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Word List in Tulu Language to Assess Speech Production Skills in 3-8 Year Old Tulu Speaking Children – A Preliminary Study

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Abstract

In a multi-lingual country like India where every language has its own phonological system, there is a need for language specific articulation test. Although in recent times there has been increasing awareness among parents for early intervention in children with articulation problems within the regional areas of the nation, the availability of articulation tests in the regional languages is very limited. The present study makes a preliminary attempt at developing an assessment tool to assess the articulatory skills of Tulu speaking children, who form a significant population in South India. Word list was developed based on familiarity rating and was administered on 50 children, aged 3-8 years. The target speech sounds were embedded in words which were presented in picture form to elicit responses from the participants. The responses were analysed qualitatively and in terms of production accuracy across age groups.

Key words: Tulu, articulation, children, preliminary study

Introduction

Among the communication disorders that are assessed and managed by Speech - Language Pathologists, articulation impairment is a common type of speech production problem seen in young children. It is defined as "Atypical production of speech sounds...that may interfere with intelligibility" (ASHA, 1993). Although in India, the prevalence of articulation impairment as a disorder by itself is not very clear, systemic review commissioned by the National Health Service Centre for Reviews and Dissemination at the University of York on behalf of the National Health Technology Assessment Programme of the NHS in the UK estimated its prevalence to be roughly ranging from 2-25% in children aged 5-7 years. (Law, Boyle, Harris, Harkness, & Nye, 2000). When articulation impairment which is organic or

functional in nature is not intervened early, it can have detrimental effects on a child's social, educational and emotional life. It is reported that individuals with deviant articulation or phonology are victims of unfavourable comments, teasing, ostracism, exclusion, labelling and frustration (Van Riper & Erickson, 1996). This signifies the importance and need of the articulation tests that can aid in the early assessment and management of children with articulation problems. "An articulation test is an evaluation which yields information about the nature, number and characteristics of articulatory errors as they occur in a person's speech" (Nicolosi, Harryman & Kresheck, 1996). Although Articulation tests are available in western countries, they cannot be directly administered on Indian children as the population in which they were developed and standardized is different. Since India is a multi- lingual country, there is a need for language specific articulation test, as every language has its own phonological system. Given India's multi-dialect, multi-lingual and multi-cultural background, attempts have been made at developing articulation tests in picture form in India's official state languages like Tamil (Usha, 1986), Telugu (Padmaja, 1988), Bengali (Banik, 1988), Hindi (Pandit, 1989), Malayalam (Manoj, 1998) and Kannada (Babu, Rathna & Bettagere, 1972) by eliciting responses from children aged between 2-8 years. All these tests have established norms for age of acquisition by using a cut off criteria to judge the sounds as acquired. Given the present scenario of increasing awareness in parents for early intervention of children with articulation problems within the regional areas, literature is very scarce with articulation test in local languages being developed only in Konkani (D'Souza, 2001) and Coorgi (Somanna, 2007) languages.

Due to the paucity of literature in the area of development of articulation assessment tool in languages spoken by minority groups of the nation, the present study is carried out that looks at developing an articulation test in one of the important regional languages of South India called *'Tulu'*, spoken by people living in Southern Karnataka (previously known as South Canara District/ Dakshin Kannada) and in the northern part of Kasargod District of Kerala. It is a Southern branch of the Dravidian language family (Krishnamurti 2003), spoken by approximately 3 million people. Although it is a regional language, it is spoken by a significant number of people and any test to assess articulatory skills in Tulu speaking children suspected of articulatory delay/deviation is still unavailable. Hence the current study aims to develop a word list that quickly and reliably interprets articulatory errors in Tulu speaking children.

Method

Aim

- Identification of commonly used vowels and consonants in Tulu language
- Developing word list with target vowels and consonants
- Obtaining performance on the word-list by Tulu speaking children from each of the age groups: 3-4 years, 4-5 years, 5-6 years, 6-7 years and 7-8 years

Participants

50 native Tulu speaking children aged 3-8 years, grouped as 3-4, 4-5, 5-6, 6-7 and 7-8 years, with 5 males and 5 females in each group were considered for the study. Male to female ratio was maintained as 1:1. Table 1 below shows the total number of children and their age ranges. Letter of permission requesting consent for data collection was addressed to the school principal and the data collection commenced only after the permission was granted. It was clearly mentioned in the permission letter that the data would be used solely for research purposes. All children were from middle class socio-economic status and both parents of the children spoke Tulu at home. The children were screened for presence of oro-motor structural abnormalities and age appropriate receptive and expressive language skills and cognitive skills. Slow learners, as per reports from teachers were excluded from the study.

Groups	Age range (years)	No. of Participants	Mean Age (years)	SD
A	3-4	10	3.4	0.13
B	4-5	10	4.4	0.15
C	5-6	10	5.5	0.12
D	6-7	10	6.4	0.16
E	7-8	10	7.3	0.18

Table 1: Mean age and standard deviation for 5 groups children

Stimuli Preparation

Identification of commonly used Vowels and consonants in Tulu language: Vowels and consonants commonly used in Tulu language were identified using Tulu dictionary by Upadhyaya (2000). Vowels identified were: /ə/, /ə:/, /a/, /a:/, /i/, /i:/, /u/, /u:/, /ɽ/, /ɛ/, /ɛ:/, /e/, /e:/,

/o/, and /o:/ And consonants identified were: /g/, /gʰ/, /k/, /kʰ/, /ʈ/, /ʈʰ/, /ɻ/, /ɻʰ/, /ɖ/, /ɖʰ/, /ɖ̤/, /ɖ̤ʰ/, /p/, /pʰ/, /b/, /bʰ/, /dʒ/, /dʒʰ/, /tʃ/, /tʃʰ/, /j/, /r/, /ɭ/, /w/, /ʃ/, /s/, /h/, /l/, /ŋ/, /ɳ/, /ɲ/, /ʂ/, /ɳ̤/ and /m/. The place and manner of articulation for the consonants is shown in Table 2 and the description of vowel production is shown in table 3 below. This information is borrowed from the book titled *Tulu Lexicon*, an authentic work by Upadhyaya (2000) on Tulu vocabulary.

	Unaspirated Stop		Aspirated Stop		Nasals	Semi vowel	Trill	Lateral	Sibiliant	Fricative	Aspirated affricative		Unaspirated affricative	
	+v	-v	+v	-v							+v	-v	+v	-v
Velar	g	k	gʰ	kʰ	ŋ									
Retroflex	ɖ	ʈ	ɖʰ	ʈʰ	ɳ			ɭ	ʂ					
palatal					ɲ	j					dʒʰ	tʃʰ	dʒ	tʃ
dental					n̪						d̪ʰ	t̪ʰ	d̪	t̪
labial					m	w					bʰ	pʰ	b	p
alveolar							r	L	s					
Palato - alveolar									ʃ					
glottal										h				

Table 2: Place and manner for the articulation of the Tulu consonants. Source: Upadhyaya (2000) ('+ v' indicates voiced phoneme, '- v' indicates unvoiced phoneme)

Vowel description	Vowels
High mid central short unrounded	ɘ
High mid central long unrounded	ɘ:
Low front short unrounded	A
Low front long unrounded	a:
High front short unrounded	I

High front long unrounded	i:
High back short rounded	U
High back long rounded	u:
Dental/alveolar	ɽ
Lower mid front short unrounded	ɛ
Lower mid front long unrounded	ɛ:
Higher mid front short unrounded	E
Higher mid front long unrounded	e:
Higher mid back short rounded	O
Higher mid back long rounded	o:

Table 3: Description of Tulu vowel production. Source: Upadhyaya (2000)

***Developing word list with target vowels and consonants*:** Most commonly used words by urban speakers in Tulu language were identified. This list was based on words that were reported by parents as commonly used by their children who were in the age range of 3-8 years and also based on the books available in schools attended by children in this age range. Maximum of 3 words were considered as commonly used words for each of the target sounds (consonant and vowel) in each position (initial, medial and final positions). Only those words were selected that existed in the vocabulary list of the book titled *Tulu Lexicon* by Upadhyaya (2000), and that which could be presented in picture form and were non-ambiguous. This list was given to 5 middle class adult Tulu speakers for familiarity rating who were asked to rate the words as unfamiliar, familiar and highly familiar. Among the 3 words in each position, the words rated as highly familiar by more than 50% of the subjects were considered for the study. After familiarity rating, 69 words were selected with 10 target vowels and 20 target consonants in different position of the word.

Out of the total 15 vowels that were initially listed, 10 vowels were selected to be used in the initial, medial and final positions, except for /ə/, /ə:/, /e/, /e:/ and /u:/. The target vowels selected in different positions of the words are given in table 4 below.

Vowels	Position of target vowel the word	Words with target vowe	English equivalent terminologies
/a/	Initial	/aŋgi/	Dress
	Medial	/kai/	Hand
/a:/	Initial	/a:n̪ɛ/	Elephant
	Medial	/baŋga:r/	Gold
/i/	Initial	/ili/	Mouse
	Medial	/pili/	Tiger
	Final	/ambi/	Dung
/i:/	Initial	/i:ʃwrɛ/	Deity
	Medial	/mi:n̪/	Fish
/u/	Initial	/umil/	Mosquito
	Medial	/putʃɛ/	Cat
/ɛ/	Medial	/ʈʰɛt̪i/	Egg
/ɛ:/	Medial	/mɛdz/	Table
/o/	Medial	/koɖɛ/	Umbrella
/o:/	Initial	/o:ɳi/	Lane
/ɾ/	Initial	/ɾʃi/	Sage

Table 4: Target vowels and words selected based on non-ambiguity and that which could be depicted in picture form

Out of the initially listed 34 consonants, 20 consonants were selected to be used in the initial, medial and final positions except for /gʰ/, /kʰ/, /ʈʰ/, /t̪ʰ/, /ɖʰ/, /d̪ʰ/, /pʰ, /bʰ, /dʒʰ, /tʃʰ/, /w/, /h/, /ɲ/ and /ʂ/. This is shown in table 5 below. Pictures corresponding to the word list were also selected.

Consonant	Position of target consonant in the word	Words with target consonants	English equivalent terminologies
/p/	Initial	/pu:/	Flower
	Medial	/tʃəpa:ti/	Indian bread
	Final	/ʈo:pi/	Cap
/tʃ/	Initial	/tʃəpa:ti/	Indian bread
	Medial	/bartʃɳɛ/	Comb
	Final	/putʃʼɛ/	Cat
/l/	Initial	/la:də/	Laddoo
	Medial	/na:la:i/	Tongue
	Final	/pal'i/	Lizard
/d̪/	Initial	/d̪uɖu/	Money
	Medial	/maɖd̪imɛ/	Marriage
	Final	/paɾɳɖə/	Banana
/b/	Initial	/ba:dzi/	Dish
	Medial	/sa:bu:n̪ə/	Soap
	Final	/kəɾmbu/	Sugarcane
/r/	Initial	/rail/	Train
	Medial	/birɛl/	Finger
	Final	/kat'ɛri/	Scissor
/m/	Initial	/maŋgɛ/	Monkey
	Medial	/ima:n̪a/	Airplane
	Final	/bim'a/	Lips
/s/	Initial	/sa:bu:n̪ə/	Soap
	Medial	/kɛsər/	Dirt
	Final	/mi:sɛ/	Moustache
/g/	Initial	/go:ŋi/	Sack
	Medial	/ugur/	Nail
	Final	/maŋgɛ/	Monkey

/k/	Initial	/kap'ɛ/	Frog
	Medial	/saikəl/	Cycle
	Final	/kuk'u/	Mango
/dz/	Initial	/dzɛdɛ/	Braid
	Medial	/kudzəl/	Hair
	Final	/oɲdzi/	One
/ʈ/	Initial	/ ʈo:pi/	Cap
	Medial	/paʈa:ki/	Fire cracker
	Final	/ ʈuʈi/	Lips
/ʈ̪/	Initial	/ʈ̪ʰɛ ʈ̪i/	Egg
	Medial	/kaʈ̪'ɛri/	Scissor
	Final	/pɛʈ̪'a/	Cow
/ɖ/	Initial	/ɖab'i/	Box
	Medial	maɖikɛ/	Earthen Pot
	Final	/koɖɛ/	Umbrella
/n̪/	Initial	/n̪a:ji/	Dog
	Medial	/boɳɖa/	Tender coconut
	Final	/a:n̪ɛ/	Elephant
/j/	Initial	/jɛ:ɳi/	Ladder
	Final	/n̪a:ji/	Dog
/ɳ/	Medial	/maɳo:li/	Ivy Gourd
	Final	/kaɳ'/	Eye
/ɭ/	Final	/kuɭ'i/	Short
/ʃ/	Initial	/ʃaŋka/	Conch shell
	Final	/ṛʃi/	Sage
/ŋ/	Medial	/aŋgi/	Dress

Table 5: Target consonants and words selected based on non-ambiguity and that which could be depicted in picture form

Procedure

Test was carried out in a silent room away from external disturbances to keep children focussed on the task. Children were instructed to name pictures corresponding to the word list one after the other that were presented on the computer screen. In case the child failed to label the picture, initial phoneme cue was provided. If no response on phoneme cue was obtained syllable cue followed by question cue and modelling of the word was done. Verbal reinforcement ‘’good’’ was provided intermittently after correct responses. In order to obtain an estimate of norm, percentage of words produced correctly by each of the 10 subjects was calculated by dividing the number of words produced correctly (each correct word free of any error was given a score of 1) by the total number of words presented and multiplying it by 100. Following this, percentage of words produced correctly is averaged across 10 subjects in each age group.

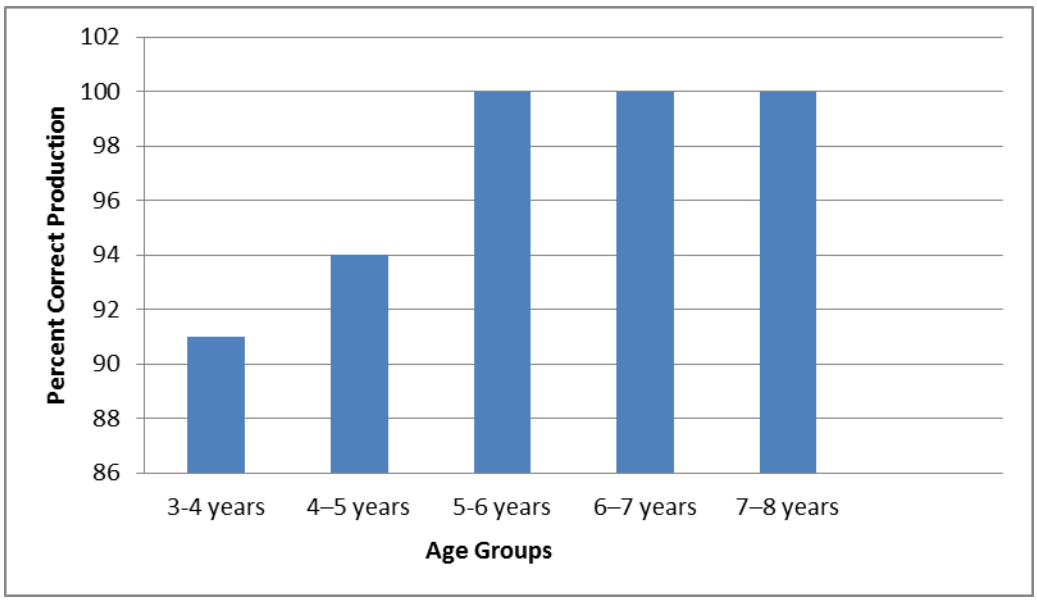
Results

Out of the total words that were selected with 10 target vowels and 20 target consonants in different positions of the word, those words that required modelling of its production by the examiner are listed below in table 6. Articulation errors consisted of substitution, omission and distortion errors with most common being the omission errors, hence no sub classification of the inaccurate production is made in the present study.

/i:/	Initial	/i:ʃwrɛ/	Deity
/o:/	Initial	/o:ɳi/	Lane
/ɾ/	Initial	/ɾʃi/	Sage
/b/	Initial	/ba:dzi/	Dish
	Final	/kəɾmbu/	Sugarcane
/m/	Final	/bim'a/	Lips
/ɖ/	Medial	/maɖikɛ/	Earthen pot
/j/	Initial	/jɛ:ɳi/	Ladder
/ɳ/	Medial	/maɳo:li/	Ivy Gourd
/ɭ/	Final	/kuɭ'i/	Short
/ʃ/	Initial	/ʃaŋka/	Conch shell

Table 6 : words requiring modelling to elicit response

Percentage errors on production of words decreased as age increased. This is shown in Graph 1 below. 3-4 age group's average percentage of words produced correctly by 10 subjects was 90.96% (1 SD = 3.69, Std. Error=1.16); 94.02% (1 SD = 4.05, Std. Error=1.28) in 4-5 age group and 100% in the age groups of 5-6, 6-7 and 7-8.



Graph 1: Average percentage of words produced correctly by 10 subjects in each age group

Discussion

/ʃ/ in the initial and final positions in the words /ʃaŋka/ (Conch shell) and /r̥ʃi/ (Sage) respectively; and /i:/ in the initial position of the word /i:ʃwrɛ/ (Deity) are the words that are often used in the context of Hindu religion, religious ceremonies and mythologies, so these words could not be spontaneously elicited from all children without modelling. /ɭ/ in the final position of the word /kuɭi/ (Short) is an adjective describing height of a person, which could be depicted in picture form, but required question cues and word production modelling to bring about the labelling response. This could be attributed to lack of this adjective use among children or ambiguity of the picture. Similarly /j/ in the initial position in the word /jɛ:ɳi/ (Ladder), /b/ in the initial and final position of the word /ba:dzi/ (Dish) and /kəṛmbu/ (Sugarcane) respectively, /ɖ/ in the medial position in the word /maɖikɛ/ (Earthen pot), and /ɳ/ in the medial position of the word /maɳo:li/ (Ivy Gourd) were not familiar among all the children, possibly due to lack of exposure to these words within the household. /o:/ in the initial position in the word /o:ɳi/ (Lane)

and /m/ in the final position of the word /bim'a/ (Lips) were produced with alternate names, hence they can be considered as ambiguous words in the study.

From Graph 1, it can be seen that with increasing age, the percentage of errors decreased and scores improved suggesting that some sounds are mastered earlier than others. By 5–6 years children were able to produce all the words from the word list without error indicating that the articulation development was complete by this age. The detection of the inability to produce the words until 5 years and ability to produce whole range of vowels and consonants beyond 5 years appears to validate the word list used in the present study.

Conclusion

The present study was carried out to fulfil the need for addressing the articulatory skill assessment issues in young children residing in regional area of India. The study has made a preliminary attempt at developing a list of words that can be used to assess the articulatory skills in Tulu speaking children who form a significant population in southern part of Karnataka and northern part of Kerala state of South India. The word list developed can be used as a testing tool in Tulu speaking children aged 3-8 years. The use of the words that require modelling to elicit naming response might result in slightly longer testing duration, but these words can still be considered given the ease in representing the words in picture form.

Limitations: All commonly used sounds in day to day life of Tulu speakers were included in the study except for seldom used vowels and rarely used consonants such as the aspirated consonants. Attempts were made to include commonly used speech sounds in all positions of the word, but this was limited due to the inability to depict them in picture form and their ambiguity. Standardisation of the test with establishment of age norms would be the future direction for the present study.

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