

## **Syllable Awareness in Kannada Speaking Children with Cerebral Palsy**

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### **Abstract**

Syllable awareness is a metaphonological skill that is acquired by children before acquisition of phoneme awareness skills. Its importance has been documented in alphabetic languages where it functions as a predictor of later reading success. However, it has been less researched in alphasyllabary languages with dearth of knowledge in childhood disorders like cerebral palsy. In the present study, the skills of syllable stripping and syllable oddity for words and non-words were studied using the Metaphonological Skills Test (Prema, 1997) in Kannada speaking children with cerebral palsy (n=12) and language-age (> 8 years) matched with typically developing peers (n=30). The findings revealed that performance for syllable stripping and syllable oddity for words was on par for both groups. However, children with cerebral palsy (CWCP) performed poorly on syllable oddity for non-words proving that the ability to engage in overt articulation has an indirect influence on their performance.

**Key words:** Syllable awareness, Kannada speaking children, cerebral palsy

### **Introduction**

Phonological awareness is that one possesses about the sound structure of a spoken word (Gillon, 2004). It has multiple levels consisting of awareness at word level (awareness that a sentence is comprised of individual words), syllable level (awareness that words can be divided into syllables), onset-rime level (awareness at intra-syllabic level that syllables can be divided into onsets and rimes) and phoneme level (awareness that words are comprised of individual sounds) (Gillon, 2004; Lane, Pullen, Eisele, & Jordan, 2002). Syllable awareness

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is the knowledge that a word is comprised of smaller constituent units known as syllables. It is one of the metaphonological skills that a typically developing child will acquire from three to five years of age (Hodson, 2005, cited in Rhyner, 2009).

The sequential order of development of syllable awareness is syllable segmentation, syllable blending, syllable deletion and syllable manipulation. Syllable segmentation is the ability to divide a word into its constituent syllables or identification of the number of syllables in a word by clapping or tapping. Syllable blending is the ability to blend together segmented syllables. Both syllable segmentation and blending are evident in 4-5 year old children. Syllable deletion (syllable stripping) is the ability to produce a word after deletion of the target syllable, observed in children aged 5 years. Syllable manipulation emerges around 7 years and involves the ability to manipulate syllables within a word to form a new/nonsense word. The ability to add, delete or manipulate syllables at the end of a word develops before the ability to do the same with the initial syllable followed by the medial syllable (O'Keefe, 2000, cited in Schreiber, 2008). Syllable oddity is the ability to detect the odd one out among a set of four presented words (Prema, 1997) which emerges later than syllable manipulation, being a task that requires analysis.

The importance of syllable awareness has been documented in alphabetic languages. Syllable segmentation is reported to be a predictor of later reading success (Liberman, Shankweiler, Fischer, & Carter, 1974) as spelling ability depends on it. Syllable blending is necessary for both spelling and reading (Ehri, 2000). Syllable awareness is a predictor of early reading skills (Plaza & Cohen, 2007). Syllable awareness along with articulatory skills and rime awareness predict later phoneme awareness (Carroll, Snowling, Hulme, & Stevenson, 2003). In CWCP, the ability to speak influences performance on tasks requiring the use of overt articulation like syllable segmentation (Card & Dodd, 2006; Larsson & Dahlgren Sandberg, 2008). Quality of articulation influences phonological awareness in CWCP and is related to their phonological short term memory (Peeters, Verhoeven, de Moor, & van Balkom, 2009).

Although it has received less research attention in children learning non-alphabetic languages, syllable awareness develops equally well in children exposed to alpha-syllabary language systems like Kannada. Syllable stripping skills mature earlier than syllable oddity

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for words and non-words (Prema, 1997). Ramakishan (1989) and Ramaa (1993, cited in Karanth, 2003) reported a strong relationship between syllable segmentation abilities and school achievement. In contrast, however, Karanth and Prakash (1996) documented that syllable stripping ability is the foremost indicator of reading ability in beginning readers of Kannada. Relevant studies in the domain of syllable awareness in CWCP exposed to Kannada are lacking. In order to shed light on their skills, it is essential to study the syllable awareness skills in Kannada speaking CWCP. With this aim, the objectives of this research were to investigate the syllable stripping and syllable oddity skills in this population.

## **Methodology**

Prior ethical clearance to pursue this study was obtained from concerned authorities and informed consent was sought from all the study participants and their parents/teachers. The study design used was a standard group comparison employing convenience sampling. The study participants were divided into two groups i.e. Group 1 comprising of CWCP (n = 12) with a language age greater than 8 years (based on informal language evaluation), though their chronological age varied from 10 to 19 years. These children had intelligence quotient > 70 (data obtained from the medical records), were attending special school and had normal hearing and vision. Those with multiple disabilities and recurrent middle ear infections were excluded. Group 2 comprised of typically developing children (n = 30) with language age greater than 8 years (based on informal language evaluation), attending regular school with normal hearing and vision. Their mean chronological age was 8 years.

