



Immediate and Delayed Recall for Words and Non-Words in Native and Non-Native Speakers

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Abstract: Memory is an important aspect of cognition. Recall and recognition can be used as experimental tasks for assessing memory. Non-Word Recall taps phonological short term memory. The non-word recall is language sensitive hence there is a need to investigate this ability in native and on-native speakers. The current study aimed to study immediate and delayed recall in native and non-native speakers. A total of 30 participants (15 native and 15 non-native speakers) in the age range of 18-30 years participated in the study. 15 words and 15 non-words were presented in Malayalam and the participants were asked to recall the stimulus immediately after the stimulus presentation and 2 days post stimulus presentation. The results of the showed that the performance on recall varied for words and non-words. Performance on Recall was better for native compared to non-native speakers.

Keywords: Phonological Short Term Memory, Native Advantage, Recall, Retention, Transfer

About the Authors



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1. Introduction

Memory is considered as an important cognitive function. Though different models of memory have been proposed till date, most of the models consider that processing for memory would take place in three stages: encoding, storage and retrieval. The information that lasts in memory is directly dependent on these three stages. Short term memory, working memory and long term memory are considered as the variants of memory. Short term memory is the component of memory system that holds information that the individual is consciously thinking off. The retention span of information in short term memory is assumed to be in seconds.

Memory has been investigated in native and non-native speakers. Verbatim recall or sentence recall has been investigated in this population (Schweppe, Barth, Noltge & Rummer, 2016) and it is been reported that non-native speakers performed poorly compared to native speakers. Stalhammar, Hellstrom, Eckestrom and Wallin, 2022 administered a series of neuro-psychological test battery comprising of memory task in native and non-native speakers and report that non-native speakers performed poorly on verbal tasks. Word definition task on meaning recall in second language learner (Gyllastad, Sundqvist, Sandlund & Kaikvist, 2022). In this study the words were



preceded by translation equivalents and translation non-equivalents and it was observed that the words preceded by translation equivalents were recalled better showing that the language mediates memory/recall.

The role of short term memory especially the phonological short term memory is considered to be pivotal in language learning (Service, 2013). The phonological short term memory is assumed to play an important role in learning words of the first language as well as non-native language especially foreign language (Service & Kohonen, 1995; Atkins & Baddeley, 1998) and also syntax (French, 2006). The phonological short term memory store is assumed to involve a rehearsal component by default and plays a major role in preventing the decay of information. The information in the phonological short-term memory is considered to act as an interface in transferring the information to long term memory.

The phonological short term memory recall task can be used as an experimental task in investigating many questions in language studies and psycho-linguistics. It can use words and non-words as stimuli. The non-words violate the phonological expectations (Kujala *et al.*, 2004) which in turn would increase the complexity or would impose the load on phonological short term memory. The current study aimed to explore the role of phonological short term memory in learning words and non-words in native and non-native speakers.

The phonological short term is employed in assessing the learning of words and non-words, the non-words are considered as irregular and novel stimuli hence the role of phonological short term memory in learning the regular and irregular stimulus is explored. The participants are asked to recollect the regular and irregular stimulus on two time intervals or gap, one immediately after training and another after a lapse of 2 days or greater than 2 days to assess if the phonological short term memory has facilitated the transfer of information to long term memory. The current study is distinct from the studies carried out in the past as it considers native and non-native speakers of a given language to affirm the native advantage in learning regular and irregular stimulus.

The aim of the study was to compare the number of words and non-words learnt by native and non-native speakers of Malayalam for words and non-words on immediate and delayed retrieval task.

2. Methods

2.1 Participants

15 female native speakers of the Malayalam language and 15 female non-natives between the ages of 18;0 and 24;11 (years; months) took part in this study. All participants were students pursuing undergraduate and post-graduate courses. The participants for this study were chosen by convenient sampling.

2.2 Materials

The stimuli used for the study were pre-recorded, in a smartphone as two audio files. It was recorded by a native female speaker and was presented to the participants via wired headphones, at a constant amplitude.

The first stimuli set was of 15 Malayalam words of word length that ranged from 2 syllables to 6 syllables. The second set was of 15 non words, which were formed by transposing the syllables of meaningful Malayalam words. The length of the non-words ranged from 3 syllables to 4 syllables. The inter-stimulus interval was kept at a constant of 2 seconds for both the words and the non-words.

2.3 Procedure

Phonological Short term Memory task/Immediate re-call task:

This experiment began with each participant being presented with 15 Malayalam words in the auditory mode. They were instructed before the initiation of the stimuli to re-call and tell the words they remember, immediately at the end of the stimuli set. They would also be instructed in prior that each stimuli set would be played only once.

This was followed by presenting 15 non-words. The participants were asked to re-call and tell the non-words as soon as the last stimuli ended.

Phonological long-term memory task/Delayed re-call task:



The participants were informed to come after two days, for the subsequent task – delayed re-call. For this task, they were instructed to re-call and tell the meaningful Malayalam words as well as the non-words, that they remember. The audio stimuli were not presented again, for this task.

2.4 Scoring

The participants were scored under two categories: immediate re-call and delayed re-call. The natives and non-natives were scored separately for both categories.

The participants were given a score of '1' for correct re-call of the words and non-words each, and '0' for an incorrect re-call. The total scores were calculated for each participant, for both the immediate re-call and delayed re-call tasks. The order in which the words/non-words were recalled was not considered.

3. Results and Discussion

The mean and median values were extracted for native and non-native speakers of Malayalam for the words and non-words on immediate and delayed naming conditions. For native speakers, the median score was 7 for words and 5 for non-words on immediate recall/retrieval task. While the median score for words and non-words on delayed recall/retrieval task was 5.0 and 1.0 respectively. In the same lines, the median scores was calculated for non-native speakers. On immediate naming the median score was 4.0 and 2.8 for words and non-words respectively. On delayed naming, the median score was 2 and 1.0 for words and non-words respectively.

Table 1. Median Scores of the Participants

	Native	Non Native	Native	Non Native
Words Immediate recall			Words Delayed Recall	
Mean	7.8	4.0	6.1	2.0
Median	7.0	4.0	5.0	2.0
Non-Words: Immediate recall				
Mean	6.133	2.8	1.6	0.48
Median	5.0	3.0	1.0	1.0

As the main objective dealt with the comparison of the number of words and non-words that the participants were able to retrieve on immediate and delayed tasks between group comparison was carried out. The data was subjected to test of normality using Shapiro Wilks test and p value was < 0.05 indicating that the data was non-parametric. Mann Whitney U test was used and the Z score obtained was -4.018 and -2.489 for words and non-words on immediate recall and the corresponding p value showed significant difference between the two groups on both words as well as non-words. On delayed recall, the Z scores obtained was -3.96 and -3.42 and the corresponding p values showed significant difference for the two groups. In addition to the pre-set objectives, within group analysis was carried out using Wilcoxon's signed rank test and the statistic showed significant difference between words and non-words with Z scores of -2.7 and 3.14 for immediate and delayed recall tasks for native speakers and for non-native speakers, the Z scores was -3.30 and -3.417 for immediate and delayed recall task.

The descriptive analysis showed that the median scores was better for native compared to non-native speakers for words as well as non-words. The median scores were better for words compared to non-words on both immediate recall as well as delayed recall task. The median scores were on immediate recall compared to delayed recall task. The performance on word and non-word recall is investigated through studies (for ex [Service & Kohonen, 1995](#); [Atkins & Baddeley, 1998](#); [Baddley & Hitch, 1974](#); [Schweppe, Barth, Noltge & Rummer, 2016](#); [Gyllastad, Sundqvist, Sandlund & Kaikvist, 2022](#)). All these studies have reported word recall to be better than non-word recall and the results of the current study was also in consonance with this findings as there was a significant difference between the two groups. The comparison of native and non-naïve speakers is the novel aspect in the current study and the findings showed that the native speakers performed better than non-native speakers reflective native



advantage over word as well as non-word recall and the difference across the median scores was statistically significant. The median scores on immediate and delayed recall varied significantly showing that a short term exposure may not have been adequate to facilitate transfer of information from short term memory to long term memory.

4. Conclusions

Recall refers to the process of retrieving the information in memory. Language is assumed to mediate the cognitive processes and recall is no exception. The current study was carried out with the aim of comparing the performance of native and non-native speakers on recall task. Words and non-words were taken as stimuli. Native and non-native difference was seen for word and non-word recall on both immediate as well as delayed recall conditions. The other significant findings was that the word recall was better than non-word recall and immediate recall was better than delayed recall. The limitation of study was that it used lesser sample size limiting the external validity of the results.

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Appendix

Word list

WORDS	NON-WORDS
pakṣi	uetʃtʃara
tʃitʃraʃalabʰam	ḡʰamo:la
ketʃtʃam	paʃpum
suprabʰa:ʃam	dʰaʊṅsa:rjam
abʰinajam	tʃra:pam
kaʃala:sə	kaʃara
saha:jam	kaḡuḡa
uellija:tʃa	seraka
tʃeṅtame:lam	stampu:kʰam
uellatʃtʃa:tʃam	karsar
bʰakṣanam	keḡiuetʃtə
janaua:ḡil	ma:ʃarakkal
aʃukkala	sahē:rjam
ḡe:ua:lajam	ru:pka
saruakalaja:la	keḡupa

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Contributors

Nuha Haleema and Persis John- Design, Data acquisition, Data analysis, Statistical analysis, Manuscript preparation, Manuscript editing and review; **Neha Shafeeq** - Data acquisition, Data analysis, Statistical analysis; **Abhishek, B. P.** - Conceptual Design, Manuscript preparation, Manuscript editing and review. All the authors read and approved the final version of the manuscript.

Informed Consent

Written consent was obtained from the participants.

Does this article screened for similarity?

Yes

Conflict of interest

The Authors have no conflicts of interest to declare that they are relevant to the content of this article.

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