LEXICAL AND SEMANTIC METHODS OF NOVEL WORD LEARNING IN YOUNG NEURO-TYPICAL CHILDREN: A COMPARITIVE STUDY

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CERTIFICATE

This is to certify that this dissertation entitled "**Lexical and semantic methods of novel word learning in young neuro-typical children: a comparative study**" is a bonafide work submitted in part fulfillment for the Degree of Master of Science (Speech- Language Pathology) of the student (Registration No: 17SLP036). This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier for the award of any other Diploma or Degree to any other University.

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CERTIFICATE

This is to certify that this dissertation entitled "**Lexical and semantic methods of novel word learning in young neuro-typical children: a comparative study**" has been prepared under my supervision and guidance. It is also certified that this has not been submitted earlier for the award of any Diploma or Degree to any other University.

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DECLARATION

This is to certify that this dissertation entitled "**Lexical and semantic methods of novel word learning in young neuro-typical children: a comparative study**" is the result of my own study under the guidance of Dr. Abhishek B P, Lecturer, Department of Speech Language Sciences, All India Institute of Speech and Hearing, Mysore and has not been submitted earlier for the award of any Diploma or Degree to any other University.

Mysore

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CHAPTER I

Introduction

Fast mapping is a mechanism through which children learn new concepts based on minimal exposure to it. It is thought to be an important mechanism involved in language acquisition. It serves to explain the rapid growth of vocabulary in young children, especially the toddlers. Previous research in fast mapping has shown that children are able to retain a novel word for a substantial amount of time after they are exposed to the word for the first time (Carey & Bartlett, 1978). Further research by Markson and Bloom (1997) showed that children can remember a novel word a week after it was presented to them even with only single exposure to the novel word. Various researches have been conducted on this concept to analyse the cognitive process involved in vocabulary development and find out various factors affecting this mechanism. Plante & Creusere (2004) found out that fast mapping skill depends on the linguistic abilities of children. Studies conducted on sequential bilingual children revealed that children's word retention was associated with their existing language knowledge and their fast-mapping performance within and across language (Kan, 2014). Further, studies are also conducted on fast mapping in pathological population.

A study by Lietao and Claessen (2015) on children with specific language impairment showed that receptive vocabulary and phonological short term memory capacity were the significant predictors of fast mapping abilities. Other researches on children with Autism, Hearing impairment and Intellectual disability have reported similar findings. However, they suggest that the word-learning strategies are acquired even when children are severely delayed in their language development and learn

language in an atypical environment (Lederberg, Prezbindowski & Spencer, 2003). Researches in the Indian context have reported that fast mapping abilities also depend on factors like, phonological complexity of the word, language proficiency, degree of exposure to the language and opportunities to use the language (Sushma, Amulya, Ranjini,& Swapna, 2010)

The research findings from the recent past are contradicting to the previous findings. It indicates that children do not learn novel words using 'fast mapping' but rather learn through ‘slow mapping’ (Carey & Bartlett, 1978.) Slow mapping can be defined as a process where children learn words in a meaningful environment associating them with its semantic features. The investigators opine that children learn novel words with a single exposure using fast mapping skills but it may not be sufficient for the development of the lexicon. To retain the words learnt through fast mapping, a subsequent extended slow mapping would be required for novel word learning.

Majority of the studies conducted on novel word learning are based on fast mapping skills and there is a dearth of literature on slow mapping skills, especially in the Indian context. Hence the present study is valuable in exploring the slow mapping abilities of children. It is also important to know which mechanism (fast mapping or slow mapping) enhances novel word learning process in children because this is the age at which the child’s vocabulary get boosted up.

Need for the study

a) Most of the studies related to novel word learning are based on fast mapping abilities of children and there are limited studies in the Indian context related to slow mapping abilities of children.
b) Novel word learning would be tapped across immediate naming and delayed naming. The performance on delayed naming would decide if learning has taken place or if the word learning is tentative.
c) In addition to this, error analysis would be carried out which would evoke details on the lexical-semantic organization.

