



Recall of inflectional morphemes in Kannada speaking children

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Abstract

The current study investigates the ability to recall inflectional morphemes in typically developing 30 Kannada language speaking children in the age range of 6-9 years. The task consisted of 7 stimulus sets. Each stimulus set comprised of seven words. The words were formed by adding 7 different inflectional markers. The task of the participants was to recall the words in any order they want (free recall). The mean scores obtained by the children of grade 1, grade 2 and grade 3, was computed and analyzed. The mean scores for children belonging to these grades were 22, 28 and 34 respectively. Further statistical analysis was carried out using Kruskal Wallis test, as the data did not abide by the properties of normal distribution and the X^2 value obtained was 3.34 ($p < 0.05$) showing that there was significant difference between the three grades.

Keywords: recall, Kannada, inflectional, morphemes, children

1. Introduction

Memory is one of the main cognitive abilities that deals with retention of information. The development of memory in children has been studied extensively especially in regard to the working memory. With advancement of age, the children's retention capacity also increases and has a direct bearing with the development of academic knowledge and general intelligence (Conway, Kane, & Engle, 2003)

Memory is assumed to involve three stages of processing namely encoding, storage and retrieval of information. Encoding is the first stage in memory processing; it basically revolves around the information registered from the senses and converted to a storable form. The term echoic memory is used for storing information in the auditory modality, while the term iconic memory is used for storing information in the visual modality. Once the information is encoded, it is stored in buffers and retrieved based on situations or contexts. Recall and recognition are considered to be a part of retrieval. Recall and recognition are final stages of information retrieval, recognition is more basic skill when compared to recall. Recall is also used as an experimental task which taps all three stages of memory processing. However, the task provides more information on retrieval than the other two stages. The performance on recall is influenced by certain linguistic and non-linguistic variables. The non-linguistic variables influencing the

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performance on recall include motivation, attention, context, state dependent memory, gender, health status, physical activity, exposure, head trauma and interference

Linguistic variables are known to influence recall abilities significantly. The effect of linguistic variables on working memory in general and recall per se can be delineated through the language-based models of verbal working memory (vWM). These models make a speculation that the tentative storage of verbal information is directly dependent on the direct activation of corresponding representations within the linguistic system (Acheson & MacDonald, 2009; Majerus, 2013).

Some of the linguistic variables influencing the performance on recall include word length, concreteness and abstractness of the words, semantic relationship between the words etc. Word frequency and word length are known to influence recall directly. Considering the effect of word frequency on recall, many studies favour the claim that recall of high frequency words is better as compared to low frequency words (Gillund & Shiffrin, 1984). Considering the word length, shorter words are supposed to be recalled better as compared to longer words (Postman, 1970). Studies on concreteness and semantic relatedness have yielded mixed results as the findings are heterogeneous.

There is sparsity in studies concerning the effect of morphological structure on recall however, there are fewer studies on the same. To cite a few, Service and Tijulin (2002) carried out a study to investigate the effect of morphological structure on recall. Immediate serial recall paradigm was used. In adjunct with recall task sentence reading, equation verification and counting tasks were also administered and these tasks were called as complex secondary tasks. The study was conducted in Finnish; and it was found that the morphological complexity had a direct bearing with the recall. This study was followed by another study by Service and Maury (2015), where the participants of the study were asked to recall inflectional, derivational and morpho-phonemic variations. It was found that the participants were able to recall morpho-phonemic variations easily; followed by derivations and inflections in Finnish. Haradda and Miki (2011) carried out a study with the aim of investigating the time for recall and associative morphological memory; it was found that the time required for recall reduced when the participants were able to associate between the stimuli based on morphological information. The current study investigates the morphological recall in Kannada. Kannada is a language spoken in Karnataka, a South-Indian state. The language has 7 different inflectional morphological markers (Sumanth, Sunil & Abhishek, 2022). The aim of the current study was to investigate the ability to recall inflectional morphemes in typically developing children (TDC). Children between 6 to 9 years were considered for the study. The primary intent was to establish a relationship between morphological complexity and age. The other intent/aim was to infer the relationship between the morphological markers and recall; in other words, the study intended to deduce which of the morphological markers was easy to recall by the participants, and which morphological marker/s induced load on memory and proved to be the difficult recall in these children.



