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## WORDLIST IN NEPALI TO ASSESS ARTICULATORY ERRORS.

### ABSTRACT

The present study was designed to develop a wordlist which can be used as a screening tool to identify articulatory errors in children aged 3 and above. Total of 40 children participated in the study that was further divided into four groups with 10 children in each age group as 3 to 3.11, 4 to 4.11, 5 to 5.11 and 6 to 6.11 years. The participants of this study were included based on normal oral-motor examination, native Nepali speakers and without complaint of other otological disorders as hearing loss and ear discharge. Wordlist was developed with picturable words within the vocabulary of typically developing 3 to 5 years old children. The words contained target phonemes in three positions as initial, medial and final position. Pictures were shown to the children and response was recorded, which was further transcribed into broad IPA (International Phonetic Alphabets) and analyzed to understand the phonological acquisition across different age group.

**Keywords:** Acquisition, Articulation Nepali, Phonemes, Picture, Wordlist

### INTRODUCTION

Communication disorder is an inability or impairment in receiving, comprehending the messages (person's wants, needs, thoughts, feeling and knowledge) verbally, non-verbally and graphically, which can be due to various reasons.<sup>1</sup> Diagnostic and Statistical Manual for Mental disorders (DSM)-IV recognizes three types of communication disorders as expressive, mixed receptive-expressive and phonologic & stuttering disorders.<sup>2</sup>

One of the most common communication disorders in children is articulation disorder, which not only has impacts on psychosocial aspect but also in academics. An articulation disorder is a condition when individual cannot produce correctly articulated speech sound due to faulty placement, timing, direction, speed, pressure or integration of the articulators as lips, tongue, velum and mandible<sup>1</sup>. This results in interference in intelligibility of speech with atypical production.<sup>3</sup> The prevalence of articulation impairment as estimated by a 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 Program of the NHS in the UK estimated its prevalence to be roughly ranging from 2-25% in children aged 5-7 years.<sup>4</sup> The prevalence of speech sound disorder in primary school in

Australia is 1.06% and higher prevalence is seen in male than in female.<sup>5</sup> Structural defects that disrupt a child's ability to speak clearly occur in approximately 1 out of every 700 children.<sup>6</sup>

A person is said to have an articulation problem when he or she produces sounds, syllables or words incorrectly so that listeners do not understand what is being said. An articulation problem sometimes sounds like baby talk because young children do normally mispronounce sounds, syllables, and words. Articulatory errors can be categorized as:

- Omissions: Certain sounds are not produced - entire syllables or classes of sounds may be deleted; e.g., fi' for fish or 'at for cat.
- Additions (or Commissions): an extra sound or sounds are added to the intended word.
- Distortions: Sounds are changed slightly so that the intended sound may be recognized but sounds "wrong," or may not sound like any sound in the language. The best known example of a distortion is the lisp.
- Substitutions: One or more sounds are substituted for another; e.g., wabbit for rabbit or tow for cow.

Blood et al reported that the stigmatization associated with speech disorders may influence self-esteem, as individuals with speech disorders often experience depression, social isolation, and poorer performance on academics and

standardized tests.<sup>7</sup> Trapp noted that children with articulation disorders have anxiety levels that correspond with the level of severity of their articulation disorder.<sup>8</sup>

Approximately 92% of speech language pathologist report of serving articulation disorder in public school.<sup>9</sup> Hence, the speech language pathologist should be in position to differentiate the normal population from abnormal group. This can be achieved through the administration of appropriate articulation test.

An articulation test is an evaluation that yields information about the nature, number and characteristics of articulatory errors as they occur in a person's speech which helps in locating the causative factors and also studying phonological development.<sup>10</sup> These are tests used to identify the articulation errors in a relatively quick and systematic fashion.<sup>11</sup>

However, there are different types of articulation tests, based on the type of assessment. Types of articulation test can be classified as screening articulation test, diagnostic articulation test, deep test of articulation, and predictive screening test of articulation.