Aim of the study

The present study aims at exploring the fast mapping and slow mapping abilities through lexical and semantic methods of novel word learning in young neuro-typical children between the ages of five and six years.

Objectives of the study

a) To compare the number of novel words learnt across lexical method and semantic method on immediate recall.
b) To compare the number of novel words learnt across lexical method and semantic method on delayed recall.
c) To compare the performance across gender in both the groups (lexical and semantic) on immediate recall and delayed recall.

d) To conduct qualitative error analysis of responses produced by children employing the lexical method and semantic method of learning.

CHAPTER II

Review of literature

2.1. Language

Every individual is equipped with the ability to communicate from childhood using a conventional set of symbols (e.g., sounds, gestures, or written or typed characters.) In spoken language, the symbols are produ

ced with the help of specialised structures within the throat and mouth. In sign language, the symbols are produced with the help of hand and body movements. The symbols regardless of the means of communication are used to express feelings and emotions and exchange information.

Language is assumed to be species specific. Human beings use a specialised and sophisticated set of symbols while other animals communicate through vocal noises. Animal communication is considered to be primitive and has a confined number of symbols when compared to human communication. Human beings can use the symbols in a productive and creative way to communicate.

2.2. Components of language

Spoken language is often regarded as a primary means of communication while written language is assumed to be a secondary means of communication. Spoken language and written language have receptive and expressive components. The five language domains are, Phonology, morphology, syntax, semantics and pragmatics. Bloom & Lahey (1978) divide them into three separate but overlapping components. They are Form, content and use. Form includes morphology, phonology

and syntax. Content includes semantics and vocabulary. Use includes the use of language in a social milieu, i.e., Pragmatics.

Study of the sound (i.e., phoneme) system of a language, including the rules that govern the combination of different phonemes, is called phonology; Morphology is the study of the rules that govern how morphemes, the smallest meaningful units of language, are used in a language; Syntax refers to the rules that govern the formation of sentences in a language; Semantics govern the associations of meaning to words in a language and Pragmatics define the rules pertaining to the use of language in a social context. The ability to use language for the purpose of successful communication requires co-relation between the components of language. It develops with the process of language acquisition.

2.3. Language acquisition

Language acquisition is a process which begins in the infancy and continues throughout one's life. During the initial years of life, infants start mapping speech sounds onto its meaning. Subsequently they acquire a large of words that constitute a lexicon. But the process of language acquisition, its ontogenesis and the developmental path thereafter, are still not completely understood. Some of the different characteristics of language acquisition are, Language acquisition is triggered in the infancy and it takes its own course throughout the lifespan of an individual. It requires linguistic stimulation from the environment; the acquisition takes place rapidly, children learn language in a brief amount of time, especially in the early childhood; Language acquisition may not require formal instruction. Many

researchers believe that maternal stimulation is crucial for the development of language in a child; however, instructions by care-takers or parents are not necessary, despite the psychological benefits of attention to the child.

Language acquisition can take place either in a natural condition or a controlled condition. Natural condition refers to a continuous exposure to the language spoken by the adults and the child does not undergo formal instruction. There is little or no feedback to the child with regard to this intake. While in a controlled condition, the acquisition takes place in the background of the native language with formal instructions and an ordered exposure to the data of the language. In rare cases, there can be both natural and controlled conditions, i.e., the child can receive natural exposure to the language from the place of living along with formal instruction.

For effective communication, the sender should be able to deliver the intended concept through appropriate word selection from the 'lexicon', also known as the word pool in the brain. The items of the lexicon are termed as lexemes, or lexical items, or word forms. In Linguistics, language is said to be having two sections, lexicon and grammar. The lexicon serves as a catalogue of the language's words while the grammar allows the combination of these words into meaningful sentences.