1.1. *Need for the study*

To the best of our knowledge, no study is available in Kannada language on the recall of morphemes in the Indian context. In addition to this, it is note-worthy that all the studies cited above were carried out on adults, and there is a clear dearth of literature pertaining to the development of morphological recall abilities with respect to the age. These factors necessitated the current study. The study can be considered as a preliminary study and an exploratory study at the same time; preliminary, as limited number of participants was considered; and exploratory, as the premise has been investigated for the first time.

1.2. **Aim of the study:**

The current study investigates the ability to recall inflectional morphemes in typically developing Kannada speaking children.

1.3. *Objectives*

To compare the recall abilities in children between 6.0-7.0 years, 7.1 to 8.0 years and 8.1 to 9.0 years.

To study the relationship between the type of morphological marker and recall.

2. Methodology

2.1. *Participants:*

Purposive sampling was used in the recruitment of the participants. 30 typically developing Kannada-speaking, school-going children between the age of 6 to 9 years were recruited for the study. English was the medium of instruction for all the participants, however Kannada was the first language at school. WHO 10 questionnaire, 2011 was administered on the participants to rule any cognitive and communication related problems in the children. Based on their age, the children were divided into three groups. The first group (designated group 1) consisted of 10 children (6 females and 4 males) in the age range of 6.1 to 7.0 years and were students of first standard at the time of conduct of the current study. The second and third groups (designated group 2 and group 3) consisted of 10 children each with the same female to male ratio, and studying in second and third standard respectively at the time of conduct of the current study.

2.2. *Stimulus*

As the study was a seminal study and was not measuring the development directly, the validity check/expert opinion on complexity or relevance to specific grades were not sought. The stimulus was newly generated for the study. The stimulus comprised of 7 stimulus sets, each stimulus set comprised of 7 words, each word comprised of a different root word with an exclusive morphological marker. The 7 different inflectional morphemes occurring frequently in Kannada language were considered for the study. These are nominative /u/, accusative /ənnu/, ablative /inḍa/, dative /ge/, genitive /ja/, locative /əlli/, and vocative /e/. It was decided to consider each of these morphological markers; adjoin them with root words, and make a stimulus set out of it. In other words, the stimulus set

comprised of 7 different words, each with a different morphological marker and a different root word. Examples of stimulus set are /puṣṭakavu/, /hanənnu/, /huvinda/, /avalige/ /baleja/, /urinəlli/, /havugale/. There were 7 such stimulus sets. These words were recorded from an adult female speaker. The stimulus spanned for about 90 seconds and the participants were given a duration of 60 seconds to sub-vocally rehearse and recall the items.

2.3. Procedure

The testing was carried out in a silent environment. Each child was made to sit in front of a laptop and wear over-the-ears Sennheiser head phone and listen to all the stimuli in the stimulus set and repeat back after listening eventually. The participants were asked to recall the items in any order of their choice. Hence the recall task was a free recall task. The participants were asked to recall immediately after the stimulus presentation; hence, it was immediate serial recall. The responses from the participants were audio-recorded and analyzed further to score the responses.

2.4. Scoring

Since the task was a free recall task, the order of recall was not given importance. When the participant was able to recall the whole word (including the root word and the corresponding morphological marker, a score of 1 was allotted, the participants were not given any score (score of 0) when they did not provide any response, skipped the word or produced a substitution response. The response was considered as a substitution response when the participants interchanged the root word and morphological marker, in other words when the morphological marker was wrongly associated with the root word, a score of 0 was given. Since there were 7 stimulus sets and each stimulus set comprised 7 words, the maximum score receivable was 49. The scores were computed separately for each of three groups as the primary objective was to compare the performance of children across the three age groups. In addition to this, the response was qualitatively analyzed to determine the relationship between morphological complexity and recall.

3. Findings

The first objective of the study was to compare the recall abilities in children between 6.0-7.0 years, 7.1 to 8.0 years and 8.1 to 9.0 years. The participants were divided into three groups: group 1, group 2 and group 3. Age and grade were the grouping variables. As discussed under the 'scoring section' of the method, the study used 7 stimulus sets and each correct response was given a score of 1 and the maximum score accounted to 49.