Some of the currently available Western - Standardized screening published instruments from which speech language pathologist can choose are:

- Denver Articulation Screening Test<sup>12</sup>
- Articulation testing in Hindi<sup>13</sup>
- Predictive Screening Test Articulation Test<sup>14</sup>
- Deep Test of Articulation for Pressure consonants in Kannada<sup>15</sup>
- Quick Screen of Phonology<sup>16</sup>
- Templin Darley Screening Test<sup>17</sup>
- Test of Minimal Articulation Competence (Secord, 1981)
- Fluharty Preschool Speech & Language Screening Test<sup>18</sup>

SLPs who preferred to employ unpublished or non-standardized screening instruments may design their own measures. Most of the developed tests follow development patterns as observed in western societies. This can always be misleading and erroneous as the development of speech varies between languages. Also, the linguistic composition of most of these tests is culture bound and this makes it unsuitable for use in assessment of individuals exposed to other

language. Informal screening maybe tailored to a specific population and thus, maybe more suitable than standardized screenings at times.

Keeping this in mind the present study is an attempt to develop word list in Nepali to test articulation which would facilitate for better assessment and rehabilitative program for Nepali speaking children with misarticulations.

## METHOD

The study was designed to develop a screening tool to detect articulatory errors in children from age of three years and above. The study was divided into two parts as development of the wordlist and implementation of developed wordlist in the participants.

## PARTICIPANTS

Total of 40 children were recruited from different schools. Selection was based on following inclusion criteria:

- Nepali as primary language and exposed to English at school for at least three years
- No history of any otological conditions as ear discharge, ear pain and hearing loss
- Normal developmental history for both speech and motor milestones

Selected participants were divided into four discrete age groups as 3.0-3.11 (mean age= 3.4), 4.0-4.11 (mean age= 4.4), 5.0-5.11 (mean age= 5.5), 6.0-6.11 (mean age= 6.4) years. Each group consisted of 10 children each with random gender distribution.

## STIMULI

Most common words for wordlist were selected from variety of sources as books, magazine, Nepali dictionary<sup>19</sup> and discourse of children in the age range of 3 to 6 years. Words were selected based on following criteria as

- Not more than three syllables
- Picturable
- Unambiguous

Target words were selected for each consonants and vowels in initial, medial and final position. Maximum of five words were selected for each sound. The prepared wordlist was given to three literate adults and three primary school teacher for familiarity rating, they were asked to rate the words as unfamiliar, familiar and highly familiar to the age group of 3 to 7 years of age. Words

which were rated as highly familiar were selected for final wordlist. After familiarity rating was done wordlist contained total of 6 vowels, 2 diphthongs and 27 consonants in initial, medial and final position.

Final word list in all three positions with broad IPA transcription is shown in the table 1. For vowels and diphthongs like |ʌ|, |a|, |i|, |u|, |o|, |e|, |ɔ| and |ɔi| had words only in initial position. Consonants like |k|, |kʰ|, |g|, |ts|, |tsʰ|, |dz|, |t|, |d|, |t̪|, |n|, |p|, |b|, |m|, |r|, |l|, |s| and |ʃ| had words with sounds in all three positions. Consonant |d̪| only had word in initial and medial position. Similarly, sounds like |tʰ|, |dʰ| and |j| had words with sound in initial and final position only. Consonants as |gʰ|, |dzʰ|, |pʰ|, |dʰ|, |bʰ| and |pʰ| had words only in initial position only. Finally, consonant |w| had word with sound only in final position.

Similarly, sounds like |tʰ|, |dʰ| and |j| had words with sound in initial and final position only.

Pictures were also selected to help elicit response of the child. Pictures were selected randomly from Google image search; the pictures which were familiar and able to elicit response were selected. Three pictures were selected for each target word, which was later check for familiarity and ability to elicit response from children; which was done with five children in the age range of 3 to 5 years of age who did not participate in the earlier familiarity testing. Only the pictures which could elicit response in all children were retained for final data collection.

Response record card was maintained to record the response obtained with SODA (S for Substitution, O for Omission, D for Distortion and A for Addition) after transcription of the recorded response.

## TEST PROCEDURE

Final wordlist with 73 words was administered to 40 normal school going children in the age range of 3 to 7 years using Hewlett-Packard laptop with use of DmDx software for randomization of the picture and Logitech headphone with microphone to record the response of the participants. Participants were instructed to respond verbally to the picture that is displayed in the laptop screen by naming it. The responses obtained were later analyzed for errors

as substitution, omission, distortion and addition. The criteria set for the phoneme acquisition was set at 85% correct response.

## INSTRUCTION

The participants were instructed as "You will see picture in the screen; you need to respond by naming the picture you see." In condition when the children were unable to name the picture, cues were provided as initial phoneme. If the child was not able to name with phoneme cues, syllable cues followed by questioning and modeling was done to obtain the response. Appropriate verbal response was provided for each response as good, nice after each response.

## TESTING

Entire testing was carried out in distraction free and silent room, to help keep participant focused on the activity. On an average, administration of final wordlist took 10 minutes for each participant.

Table 1: Target words with sounds in initial, medial and final position.

Sounds	Initial Position	Medial Position	Final Position
ʌ	ʌnda	-	-
a	ākʰa	-	-
i	inar	-	-
u	ukʰu	-	-
o	otʰ	-	-
e	ek	-	-
ɔ	āūtʰi	-	-
ɔi	ʌina	-	-
k	/kar/	/kuʃur/	/mʌkʌi/
kʰ	/kʰutta/	/kukʰura/	/rukʰ/
g	/gai/	/kagʌʃi/	/kag/
gʰ	/gʰanti/	-	-
ts	/tsamsa/	/katsaura/	/kutso/
tsʰ	/tsʰaʃa/	/katsʰuwa/	/mātsʰa/
dz	/dzutta/	/gādʌʃr/	/pjadz/
dzʰ	/dzʰola/	-	-
t	/topi/	/katʌr/	/kʰat/
d	/dʰuŋga/	/gudija/	/gʰʌdi/
dʰ	/dʰoka/	-	-
t̪	/ʃara/	/kiʃab/	/ʃjatt̪i/
t̪ʰ	/ʃʰal/	-	/rʌʃʰ/
d̪	/d̪ʌradz/	/bād̪ʌr/	-
d̪ʰ	/d̪ʰago/	-	/ʌʌsʌd̪ʰi/
n	/nak/	/ʌnar/	/kan/
p	/pʌŋkʰa/	/tsappʌl/	/āp/
pʰ	/pʰon/	-	-
b	/bʌl/	/sabun/	/ʌmba/
bʰ	/bʰʌʃisi/	-	-
m	/mʌndʃir/	/kʌmila/	/tsʌsma/
j	/jak/	-	/kʰʌrajo/
r	/roti/	/biral/	/gʰʌr/
l	/ʌsun/	/gilas/	/ʌlu/
w	-	-	/mewa/
s	/sʌu/	/kʰʌrsani/	/musa/
ʃ	/ʃjʌt/	/dzʌʃjadz/	/ʃiŋʃjʌ/

Table 2: Consonants in Nepali Language as obtained from standardized Nepali dictionary:

		Bilabial		Dental		Alveolar		Palatal		Velar		Glottal	
		Voiceless	Voiced	Voiceless	Voiced	Voiceless	Voiced	Voiceless	Voiced	Voiceless	Voiced	Voiceless	Voiced
Plosive	Unaspirated	p (प)	b(ब)	t̪ (त)	d̪ (द)	t (ट)	d (ड)	-	-	k (क)	g (ग)	-	-
	Aspirated	p <sup>h</sup> (फ)	b <sup>h</sup> (भ)	t̪ <sup>h</sup> (थ)	d̪ <sup>h</sup> (ध)	t <sup>h</sup> (ठ)	d <sup>h</sup> (ढ)	-	-	k <sup>h</sup> (ख)	g <sup>h</sup> (घ)	-	-
Affricate	Unaspirated	-	-	-	-	ts (च)	dz (ज)	-	-	-	-	-	-
	Aspirated	-	-	-	-	ts <sup>h</sup> (छ)	dz <sup>h</sup> (झ)	-	-	-	-	-	-
Nasal	Unaspirated	-	-	-	-	-	-	-	-	-	-	-	-
	Aspirated	-	m (म)	-	-	-	n (न)	-	-	-	ŋ (ङ)	-	-
Tap/Flap	Unaspirated	-	-	-	-	-	r (र)	-	-	-	-	-	-
	Aspirated	-	-	-	-	-	-	-	-	-	-	-	-
Fricative	Unaspirated	-	-	-	-	-	-	-	-	-	-	-	-
	Aspirated	-	-	-	-	-	s (स)	-	-	-	-	-	ʃ (ह)
Approximant	Unaspirated	-	w (व)	-	-	-	-	-	j (य)	-	-	-	-
	Aspirated	-	-	-	-	-	-	-	-	-	-	-	-
Lateral Approximant	Unaspirated	-	-	-	-	-	l (ल)	-	-	-	-	-	-
	Aspirated	-	-	-	-	-	-	-	-	-	-	-	-

## SCORING AND INTERPRETION

The response of each participant was transcribed phonetically, which was further analyzed and scored. The responses were recorded using following symbols as tick for correct response, S for Substitution, O for Omission, D for Distortion and A for Addition. The result were tabulated and percentage of correct responses were calculated for each phoneme across age groups. Cut off criteria for acquisition was set at 85%, beyond which sound was considered acquired by that age group.