2.4. Lexical development

The language acquisition in infants occurs with remarkable speed and sophistication. They learn to discriminate phonemes and babble speech sounds during the first months, following which they acquire their first meaningful utterances or true

words by the end of the first year. (Kuhl, 2004). On the other hand, a second language learner is assumed to acquire the second language more volitionally with more effort compared to native language. The vocabulary acquisition is assumed to more implicit and statistical learning is also assumed to be incorporated during the process of acquisition. . The acquisition of a word form would facilitate mapping of words on to its meaning (Estes, 2007). As the child grows, the size of his/her lexicon increases. Young toddlers acquire 1 to 3 words per month and by the age of 18-20 months, they master about 50 words. Within 2 years, semantic roles are expressed in one or two-word utterances, which would include persons, processions, location, objects, requests and denial. This increase in the rate of word learning that usually occurs between 18 to 24 months of age is known as 'vocabulary spurt.'

There are a lot of theories and hypothesis on word learning and lexical development in children. Some researchers argue that it is the innate capability of children while some are of the opinion that learning takes place by general cognitive processes and it may not be specific to language. Some theorists believe that caregivers play a major role in the lexical development of the child, while others say that children themselves are the active participants in word learning and the role of caregivers is minimal. The recent model of emerginist coalition by Hollich, pasek, Golinkoff, Brand, Brown, Chung, Hennon & Rocroi (2000) suggests that word learning doesn't depend on a single factor. It is an emergent product of multiple factors, including global attentional mechanisms, cognitive constraints and social-pragmatic factors that get utilized at various points of time during the vocabulary development.

The factors affecting lexical development were studied by Louise in 2017. The study focused on investigating language development in preterm children. They included 148 male and 149 female pre-term children of 2 years of age. To evaluate language, they asked parents to fill a developmental questionnaire, which was MacArthur-Bates Communicative Development Inventories. Based on this, the investigation was carried out to check the effects of social, neonatal, demographic, socioeconomic factors, growth, and disability on language development. The results showed that only four factors were significantly associated with language development. They were level of disability, sex, length of hospital stay and weight. There was no significant effect of gestational age or any socioeconomic factor on language development. They concluded that in pre-term children, clinical factors of severe morbidity dominate the correlates of language development at age 2.

Socio-economic status is one of the important factors affecting language acquisition in children. A study investigated the correlation between age, socioeconomic status (SES), and performance on emissive and receptive vocabulary tests in children with typical language development. 60 preschool children of both genders, aged 3 years to 5 years 11 months were considered for the study. The ABFW Child Language Test - Vocabulary and the Peabody Picture Vocabulary Test (PPVT) for emissive and receptive language were applied to the preschoolers. The socioeconomic classification questionnaire of the Brazilian Association of Survey Companies (ABEP) was applied to the preschoolers' parents/legal guardians. Results indicated that there was no significant difference for the variables age and SES

regarding emissive and receptive vocabulary. Higher test scores were observed with increased age and SES, for social levels "B" compared with "D" and for "C" with "D".

A study on spoken word recognition and word production abilities in mid-childhood, by Walley & Amanda, 1993, suggests that word processing and lexical representation are not segmentally based; instead they are more holistic in nature. This is in contrast to the adult word- recognition models like cohort model and neighbourhood activation model. The study also suggests that the segmental restructuring of lexical representations begins by 2 years of age during 'vocabulary spurt' and continues to develop along with efficient storage for vocabulary. This process of lexical development is dynamic and extends over the pre-school years. Unlike adults, the recognition is not based on the partial, word-initial acoustic-phonetic input but the extant variations of basic lexical representations in the segmental structure. The use of such structure for recognition in the preschool period may contribute to individual differences in explicit phoneme segmentation ability, and thus facilitate early reading success.

There are uncountable things in the universe that words could be mapped onto. Many theories have been proposed to account for the way in which children successfully map words onto the correct objects and actions. Quine (1960) was one among the pioneers, who pointed out the complexity of mapping. Since then, various studies are carried out concerning novel word learning and these studies suggest that children acquire vocabulary through the processes called 'fast mapping' and 'slow mapping.'

2.5. