable shapes, ambient language

### Introduction

The study of human infant vocal behaviour has grown substantially in recent years and much is now known about the acquisition of speech and language in the early years of life. According to this theoretical notion, babbling is a random series of vocalizations in which many different sounds are produced with no apparent order or consistency. On the emergence of syllable shapes on early vocal utterances, infants begin to utter longer patterns of speech sounds as they grow. Reduplication of CV syllables occurs initially during the babbling stages. At the later stages of babbling, around 10-12 months, combination of speech sound patterns become elaborate and variegated.

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## **A Brief Review**

Onset of babbling is distinct with the appearance of syllabic productions with varied combinations of vowels and consonants. In a typical utterance, consonants and vowels rarely appear in isolation but are produced serially. Acoustic studies of early babbling have provided support for the idea of a predominance of mandibular over lingual movement in early canonical babbling (McNielage & Davis, 1995).

The combination of consonant-and vowel-like sounds is said to begin during 4 to 6 months. During the later babbling period, open syllables or syllables ending in a vowel are the most frequently occurring syllable shapes (Bauman-Waengler, 2000). Kent and Bauer's (1985) study revealed that V, CV, VCV and CVCV syllable structures accounted for approximately 94% of all the syllables produced at the end of babbling period. They also emphasized that closed syllables were found to be very limited in the repertoire of the infant at this stage of development.

Rank ordering of multiple syllable structures were also carried out, Stoel-Gammon's (1989) study with ten infants at four month intervals from 6-18 months of age showed the following rank orderings: reduplication, place variegation, and manner variegation at 6-9 and 10-13 months; place variegation, manner variegation and reduplication at 14-17 months. Whereas, Mitchell and Kent (1990) found multi syllables in rank order as reduplication, manner changes, mixed place and manner changes and lastly place changes at 7, 9, and 11 months.

Researchers have supported the fact that babbling is a predictor of language complexity as well as an indicator of language delay. Number of studies has indicated a correlation between complexity and amount of babbling with later language proficiency (Camp, Burgess, Morgan, & Zerbe, 1987; Stoel- Gammon, 1989; Whitehurst, Smith, Fischel, Arnold, & Lonigan, 1991; Thal, Oroz, & McCaw, 1995; Mirak & Rescorla, 1998).

Reduced/delayed babbling or an abnormal vocalization development might be related to an abnormal spoken language development. Jensen, Boggild- Andersen, Schmidt, Ankerhus and Hansen (1988) studied the development of infants who were at risk for a developmental delay (low birth weight, low Apgar score, neonatal cerebral symptoms) and compared them to infants not at risk. The infants at risk produced significantly fewer

consonant-like segments and less reduplicated babbling than children not at risk. A larger proportion of the children at risk also scored below age level on a language test. Hence, Oller, Eilers, Neal and Cobo-Lewis (1998) argue that a late babbling onset might possibly function as an early marker of abnormal development. Westermann and Miranda (2004) support these findings by indicating there is growing evidence that the pre-linguistic stage significantly influences the later development of phonological skills in children. The review of literature suggests that babbling is a predictor of later language complexity as well as language delay.

## **Indian Studies**

There are limited reported studies in the Indian context on the emergence of syllabic productions in the early phonetic repertoire other than Kannada. It is an established fact that early vocalizations have an effect of the adult ambient language (De Boysson –Bardies et., al 1989; Mattock, Rvachew, Alhaidary & Polka, 2008). India being a multilingual country, there is a need to study the emergence of early syllabic productions in other major Indian languages also. There is no reported literature on the phonetic characteristics of babbling in Malayalam hence the present study was taken up. The purpose of the study was to determine the patterns of syllabic productions in babbling for infants from Malayalam babbling families.

In the Indian context, a cross linguistic study in Hindi and Kannada was carried out by Shyamala and Basanti (2003). They reported that five vowels /i/, /e/, /a/, /u/ and /o/ in Kannada made their appearance during 6-12 months. In Hindi, only four vowels (/i/, /e/, /a/ and /u/) including their longer counterparts were seen. For consonants, the Kannada group had twelve consonants in their phonetic repertoire with higher frequency of stops and nasals. However, the Hindi group had fifteen consonants with additional sounds /t/, /s/ and /r/. The differences in phonetic repertoire across languages, as early as in the babbling stage were evident in this study. However, the syllable shapes were not studied in detail.

In Kannada, the predominant syllable shapes on 30 babbling infants, found by Anjana and Sreedevi (2008) were V, C, CV, CVC, VC and VCV. The singleton vowel utterances were more frequent in the younger age group and declined from 9-10 months. CV patterns were highest in 6-7 month age group and closed syllables like VC and CVC occurrences were rare across all the age groups; VCV syllables predominated in the higher age group, associating with the fact that open ended syllables are frequent in Kannada (Hiremath, 1980).

Reduplicated babbles were predominant from the age of 6-9 months. The variegated babbles made their first appearance at 8-9 months. In the 10-11 month group, for multi syllable productions place variations occurred more frequently. A combination of place and manner variations occurred more frequently in 11-12 month age group. The differences in these findings with other languages like English (Stoel-Gammon, 1989; Mitchell & Kent 1990) which has predominant manner variations is because of the differences in the linguistic structure of the two languages.

## **Method**

### **Participants and Inclusion criteria**

Eight typically developing infants were audio recorded from native Malayalam speaking families, two boys and two girls at 4-6 months and at 10-12 months. Malayalam belongs to the Dravidian family of four major languages with a rich literacy tradition.

According to 2011 census, Malayalam is spoken by 33,066,392 people, primarily in the state of Kerala. <http://www.lmp.ucla.edu> An informed consent was obtained from the caretakers/ parents for the participation of the children in the study. Care was taken to ensure that the participants had normal development and had not been exposed to any other languages. Participants were identified from native Malayalam speaking families and were assessed using the Developmental Screening Checklist (Swapna, Jayaram, Prema, & Geetha, 2010) for receptive and expressive communication skills, auditory, motor and cognitive skills. It was mandatory that both the parents were educated up to a minimum of 10<sup>th</sup> grade. The proficiency of the native language of the parents was assessed using the Language Proficiency Questionnaire: An adaptation of LEAP-Q in the Indian context by Ramya Maitreyee and Goswami (2009).

### **Measures Considered in the Study**

Based on transcription of the babbling data, the types and frequency of syllable shapes and the frequency of reduplicated and variegated utterances were calculated.

**Procedure:** Audio recordings were carried out by the investigator in a fairly quiet room with minimal distractions at the respective homes of the participants. Vocalization samples were recorded when the child was fed and in a comfort state. Parents were asked to

interact naturally with the child. No additional play materials were introduced into the environment to capture the infants' typical vocalizations in familiar surroundings. The infant was stimulated more with toys and facial expressions than verbal utterances to avoid verbal imitation. Sony M55 audio recorder was utilized for recording each participant's vocalizations. All the recordings were transferred to a computer and were analyzed using the VLC media player software.

**Data analysis:** The recorded samples were transcribed by the primary investigator using broad and narrow International Phonetic Alphabet (2005). Sounds such as grunts, gurgles, laughs, shrieks and whisper, etc. were excluded from transcription. A criterion for the transcribed sample was utilized, to consider a phone/ syllable to be present in the infants' vocalizations. It is known that the complexity and frequency of vocal utterances will increase with age. Hence even a one-time production of a vowel/consonant/syllable shape was considered as to be present in the infants' productions at 4-6 months whereas three or more productions of a vowel/consonant/syllable shape was considered to be present in the infants' productions at 10-12 months. After identifying the phones/ syllables, the types of syllable shapes and their frequency of occurrence were calculated. Later the syllable shapes were rank ordered in an ascending order. From the multisyllabic utterances, reduplicated and variegated babbling utterances were identified and their frequency of occurrence was obtained. Inter and intra transcriber reliability was calculated for 10% sample of each participant. Cronbach's alpha co-efficient for inter and intra transcriber reliability was 0.8 for 10% of the sample analyzed for each individual participant.

## **Results and Discussion**

The aim of the current study was to determine the patterns of syllabic productions in babbling of infants from native Malayalam speaking families. The measures considered in the study were the types and the frequency of syllable shapes and the frequency of reduplicated and variegated utterances. From the transcribed samples, the number and type of syllable patterns for the age groups 4-6 months and 10-12 months age groups were obtained and are depicted in Table 1.

Table 1

Number and frequency of various syllable shapes across the two age groups

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Ms. Reeny Roy and Dr. N. Sreedevi

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SYLLABIC PATTERNS	AGE GROUPS	
	4-6 MONTHS	10-12 MONTHS
Singleton Vowels	9	9
Singleton Consonants	-	2
Diphthongs (VV)	12	6
CV	12	26
VC	2	1
CVC	2	-
VCV	11	18
CVV	-	6
VVV	2	4
CVCV	-	14
VCCV	2	-
String of vowels (> 3)	-	3
String of consonants (nasalized bilabials)	-	4
Multisyllables (> 4 phonemes)	-	40
Reduplicated utterances	-	18
Variegated utterances	-	22

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indicates not present.

Table 1 shows the syllabic patterns produced by the participants in both the age groups. The singleton vowel types were /a/, /æ/, /æ:/, /ə/, /ə:/ /ε/and /ε:/ which were predominantly present in both the age groups. All the vowels seen in the study were low vowels which can be related to the acoustic studies of early babbling which have provided support for the idea of a predominance of mandibular over lingual movement in early canonical babbling (McNielage & Davis, 1995). Singleton consonants were /m/ and /mm:/ which were consistently produced by the 10-12 month age group.

Diphthongs were frequent in the 4-6 month age group but decreased to half its frequency in at 10-12 months. The CV syllable structures were significantly higher in the 10-12 month age group compared to the 4-6 month age group. The VC structures were limited in occurrence in both the age groups. CVC pattern was present in the 4-6 month age group but did not make its appearance at 10-12 months indicating a preference for open syllable utterances. This finding is similar to the study by Anjana and Sreedevi (2008) in which the CVC syllables were present from 6-9 months, but were not seen during 10-12 months.

The VCV syllabic structures were frequently produced by both the age groups. The VVV structure increased to almost twice the number in frequency in the 10-12 month age group. These findings correlated with earlier studies (Bauman-Waengler, 2000; Anjana &

Sreedevi , 2008) that during the later babbling period, open syllables or syllables ending in a vowel are the most frequently occurring syllable shapes. The findings are also similar to Kent and Bauer's (1985) study which emphasized that closed syllables were found to be very limited in the repertoire of the infant at this stage of development.

Multisyllables CVCV, VCCV, strings of vowels (greater than three), strings of consonants (greater than three) increased in frequency at 10-12 months compared to the 4-6 month age group which had a predominance of VCCV syllabic production. In the present study, as expected at 4-6 months, reduplicated and variegated utterances were not present. However, in the 10-12 month period both type of utterances were present with higher frequency of occurrence of reduplicated babbling which is in consonance with Anjana and Sreedevi (2008).

To summarise, the results suggest no significant difference between boys and girls across both the age groups 4-6 months and 10-12 months. The study also shows the predominant production of VCV structure in the early pre- linguistic period in Malayalam. As age increases it is observed that there is a high production of multisyllabic patterns that reflect the ambient language of the adult ( Anjana & Sreedevi, 2008; De Boysson –Bardies et.,al 1989; Mattock, Rvachew, Alhaidary & Polka, 2008). Less number of participants was taken up in the study which indicated a major statistical drawback; hence the paper does not reveal any statistical procedure. However, for future research, the study could utilize a larger sample size for which a wider variety of production patterns could be obtained and appropriate statistical procedures could be incorporated.

The study would augment the understanding of phonological development during the pre- linguistic period in Malayalam. There is limited number of studies on the emergence of syllabic patterns in early infancy in Indian languages. This is one of the first attempts to investigate the emergence of syllabic patterns in Malayalam, one of the major Dravidian languages in the Indian subcontinent. The findings obtained will be vastly relevant in clinical practices of communication disorders.

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**Language in India** [www.languageinindia.com](http://www.languageinindia.com) ISSN 1930-2940 **13:9 September 2013**

Ms. Reeny Roy and Dr. N. Sreedevi

Emergence of Syllabic Patterns in Babbling



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### **Acknowledgement**

I would like to thank the Director, All India Institute of Speech and Hearing, Mysore and my co- author Dr. N. Sreedevi. I am thankful to Dr. Vasanthalakshmi, Lecturer in Bio-statistics for her guidance. My sincere thanks to Mr. Sampath Kumar for his motivation and kind guidance. A heartfelt gratitude to the families for their consent in carrying out the recordings of their children.

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