The Metaphonological Skills Test, a sub-test of the Reading Acquisition Profile - Kannada (RAP-K) developed by Prema (1997) was used as the measurement tool. The sections assessing for syllable awareness i.e. syllable stripping, syllable oddity for words and syllable oddity for non-words were administered. For *syllable stripping*, the instruction given was to produce a given word after deleting a target syllable from it. In the *syllable oddity* task, the participant was told that four words will be presented and that the he/she was required to indicate which word was the 'odd one out' through either of two response modes; one being a verbal response while the other, a pointing response. For the pointing response, the child was shown four squares, each containing a number from one to four. The four words were presented in order and the child was required to point to the number of the word which was the 'odd one out'. Practice items were presented before the actual test items. The

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documented responses were scored. Each correct answer was given a score of 1 and each incorrect response, a score of 0 with the total obtainable score on each section being 12.

Mean and Standard deviation (Descriptive statistics) were obtained for the three sections of the test. Student t-test (independent samples) was employed to compare the performance between the groups using SPSS software (version 16.0).

Prior to administration of the test, speech intelligibility of each child was rated perceptually on a 5-point rating scale (0 – Intelligible; 1 - Mild unintelligibility; 2 - Moderate unintelligibility; 3 - Marked unintelligibility; 4 - Severe unintelligibility) by a Speech Language Pathologist. One child was rated as being intelligible, eight were mildly unintelligible and three were moderately unintelligible.

## Results and Discussion

This study focussed on the syllable awareness skills in Kannada speaking CWCP. The skills studied were syllable stripping, syllable oddity for words and syllable oddity for non-words.

### Syllable Stripping Abilities

In the skill of syllable stripping, CWCP had a mean of 10.3 (SD=1.8) and typically developing children, 10.93 (SD=1.38) as shown in Table 1. No statistically significant difference was obtained between the means of both groups.

Table 1 - Overall mean performances in syllable stripping

	Group 1*		Group 2*			
<i>Task</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>t value</i>	<i>'p' value</i>
Syllable Stripping	10.3	1.8	10.93	1.38	-1.14	0.261

(\*Group 1 = CWCP, \*Group 2 = Typically developing children)

In the current study, all the children had a language age greater than 8 years of age and their performance approximated the maximum, thus indicating the relative ease of the syllable stripping task for both groups. These findings are in agreement with those obtained by Prema (1997), who reported that scores on syllable stripping in typically developing

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Kannada-speaking children approximated the maximum by Grade 3 i.e. 8 years of age. Similarly, Prakash, Rekha, Nigam, & Karanth (1993) also reported that syllable deletion was relatively easy as Kannada-speaking children from 1<sup>st</sup> to 3<sup>rd</sup> grades in their study scored highest in this task.

In the syllable stripping task, it was observed that for CWCP, among the initial, medial and final syllables; the easiest syllable to delete was the final syllable followed by initial syllable and lastly, medial syllable. However, typically developing children found it easier to delete the initial and final syllable to an almost similar extent with deletion of medial syllable proving comparatively difficult. O’Keefe (2000, cited in Schreiber, 2008) stated that the ability to add, delete or manipulate syllables at the end of a word develops before the ability to do the same with the initial syllable followed by the medial syllable. This hierarchy was very much evident in the current study in both groups. Prema (1997) had reported that typically developing, native Kannada speakers found it easiest to delete the initial syllable followed by the final syllable, with the medial syllable being the most difficult. In support of her findings, both groups in the current study found it difficult to delete the medial syllable, compared to the initial and final syllables. Goswami (1994, cited in Prema, 1997) opined that the coda (medial syllable) is tougher to delete rather than onset (initial syllable) or rime (final syllable) due to difficulty in perception of intra-syllabic differences.

### **Syllable Oddity in Words and Non-words**

For syllable oddity in words, CWCP had a mean of 7.5 (SD=2.35) and typically developing children, 8.46 (SD=1.73) with no statistically significant difference between the two groups. With respect to syllable oddity in non-words, CWCP had a mean of 6.45 (SD=1.5) and typically developing children, a mean of 8.13 (SD=2.03) as shown in Table 2. Statistically significant difference between the means was obtained for syllable oddity in non-words with a ‘p’ value of 0.017.