The mean scores of group 1, group 2 and group 3 participants was 22, 28 and 34 respectively. The median scores converged with the mean values (+/-2); and the median values showed the same trend as the mean values. The SD for the three groups was 8.2, 8.9 and 7.72 respectively. The descriptive analysis clearly showed an exponential rise in the performance. Group-3 children performed better followed by group-2 and group-1



children. The results thus showed that the performance varied as a function of age. Qualitative analysis showed that children transposed the root word with the morphological markers making room for errors. This trend however reduced with age as children in the third group exhibited fewer errors like this. No responses were higher for the lower age group.

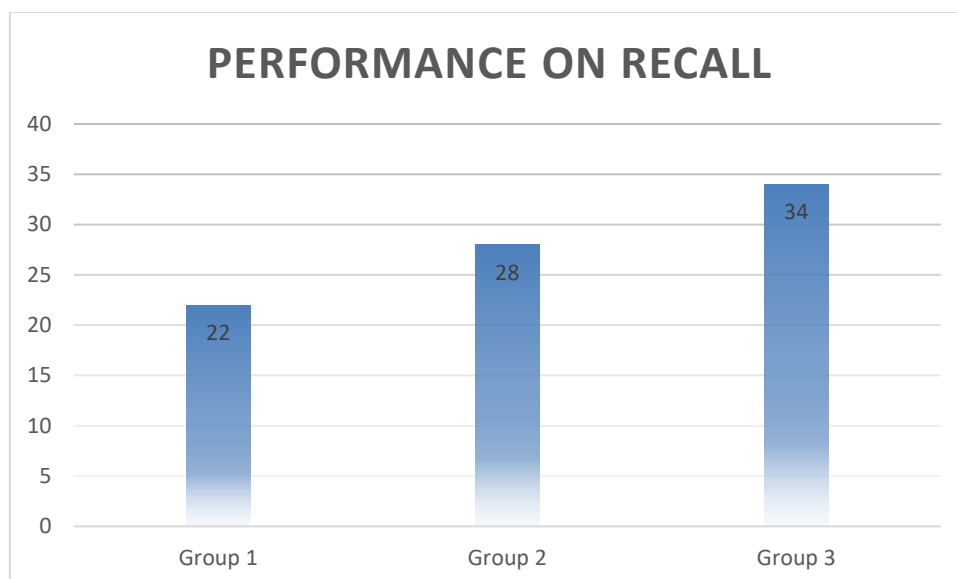


Figure 1. Performance of the three groups on recall task

Further statistical analysis was carried out using Kruskal Wallis test, as the data did not abide by the properties of normal distribution and the X^2 value obtained was 3.34 ($p < 0.05$) showing that there was significant difference between the three grades. Thus Mann-Whitney was carried out for group wise comparison and the Z score obtained on comparing group 1 with group 2 and group 2 and group 3, group 1 and group 3 was 3.34, 3.18 and 3.96 respectively and the corresponding p values showed a significant difference suggesting that the performance on recall task for inflection markers varied as a function of age.

The second objective of the study was to determine the relationship between the types of morphological marker and recall task. As stated in the method section, seven different types of morphological markers were used and the recall for each of the morphological marker (inflection marker) was compared for each of the age groups. Details are provided in Table 1 and Figures 2-8 The maximum score for each morphological marker across the 7 stimuli set was 7.

Table 1
Inflectional Morpheme wise information

| | Group 1 | Group 2 | Group 3 |
|-------------------|---------|---------|---------|
| nominative /u/ | 4 | 5 | 4 |
| accusative /ənnu/ | 3 | 4 | 5 |
| ablative /inḍa/ | 3 | 4 | 5 |
| dative /ge/ | 3 | 4 | 5 |
| genitive /ja/ | 3 | 3 | 6 |
| locative /əlli/ | 4 | 4 | 5 |
| vocative /e/ | 2 | 4 | 4 |

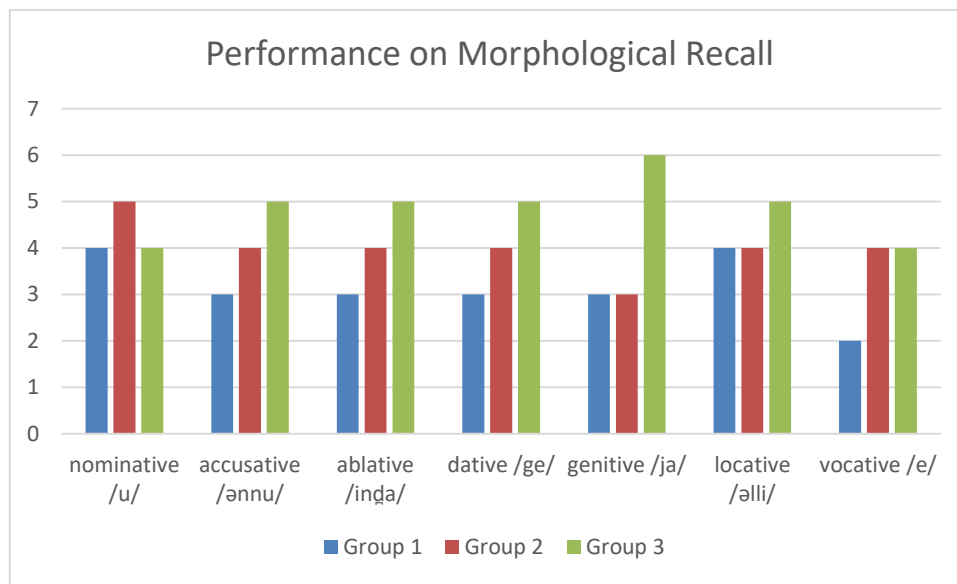


Figure 2. Performance on Morphological Recall with respect to different morphemes

As shown in Table 1 and Figure 2, the performance for each morpheme showed a developmental trend i.e. the recall for all the seven morphological markers increased with age (except nominative /u/). Considering all three groups, there was only a marginal difference across the different morphemes. Group 1 children were able to recall items with nominative and locative morphological markers while they confront difficulty with the vocative inflectional morphological marker. Group 2 participants were also able to recall nominatives slightly better but the performance did not vary as a function of the type of morphological markers; as the difference was only marginally different for different morphological markers. Group 3 participants were able to recall the genitive morphological markers better. Thus, there was no trend observed as far as the type of morphological marker and recall is concerned. In addition to the pre-set objectives, the performance of three groups were analyzed across the genders for each of the inflectional markers. There were 6 females and 4 males in each group.

The mean scores for males and females in each group are tabulated in Table 2 and Figure 3.

Table 2
Performance of the participants across gender

| | Females | Males |
|---------|---------|-------|
| Grade 1 | 24 | 20 |
| Grade 2 | 30 | 26 |
| Grade 3 | 36 | 32 |

