Relationship between Morphology and Reading in Kannada

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The state of reading research today, more than ever before, is bringing us closer to an understanding of the cognitive processes that underlie learning to read (Snowling & Hulme, 2005). Reading emerges from child’s oral language. Oral language is important for reading, and it continues to serve reading development (Hiebert, Pearson, Taylor, Richardson, & Paris 1998). Hiebert et al., (1998) quoted that, to comprehend decoded text the readers need to extract the meaning (semantics) and structure (syntax) of spoken language. In addition, children who exhibit reading difficulty generally lack the ability to process and manipulate speech sounds, and therefore, the link among oral language, phonological skills and reading development appear to have been well established (Sonali & Snowling, 2005).
Phonological awareness and reading

Majority of the research in early reading has been reported from the Western countries. Consequently, the language that was studied extensively was English that emphasize the significant contribution of phonological sensitivity to early reading skills. Phonological awareness (term used alternative to “phonological sensitivity” in the present paper) refers to the broad range of skills in the awareness and manipulation of sound structures at the syllable, onset/rime and phonemic level (e.g. counting of syllables, rhyming and isolating initial phonemes). Phonological awareness has been found to influence early reading in English that has alphabetic script (Ehri, 1999; Lonigan, Burgess, Anthony, & Barker, 1998; Wagner, Torgesen, & Rashotte, 1994; Wood & Terrell, 1998).

Recent evidence from studies by Burgess & Lonigan (1998), indicate that phonological sensitivity and reading are reciprocally related. That is, phonological sensitivity facilitates the development of early reading and the vice versa. Study by Lonigan et al., (1998) revealed that phonological sensitivity can be assessed in young preschool children and that lower levels of phonological sensitivity may serve as developmental precursors to higher levels of phonological sensitivity as the child develops.

Influence of language and script structure on reading acquisition

The influence of language and script structure on reading acquisition and reading disorders was examined by researchers who examined children from non-English speaking countries. There was convincing evidence to state that the nature of script (transparency or opaqueness) does play a role in reading acquisition (See orthographic depth Hypothesis by Katz & Frost, 1992). The hypothesis postulates that learning to read a transparent orthography such as German (Wimmer & Hummer, 1990), Greek (Goswami, Porpodas, & Wheelwright, 1997), Italian (Thorstad, 1991), Spanish (Goswami, Gombert, & De Barrera, 1998), Turkish (Öney & Durgunoglu, 1997), or Welsh (Ellis & Hooper, 2001) is easier than learning to read a language that is orthographically opaque such as French or English (Goswami, Gombert, & De Barrera, 1998; Landerl, Wimmer, & Frith, 1997).

The script that has direct connection between orthography and phonology is considered to be transparent while that with lesser connection between these two levels is considered opaque.
Alphabetical languages like English and Portuguese need letter mapping while reading, where every letter has to get converted into its respective sound. In alpha-syllabic languages, the mapping happens at syllable level while reading.

The alpha-syllabic languages are a group of orthographies that represent sounds at the level of the syllable but have distinctive features to indicate sub-syllabic information (Bright, 1996). Kannada, a south Indian Dravidian language, is a typical example of alpha-syllabic orthography. In alpha-syllabary, the basic unit of the orthographic symbol is the Akshara. The Akshara usually maps to phonology at the level of the syllable. Linguistic features of the alpha-syllabaries suggest that subtle differences exist in sound-to-symbol mapping when compared with the alphabetic and logographic orthographies since the mapping units are bigger in Kannada compared to English.

The logographic script as in Chinese has even bigger level of mapping unit compared to letter and syllabic mapping. Current evidence indicates that irrespective of whether it is the matching of phonemes to letters (as in alphabetic orthographies like English and Spanish) or the linking of morphemes to characters (as in logographic orthographies like Chinese), reading acquisition depends on becoming skilled with sound and symbol mapping. Further, the degree of consistency in the sound and symbol mapping facilitates or slows down reading acquisition. Children learning to read transparent, consistent alphabetic orthographies, acquire reading more rapidly than children learning to read in the more opaque, orthographically inconsistent languages like Portuguese and English (Seymour, Aro & Erskine, 2003). However, the type of cognitive processes relied upon when mapping phonemes to letters can be expected to differ from the mapping processes for morphemes and characters (Ellis, 1993).