## RESULT AND DISCUSSION

Total 40 participants were included in the final study; they were divided into four age groups as 3 to 3.11 years, 4 to 4.11 years, 5 to 5.11 years and 6 to 6.11 years with the mean age of 3.4, 4.4, 5.5 and 6.4 simultaneously; each group consisting of 10 children. Based on the consonants and vowels in Nepali language on standard dictionary as shown in table 2 and Figure 1, final wordlist was developed for the study (Table 1). Consonants as |k|, |k<sup>h</sup>|, |g|, |ts|, |ts<sup>h</sup>|, |dz|, |t|, |d|, |t̪|, |n|, |p|, |b|, |m|, |r|, |l|, |s| and |ʃ| had words with sounds in all three positions. Vowels and diphthongs like |ʌ|, |a|, |i|, |u|, |o|, |e|, |u| and |ɪ| had words with sound in initial position only. Other consonants as |d̪| had word in initial and medial positions; |t̪<sup>h</sup>|, |d̪<sup>h</sup>| and |j| had words with sound in initial and final position; |g<sup>h</sup>|, |dz<sup>h</sup>|, |p<sup>h</sup>|, |d<sup>h</sup>|, |b<sup>h</sup>| and |p<sup>h</sup>|

had words in initial position only and consonant |w| had word in final position simultaneously.

## SUMMARY AND CONCLUSION

The present study developed wordlist, with target sounds in initial, medial and final position, which can be used to evaluate articulatory errors in children from age of three years and above. This study also has developed phonological developmental chart, showing phonological acquisition by age, though further detailed study in this is required to understand in detail phonological development of Nepali language in children. This test will act as a screening tool for articulatory and further diagnostic tests deep test of articulation needs to be used to understand in detail.

## IMPLICATION

- Standard screening tool in Nepali that can be used clinically in short period of time.
- Can act as a tool for planning management for children with articulatory errors.

## LIMITATION

- Phonemes which are not picturable were not tested.
- Not all phonemes could be tested in all three positions.
- Distribution with age was considered but not with gender.
- Less sample size.

- /i/ - High front unrounded (इ)
- /e/ - High-mid front unrounded (ए)
- /a/ - Low central unrounded (आ)
- /ʌ/ - low-mid back unrounded (अ)
- /o/ - high-mid back rounded (ओ)
- /u/ - High back rounded (उ)

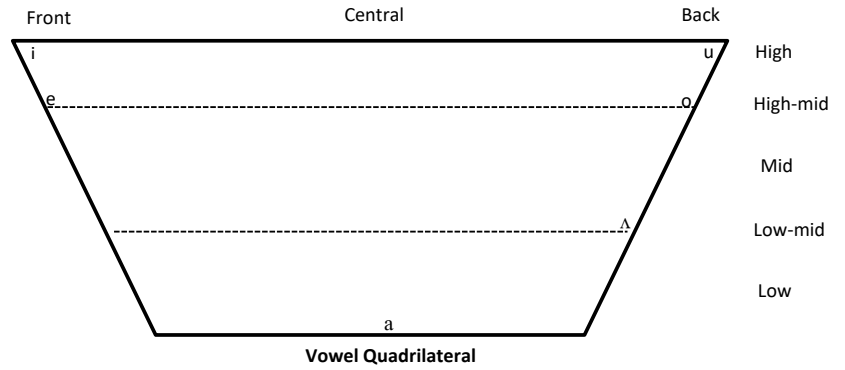


Fig. I Vowels (Monophthongs) in Nepali language as obtained from a standardized Nepali dictionary depicted in vowel quadrilateral.



Fig. II Vowels (Diphthongs) used in this study as obtained from a standardized Nepali dictionary depicted in vowel quadrilateral.