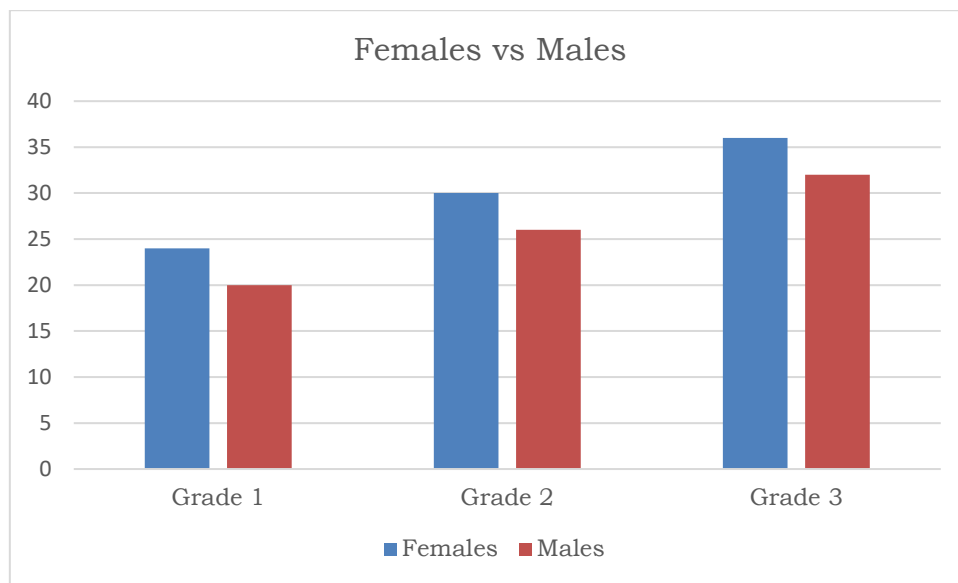


Figure 3. *Performance of the participants across gender*

In order to verify if there was any significant difference across the two genders, Friedman’s test was carried out. The X^2 value obtained was 2.98 and the corresponding p value ($p < 0.05$) showed significant difference across the two genders.

4. Discussion

The current study investigated the ability to recall inflectional morphemes in typically developing Kannada speaking children. The literature suggests that there is a dearth of studies focusing on the acquisition of inflection morphemes in Kannada language. However, there are a few studies on morphological recall such as, Service & Tijulin, 2002; Service & Maury, 2015, most of these studies are on adult participants and the objective of these studies is to compare the recall of inflectional and derivational morphemes together. A few studies have been carried out in the

Indian context as well. However, the focus of these studies is on the development of Person, Number and Gender markers (PNG) in Kannada. For example, a study carried out by Pooja, Rakshitha, Neha and Satish (2020), tracks the development of the PNG markers in Kannada speaking children between 4-8 years. As there are no available studies on the schedule of development of the seven inflection markers in Kannada language, specific data on development of the seven inflectional morphological markers cannot be correlated. The current study used immediate free recall of inflectional morphological markers in children between 6 to 9 years. Children in this age range were considered for the study due to the reason that children of this age will have general awareness about the different inflectional markers. The task of the participants was to recall the root words adjoined with its corresponding inflectional markers. The responses were deemed correct when they were able to recall the whole word (root word+ inflectional morpheme). The first objective was to compare the performance on recall in the three different age groups. The statistical analysis on Kruskal-Wallis followed by Mann Whitney U test suggested that there was grade wise/age-wise difference in the performance. Group 3 (8.1-9.0years) outperformed the children of other age group. On qualitative analysis, it was observed that all the participants regardless of their age exhibited transposition errors; that is, they exchanged the root words and inflection markers. Younger children (6.0-7.0 years) exhibited more errors than the latter group.

The gradation in the performance can be attributed to the development of the cognitive skills, the cognitive development shows gradual development with respect to age (Conway, Kane, & Engle, 2003). This has a direct bearing with the development of intelligence and academic skills. Children in group 3 would have a better retention capacity which would have attributed to greater scores on morphological recall

The other objective of the study was to determine the relationship between the type of morphological marker and recall. The performance on the 7 morphological markers (across the seven different stimulus set) was computed and analyzed and the analysis revealed a marginal difference between the different morphemes. As stated in the "Methods" section, the current study is a preliminary and exploratory study at the same time. The primary limitation was that limited number of participants participated under each age-range. The study may be extended by enrolling more participants hence the relationship between age and performance on recall can be determined. In addition, by employing more stimulus sets, the performance on the seven inflection markers may be tracked in a form that is more robust. The validity of the stimulus can be checked in the future studies to minimize the variability concerning the same. The study can also be elaborated by employing derivational morphemes so that the performance on both inflectional and derivational morphemes can be compared.



5. Conclusion

The study was carried with the aim of investigating the ability to recall in typically developing Kannada speaking children. Children in the age range of 6 to 9 years were considered and the participants were divided into three groups based on their age. Immediate free recall task was administered on the participants. Root words adjoined with seven different inflectional morphological markers were coined and used as a stimulus set. 7 such stimulus sets were used. It was found that the performance showed a graded improvement with age. Older children outperformed younger children. Mainly transposition errors were seen. In regard to the ease of recall among the 7 different morphological markers, the response varied across the three groups as well as the 7 different inflectional markers.

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