**Role of Morphological Knowledge**

In character reading, as in languages like Kannada for example, morphological knowledge may play a more crucial role when compared to letter reading (McBride-Chang, Shu, Zhou, Wat, & Wagner, 2003). As the mapping unit changes from smaller to bigger units (alphabetic as in English, alpha syllabic as in Kannada to morphemes as in Chinese), the significance of phonological awareness (sensitivity) for reading acquisition is questioned by many investigators.
Studies on Indian languages like Kannada, Hindi and Oriya report that phonemic awareness is not so crucial in learning to read (Karanth & Prakash, 1996; Prakash, 1987; 1994; 1999; Prakash, Rekha, Nigam, & Karanth, 1993; Prema, 1998). McBride-Chang, Cho, Liu, Wagner, Shu, Zhou et al., (2005) state that phonological awareness is important in reading in English and French, but morphological awareness is important to learn to read Korean and Chinese script that are morphemic in nature. The significance of morphological sensitivity over phonological sensitivity has been studied and reported in literature over couple of decades.

Morphological awareness and reading

Studies that investigated beyond the alphabetical scripts resulted in growing evidence on significance of morphological awareness to reading. Morphological awareness is the awareness of words’ morphemic structure and the ability to reflect on and manipulate that structure (Carlisle, 1995). In order to examine morphological awareness, majority of studies have considered derivational morphology and inflectional morphology that are linguistically distinct from each other (for an overview see Bybee, 1985, 1988, 1995). Derivational morphology concerns the generation of distinct words from a base morpheme across different grammatical categories. For example, darkness, and darken all derive from a single base morpheme dark. Inflectional morphology is concerned with the systematic marking of grammatical information on a word stem. For example, nouns may have distinct case forms; adjectives may agree with the nouns they modify; and verbs may have distinct forms for tense, aspect, mood, voice, and valence, as well as number, person, and gender agreement. In an inflectional expression, semantic units are bound into a single word in the form of affixes to a stem (e.g. looked) or in the form of a change in the stem itself (e.g. saw). Unlike derivations, inflections are morphemes that do not change the class of the word they are affixed to and generally can be added to every word within the same grammatical class. Therefore, for manipulation of morphemes, such morphological awareness either at implicit or at explicit levels is mandatory for reading acquisition.

Bellugi and Brown (1964), Brown (1973), and Miller (1981) studied the development of morphemes in English language by children at different age. At around two years the child is expected to acquire inflectional morphemes and at the age of four he is expected to begin
acquiring derivational morphemes. The morphology develops as the vocabulary increases, with both morphological knowledge and vocabulary development mutually facilitating each other.

Devaki (1983) studied morphological development in Kannada language and reported that development of different types of morphemes in Kannada is complete by the age of seven years.

Study by Karanth and Suchitra, (1993) and Scholes, (1993) revealed that school going children become increasingly proficient in identifying grammatical inaccuracies from Grade I through VII. Carlisle (1995) conducted a longitudinal study which followed children from kindergarten till Grade II and found that first-grade morphological awareness made a significant contribution to later reading achievement. With regard to spelling in the early elementary years, Verhoeven and Perfetti (2003), state that progress in reading acquisition requires gaining knowledge of morphemes as abstract linguistic units. They also state that the relationship between awareness of morphology and progress in reading acquisition can also be seen as reciprocal and mutually facilitative in that morphological awareness develops as a consequence of reading instruction. Studies of adults and older children have demonstrated that morphological knowledge plays a role in reading complex words (e.g. Elbro, 1990; Fowler & Liberman, 1995; Elbro & Arnbak, 1996; Nagy, Berninger, & Abbott, 2006) as well as in spelling and reading comprehension. Nunes, Bryant, and Bindman (2006) found that six-year old children’s inflectional spellings predicted their morphological awareness performance at the ages of seven and eight. In the alphabetical language like English research has already highlighted the predominant role of derivational morphological awareness to reading (E.g. Venezky, Jastrzembski & Lucas, 1980; Sowell &Yanigahara, 1989; Massaro, Taylor, Stahl & Nagy, 2006; Balota, Yap, Cortese, Hutchison, Kessler, Loftis, et al. 2007 and Matthews, 2007).

Nagy, Berninger, and Abbott (2006), using structural equation modeling evaluated the contribution of morphological awareness, phonological memory, and phonological decoding to reading comprehension, reading vocabulary, and phonological decoding to morphologically complex words for Grade IV and V students, Grade VI and VII students, and Grade VIII and IX students. Morphological awareness made a significant unique contribution to reading comprehension, reading vocabulary, and spelling for all the 3 groups, to all the measures of decoding rate for the Grades VIII/IX students, and to some measures of decoding accuracy.
for the Grade IV/V students. Morphological awareness also made a significant contribution to reading comprehension above and beyond that of reading vocabulary for all the 3 groups. Casalis, Colé, and Sopo (2004) studied the phonological process in dyslexics. Casalis’ and colleagues reported that the deficit in the phonological paradigm is compensated by intact morphological paradigm in these dyslexics, thus enabling them to read.

In addition to these and other reports on the role of morphology in reading complex words (See study by Elbro, 1990; Elbro & Arnbak 1996 and supporting studies), some cross-sectional research (Carlisle, 1995; Singson, Mahony, & Mann, 2000) indicated that the influence of morphological awareness on reading increases as reading becomes more sophisticated. This increase is logically predicted by models of reading development that include a shift in emphasis from phonological to orthographic and morphological information over development (e.g. Ehri, 1999; Seymour, 1999). Other longitudinal studies indicate stable contributions of morphological awareness over time (Deacon & Kirby, 2004).

There is similar but more limited evidence for the connection between morphological awareness and reading in French, a transparent orthographic language. Plaza and Cohen (2003, 2004) studied French language and reported that morphological awareness in the first grade determined a significant portion of children’s reading and spelling ability that year and of their spelling one year later, even after controlling for phonological awareness and naming speed.

The hypothesis that morphological awareness contributes to reading is further supported by research demonstrating its role across a range of alphabetic and nonalphabetic orthographies (e.g., Abu-Rabia, Share, & Mansour, 2003; Ku & Anderson, 2003; McBride-Chang et al., 2003; McBride-Chang, Cho et al., 2005; for parallel research on spelling, see Levin, Ravid, & Rappaport, 1999). In their comprehensive study, McBride-Chang et al. (2003) reported that morphological awareness was related to Chinese character recognition in the second grade. This link survived controls for age, phonological awareness, naming speed, speed of processing, and vocabulary. This research bolsters the conclusion that morphological awareness has an independent role in the reading development of monolingual children. Relationship between morphological knowledge and vocabulary development has already been established in English by Emden and Harrington (2007). Bowers, Kirby and Deacon (2010), studied the vocabulary development in two groups, one of them receiving morphological instructions and the other not
receiving it. The authors concluded that the group that received morphological training tends to learn vocabulary faster compare to the group that did not receive formal instruction on explicit morphology.

Review of studies suggest that there are evidences towards the role of morphological awareness in the acquisition of reading, reading complex words, reading at higher grades although the details of the developmental pattern of its contribution is not very clear. The existing studies link morphological knowledge and vocabulary development (oral language) in alphabetical language and also in other alpha-syllabic languages. However the direct relation between morphological sensitivity and reading development is yet to be derived for Dravidian alpha syllabic language, Kannada.

The need for the present study is justified by the lack of studies on examining relationship between morphological sensitivity to reading development in Kannada. The present study uses a reading task along with inflectional/derivational morphologies in sentence completion and priming task through grades IV, V and VI in order to find out the empirical relation between morphological sensitivity and reading. Thus the aim of the present study is to examine explicit morphological knowledge of children using sentence completion task through grades IV, V and VI. The study also aims to examine child’s implicit awareness of morphology using morphological priming task through grades IV, V and VI and evaluate the relation across tasks. The study intends to trace the development in morphological knowledge as reading performance increases and report the correlation between morphological knowledge and literacy.

**Method**

**Participants**

Ten children each were selected from Grade IV, V and VI studying in a Kannada medium school in Mysore city. All the participants were administered the WHO Ten Disability questionnaire (Singhi, Kumar, Malhi, & Kumar, 2007) to screen for developmental disabilities. The participants did not have any academic difficulties as informed by their teachers.
Material

Word reading task

Reading ability of the participants was examined using 50 words selected from Frame Work for Testing Kannada Reading on the Bases of Automaticity, Rules of Orthography, and Sequential Processing (Purushotama, 1986). (See Appendix for 50 words used in the present study).