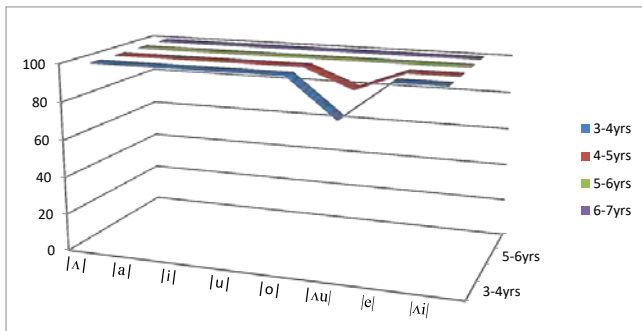


Fig. III: Showing vowel (monophthongs and diphthongs) acquisition by age.

Among vowel production it was observed that all age group participants from age 3 to 6 years presented no errors, indicating well developed vowel phonology except for diphthong /ʌu/, which was acquired by the age of 5-5.11 years (Figure III).

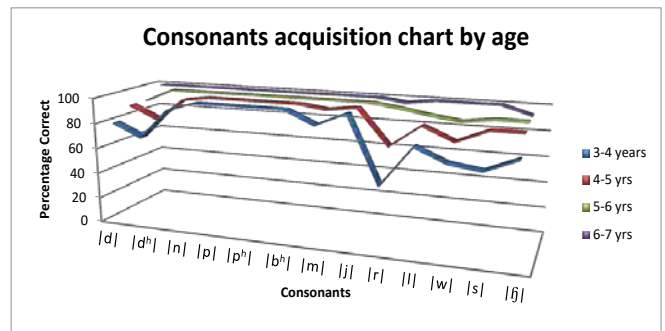


Fig. V: Showing consonants acquisition by age.

Consonants like /dʒʰ/, /p/, /pʰ/, /b/, /bʰ/, and /j/ were found to be achieved by the participants in the age group of 3 to 3.11 years. Consonants like /dʰ/, /t/ and /tʰ/ were acquired by the age of 4 to 4.11 years. Similarly, consonants as /k/, /kʰ/, /gʰ/, /d/, /dʰ/, /n/ and /m/ were observed to be achieved by the participants in the age range of 5 to 5.11 years. Participants in the age range of 6 to 6.11 achieved consonants as /ts/, /dʒ/, /r/, /w/, /s/, /ʃ/ and /l/. Consonants as /t/ and /g/ were not achieved by the participants of this study, and thus, we can conclude that they were achieved after 7 years of age. (Figure IV, V and Table 3)

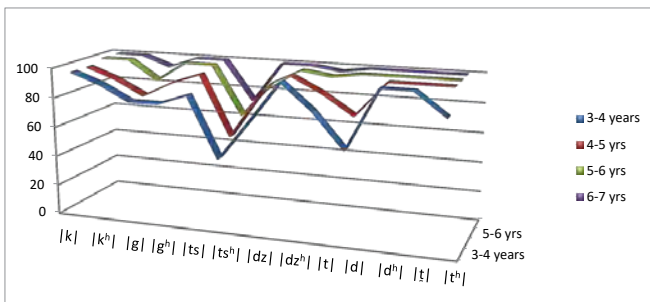


Fig. IV: Showing consonants acquisition by age.

Table 3 showing consonants acquisition across different age group of this study.

Sounds	Acquisition (years)	Sounds	Acquisition (years)	Sounds	Acquisition (years)
b	3-3.11	k	5-5.11	d̪	6-6.11
b <sup>h</sup>	3-3.11	k <sup>h</sup>	5-5.11	r	6-6.11
j	3-3.11	g <sup>h</sup>	5-5.11	w	6-6.11
dz <sup>h</sup>	3-3.11	d	5-5.11	s	6-6.11
p	3-3.11	d̪ <sup>h</sup>	5-5.11	ʃ	6-6.11
p <sup>h</sup>	3-3.11	n	5-5.11	l	6-6.11
d <sup>h</sup>	4-4.11	m	5-5.11	ts <sup>h</sup>	After 7
t̪	4-4.11	ts	6-6.11	t	After 7
t̪ <sup>h</sup>	4-4.11	dz	6-6.11	g	After 7

## FUTURE DIRECTIONS

- Means of eliciting the phoneme that could not be pictured can be explored.
- Can be used to develop articulation test in other various languages of Nepal.
- Larger sample size and various geographical regions could be incorporated.
- Phonological development can be explored.

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