Table 2 - Overall mean performances in syllable oddity

<i>Task</i>	Group 1*		Group 2*		<i>t value</i>	<i>‘p’ value</i>
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>		
Syllable Oddity (words)	7.5	2.35	8.46	1.73	-1.46	0.15

Syllable Oddity (non-words)	6.45	1.50	8.13	2.03	-2.49	0.017
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(\*Group 1 = CWCP, \*Group 2 = Typically developing children)

For syllable oddity in words, both groups performed on par, whereas a significant difference was observed between the groups for syllable oddity in non-words. The reason for almost similar performance by both groups on syllable oddity for words could be attributed to the use of linguistically meaningful and familiar stimuli with relatively easy covert/overt rehearsal. For syllable oddity in non-words, it was noted that all children were engaged in overt vocal rehearsal of presented stimuli before responding with the answer. CWCP found it more difficult to repeat the non-words and exhibited errors.

Card and Dodd (2006) reported that the ability to speak facilitates performance on phonological awareness tasks which require the use of an articulatory loop in CWCP. Peeters et al. (2009) highlighted that the use of overt/covert speech in CWCP facilitates better development of phonological awareness skills. They related the articulation ability of the child to phonological short-term memory. Their results indicated that better the articulation skills of the child, the longer the string of words the child can remember and the better phonological short-term memory span of the child. The results of the above two studies can be used to explain the findings of the current study. Majority of the CWCP were mildly unintelligible implying that their articulation abilities were not at par with typically developing children. Hence, their ability to exploit the use of their articulatory loop to rehearse and remember the non-word stimuli would have been limited. The better performance of the typically developing children can be explained by their possession of precise articulation skills, aiding them in vocal rehearsal of the stimuli.

In syllable oddity for words, CWCP evidenced more difficulty in detecting the ‘odd one out’ among the four words when the common syllable was in medial position rather than when it was in initial or final position. Similar findings were noted for the typically developing children. For example, the children had more difficulty in detecting which word was the odd one out if the stimulus was /kʌrune - tʌrunʌ - kʌsu:ti - gʌrudʌ/ than if it was /nɛgʌdi - nɛnʌpu - nɛlʌsi - tʃilume/ or /tʃʌrʌkʌ - sʌrʌʌ - mʌgʌʌ - dʒʌgʌʌ/. (In the above example, the ‘odd one out’ has been underlined.) Similarly, in syllable oddity for non-words also, CWCP evidenced more difficulty in detecting the ‘odd one out’ among

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the four words when the common syllable was in medial position rather than when the common syllable was in initial or final position. The typically developing children also showed similar results. For example, the children had more difficulty in detecting which word was the odd one out if the stimulus was /punimΛ - kitΛbu - venidΛ - tunijΛ/ than if it was /gΛriko - gΛputʃi - tΛdeti - gΛneto/ or /budito - dΛguto - tepΛto - dʒirodi/. (In the above example, the ‘odd one out’ has been underlined.) The outcome of this study can be explained by extrapolating O’Keefe’s (2000, cited in Schreiber, 2008) findings regarding syllable deletion to the syllable oddity task. He reported that the ability to add, delete or manipulate syllables at the end of a word develops before the ability to do the same with the initial syllable followed by the medial syllable. Similarly, it can also be understood that when a syllable oddity task is given, the ability to detect the odd one out when the common syllable is in the final position is easier followed by initial and medial positions, observed in the current study.

In this task, when real word stimuli were used, both groups evidenced slightly better performance (not statistically significant) than when non-word stimuli were used. This could be attributed to the difficulty involved in remembering novel phonological strings which are unfamiliar (non-words) and lacking in semantic context as compared to real words. Retention of verbal information in short-term memory is believed to be enhanced by long-term word representation in order to remember familiar lexical items on the real word as compared to the non-word task (Hulme, Maughan, & Brown, 1991).

## **Conclusion**

The syllable awareness skills of Kannada speaking CWCP were studied and found to be on par with that of typically developing with respect to syllable stripping and syllable oddity for words. However, syllable oddity detection for non-words showed a significant difference. Among the tasks, better performance was evident in syllable stripping rather than syllable oddity, since deletion test taps only metaphonological skills whereas oddity detection tasks are reported to tap the higher cognitive skills also and require more mental efforts. These findings are in consonance with earlier literature reports. The poor performance of CWCP in syllable oddity for non-words is attributed to their vocal rehearsal abilities being confounded by imprecise articulation and non-word stimuli. This observation highlights the

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importance of evaluating the metaphonological skills among CWCP and remediation, as it would impact their literacy skills.

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