Experiment 1 (Sentence completion task)

The participants were given sentence completion task in which they were asked to complete a set of 15 sentences each by choosing either inflectional and/or derivational morphemes suitable to the context (see Appendix for sample sentences). A sample response form is given in Appendix. (Sentence completion task has been used frequently in literature to examine explicit morphological skills of participant (e.g. Carlisle, 1995; Fowler & Liberman, 1995).

E.g. Inflectional sentence completion: Rama… bana (“na” a possessive inflectional marker to be inserted)

E.g. Derivational sentence completion: avanubudhi….. (“vantha” to be inserted)

Experiment II (Priming task)

Priming task was designed with 15 stimuli each for inflectional and derivational morphemes. The prime appeared on the top of the screen for duration of 500 milliseconds following the target which was aligned at the center and appeared for duration of 1000 milliseconds. The prime was a bound morpheme and the target was root word. The participants were required to judge whether the bound morpheme with the root word is appropriate or inappropriate (lexical decision task). He/she has to press ‘0’ on the keyboard if the bound morpheme is judged inappropriate with that root and ‘1’ if the bound morpheme is judged appropriate with the word (See Appendix for test materials used).
**Procedure**

a) **Word reading task:** The Word reading test was administered as individual task. Words were typed using Baraha in Kannada, with 14 fonts, black colour and printed on A4 sheet. Each participant read the words and the responses were noted.

b) The experiment I was a group task. All the 10 participants from a class were given Sentence completion task in which they were instructed to complete the given sentences by choosing the correct morphemes from the list of options.

c) In experiment II, each participant was tested on a priming task individually and the Reaction Time (RT) and accuracy of responses were recorded.

d) Testing was carried out in a quiet environment.

**Scoring and analysis of data**

On the word reading task, Children were asked to read and each correct response was given the score of ‘one’ and words those were either read with errors or incorrectly are given score of ‘zero’.

Binary scoring system was followed for responses obtained in Experiment 1. A score of ‘one’ was given when the participant had used correct inflectional/derivational morpheme to fill the blank. A score of ‘zero’ was given when inappropriate morphemes were used to fill the blanks. Total score for each participant was computed for a maximum of 15 each for inflectional and derivational morphemes.

Reaction Time for the target responses of all the participants was recorded in Experiment II. The reaction time taken by the participants to judge the word as correct or incorrect was noted using DMDX software in milliseconds. Incorrect responses were eliminated from scoring.

**Results**

Results were analyzed for scores on Word reading task, sentence completion task (Experiment I) and priming task (Experiment II). Descriptive statistics were used to find out the average scores on this 50 word reading task across grades IV, V and VI. Average of correct
responses for Grade IV was 39, Grade V was 41 and Grade VI was 46, showing a steady increase in the performance.

i) Explicit Inflectional morphology

The results of sentence completion task (Experiment 1) is described in Table 1 for all the three grades respectively (IV, V and VI). Descriptive statistics was used to find out the average scores on sentence completion task. Table 1 show that the mean scores for inflectional morphemes for a maximum of 15 sentences for Grade IV is 6.8, Grade V is 8.1 and Grade VI is 8.7. The increase in mean scores is seen from Grade IV to Grade VI. While there was an increase in the mean score by 2.7 for explicit inflectional morphological skills between Grade IV and Grade V, that between Grade V and Grade VI was only 0.7 indicating rapidity in the acquisition of inflectional morphological skill, yet being only 50% of the maximum score by Grade VI suggesting that the skill is not completely achieved (Figure 1).

ii) Explicit Derivational morphology

The mean scores for sentence completion task with derivational morphemes also showed consistent improvement across Grades IV (5.1), V (6.2) and VI (7.4). The increase in mean score from Grade IV to Grade V was 1.1 and that from Grade V to Grade VI was 1.2. The performance of children on inflectional and derivational morphemes showed a consistent developmental trend across the three grades. However, the development for inflectional morphemes was relatively better across the grades than for derivational morphemes suggesting that inflectional morphemes are acquired earlier to derivational morphemes.

Table 1. Mean Scores on Inflection and Derivational Morphemes across Grades

<table>
<thead>
<tr>
<th>Grades Type of morphemes</th>
<th>Grades</th>
<th>Inflection</th>
<th>Derivation</th>
<th>Inflection</th>
<th>Derivation</th>
<th>Inflection</th>
<th>Derivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean scores</td>
<td>IV</td>
<td>6.8/15</td>
<td>5.1/15</td>
<td>8.1/15</td>
<td>6.2/15</td>
<td>8.7/15</td>
<td>7.4/15</td>
</tr>
</tbody>
</table>
iii) Implicit morphological knowledge task

The priming task required the participant to judge the sentence as correct or incorrect. The reaction time for judgment was measured using the DMDX software. The mean reaction time for Grade IV was 2286.53 milliseconds, Grade V was 1833.62 milliseconds and Grade VI was 1759.66 milliseconds.

![Figure 1: Comparison of Performance across Grades on Inflectional and Derivational Morphemes using sentence completion task. X-axis representing Grades and Y-axis representing average of correct responses on 15 sentence completion task. I- sentence completion using inflectional morphemes, D- sentence completion using derivational morphemes.](image)

The gradual decrease in the reaction time with increasing Grades from Grade IV through VI suggests that participants from higher grades were faster in judging the sentences as correct/incorrect. The reduction in Mean Reaction Time for Grade V is ~450 milliseconds compared to Grade IV, whereas only ~70 milliseconds for Grade VI compared to Grade V (see Table 2). This could be compared to explicit sentence completion task performance of the participants where the Grade V mean scores were relatively better than Grade IV and that Grade VI was better than Grade V (see Table 1).
Table 2. Overall Mean Reaction Times across Grades

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Grades</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>IV</td>
</tr>
<tr>
<td>Overall mean reaction time in milliseconds</td>
<td>2286.53</td>
</tr>
</tbody>
</table>

Figure 2: Mean Reaction Times of Grades on priming tasks. X-axis representing the grades and Y-axis representing the average reaction times in milliseconds.

Table 3 shows the correlation value between morphological sensitivity and Reading across Grades IV, V and VI. The correlation values between inflectional morphemic sensitivity and Reading are 0.809, 0.829 and 0.537 for Grades IV, V and VI respectively. The correlation values show that inflectional morphemic sensitivity is highly correlating with reading on Grades IV and V and moderately with Grade VI. The correlation values between Derivational morphemic sensitivity and Reading are 0.535, 0.232 and 0.452 for Grades IV, V and VI respectively. The correlation values show that Derivational morphemic sensitivity is moderately correlating with Grade IV reading and where as the correlation of Grade V and VI derivational morphemic ability with reading is lower than Grade IV. To summarize, the correlation results revealed that the
correlation degree between morphological sensitivity and Reading reduces as Grades increases suggesting a better correlation at lower grades (IV and V).

**Table 3. Correlation value between reading and morphological sensitivity (on sentence completion task only) across Grades IV, V and VI.**

<table>
<thead>
<tr>
<th>(Grades)</th>
<th>Reading and Morphological sensitivity correlation</th>
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<tbody>
<tr>
<td></td>
<td>Inflectional</td>
</tr>
<tr>
<td>IV</td>
<td>.809 ***</td>
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<tr>
<td>V</td>
<td>.829 ***</td>
</tr>
<tr>
<td>V</td>
<td>.537 **</td>
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*low correlation  
**moderate correlation  
***high correlation

**Discussion**

The present study administered a Word reading test (Purusothama, 1986) which revealed that selected participants showed improved performance with increasing grades (39, 41 and 46 for grades IV, V and VI respectively, 50 being the maximum). The present study examined the explicit knowledge of children studying in Grade IV through Grade VI in Kannada medium on knowledge of inflectional and derivational morphemes.

Results show that the knowledge of inflectional morpheme increases with increase in Grade. However the increment is more prominent between Grade IV to Grade V. The improved performance on morphemes at these Grade levels is also reported by McCutchen, Green, and Abbott (2008). McCutchen et al, found that morphological awareness continued to develop from Grades IV through VI, and the development was most pronounced when derivational morpheme forms required phonological changes to their root words (i.e., phonologically opaque items like signature/sign).

Karanth and Suchitra, (1993) and Scholes, (1993) reported that school going children become increasingly proficient in identifying grammatical inaccuracies from Grade I through VII. Similarly Anglin (1993) also estimated that children between Grades III and V develop more derived morphemic knowledge than their knowledge of single morphemic roots itself. The statement by Anglin could be contained to English language and may be to related orthographies.

The present study, however, did not attempt to measure the single morphemic root’s growth in the Grades tested. Nevertheless the increase in performance on derived morphemes across Grades IV, V and VI in present study could be compared with study by Anglin (1993). Researchers commented that the growth might be related to children’s knowledge to recognize morphological relationships among words and apply that knowledge into better language fluency and expanded vocabulary (e.g. Anglin, 1993; Derwing, Smith, & Wiebe, 1995; Nagy & Anderson, 1984; Nagy & Scott, 2000; Nagy et al., 2006).

The present study also showed consistent development in both inflectional and derivational morphemes in Grades IV, V and VI. The difference in the development of inflectional and derivational morphemes is also stated by Wolter, Wood, and D’zatko, (2009). Wolter and colleagues compared the development of inflection and derivational morphology in English. They identified that first grade was time for spurt of development of inflectional morphemes and the later elementary grades were identified as a time of derivational growth in English. The scores of inflection morphemes being higher than derivational morphemes in the present study suggest that knowledge of inflectional morphemic rules was relatively better compared to derivational rules (see also Devaki, 1983 for order of acquisition of morphological rules in Kannada).

The study also examined the implicit morphological knowledge using priming task designed using inflectional morphemes. Priming paradigm of the present study also exhibited increased sensitivity of morphemes while reading from Grades IV through VI. The results show that children who read better also scored better on implicit usage of inflectional morphemes in priming task. Similar priming study was conducted on Grade IV French readers by Casalis, Dusautoir, Cole`, and Ducrot (2009) using morphological and orthographical priming paradigm. Their results revealed the significance of morphological knowledge for visual word recognition. McCutchen, Logan, and Biangardi-Orpe (2009) also studied the significance of morphological knowledge for reading using priming paradigm. Children in their study read target words more
quickly and more accurately when primed by words that were morphologically related compared with words that had only general semantic or orthographic and phonological overlap with targets. The results on priming task of present study also showed that children from higher grades responded faster when primed by morphemes, suggesting greater significance of morphemic sensitivity.

Morphology and reading have been related empirically by researchers in the past. Wei-Lun Chung and Chieh-Fang Hu (2007) suggested from their research findings that facilitative effect of morphological knowledge in reading was not significant in very initial stages of reading acquisition. However the facilitation effects are likely to appear at later elementary Grades. Siegel and Linda (2008) also reported that morphological awareness was more significantly related to reading and spelling over phonological awareness and oral language skills. Authors extended the findings into individuals with dyslexia and found that Dyslexics had significantly lower scores than normally achieving readers on the morphological awareness tasks. The relation between explored relationship between morphology, reading and vocabulary size is also studied in deaf adults by Bastien, Dubuisson, Bélanger, and Daigle (2006) and reported a positive correlation among the variables. A large number of studies have documented a significant connection between children's derivational morphological awareness and their reading and spelling skills (e.g., Carlisle, 1987, 1988, 1995, 2000; Carlisle & Stone, 2005; Champion, 1997; Elbro & Arnbak, 1996; Fowler & Liberman, 1995; Green et al., 2003; Mahoney, Singson, & Mann, 2000; Nagy, Berninger, & Abbott, 2006; Singson, Mahoney, & Mann, 2000; Windsor, 2000). Majority of these studies not only found such associations in normal children but also in children with reading and language/learning disabilities.

In the present study also, an increase in the performance of participants from Grade IV through Grade VI on all the three tasks under study-word reading, sentence completion tasks with inflectional and derivational morphemes, and priming tasks with inflectional morphemes suggest the possibility of relationship between reading skills and knowledge of inflectional and derivational morphology. The results of the present study suggests that facilitating morphological awareness may also facilitate word reading (Parel, 2005), thus a alternative view to intervention of children with Reading difficulty in Kannada language.
Acknowledgements

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Appendix

Selected words from word reading task of Purushothama (1986)

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Sentence completion task (inflectional morphemes)

1. ಕುಡು ಇರುವುದೆಲ್ಲದಿಯ (ಕುಡು ಇರುವುದೆಲ್ಲದಿಯ)
2. ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ (ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ)
3. ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ (ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ)
4. ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ (ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ)
5. ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ (ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ)
6. ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ (ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ)
7. ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ (ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ)
8. ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ (ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ)
9. ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ (ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ)
10. ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ (ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ)
11. ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ (ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ)
12. ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ (ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ)
13. ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ (ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ)
14. ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ (ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ)
15. ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ (ಸೂರಾ ಇರುವುದೆಲ್ಲದಿಯ)
Sentence completion task (Derivational morphemes)

1. ಎದರಾದ..(ಅದರೆ)
2. ಇದ್ದ ಸುತ್ತ..(ಹಳೆ)
3. ಎದರಾದ ಹುತ್ತುಸು..(ದರೆ)
4. ಪಾಲು ಮುಲ್ತ ಮುತ್ತ..(ಮುಲ್ತು)
5. ಎದರಾದ ಹುತ್ತುಸು ಹುತ್ತು..(ದರೆ)ಹುತ್ತು ಹುತ್ತು..(ದರೆ)
6. ಎದರಾದ ದೈತ್ಯವಾದ..(ಹಳೆ)
7. ಎದರಾದ ಹುತ್ತುಸು..(ದರೆ)
8. ಸುತ್ತು ಸುತ್ತು..(ಸುತ್ತು)
9. ಪಾಲು ಮುಲ್ತಾನಿಸ..(ಮುಲ್ತಾನಿಸಿ)
10. ಎದರಾದ ದೈತ್ಯವಾದ..(ಹಳೆ)
11. ಎದರಾದ ಹುತ್ತುಸು..(ಹುತ್ತು)
12. ಎದರಾದ ಹುತ್ತುಸು..(ದರೆ)
13. ಮುತ್ತು ಮುತ್ತು ಮುತ್ತು.., ಅನ್ನೆ ಎದರ ಹುತ್ತು..(ಹಳೆ)
14. ಎದರಾದ ಮುತ್ತು ಮುತ್ತು..(ದರೆ)
15. ಎದರಾದ ಹುತ್ತುಸು..(ದರೆ)ದರೆನಿರ

Priming task using inflectional and derivational morphemes

<table>
<thead>
<tr>
<th>Prime</th>
<th>Target</th>
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<tbody>
<tr>
<td>1. ಮಪರಾ</td>
<td>ಮಸ್ತುಳುಳು</td>
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<tr>
<td>2. ತರಕಾರ</td>
<td>ತರಕಾರುತ್ತು</td>
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<tr>
<td>3. ನಾಹಿ</td>
<td>ನಾಹಿರು</td>
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<tr>
<td>4. ಅೆಂದೆ</td>
<td>ಅೆಂದೆಯುತ್ತು</td>
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<tr>
<td>5. ವಚನ</td>
<td>ವಚನಿ</td>
</tr>
<tr>
<td>6. ಕಾಡು</td>
<td>ಕಾಡುರು</td>
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<tr>
<td>7. ತಾಲುಕಾ</td>
<td>ತಾಲುಕಾಯದು</td>
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<tr>
<td>8. ಹಾಗು</td>
<td>ಹಾಗುಗಳು</td>
</tr>
<tr>
<td>9. ಹಾಕು</td>
<td>ಹಾಕುವ</td>
</tr>
<tr>
<td>10. ಮಕ್ಕಳ</td>
<td>ಮಕ್ಕಳಿಗಳು</td>
</tr>
<tr>
<td>11. ಹಾಕು</td>
<td>ಹಾಕುವ</td>
</tr>
<tr>
<td>12. ತಾಲುಕಾ</td>
<td>ತಾಲುಕಾಯದು</td>
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<td>13. ತಾಲುಕಾ</td>
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<td>14. ಹಾಕು</td>
<td>ಹಾಕುವ</td>
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<tr>
<td>15. ಮಕ್ಕಳ</td>
<td>ಮಕ್ಕಳಿಗಳು</td>
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</tbody>
</table>
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Relationship between Morphology and Reading in Kannada

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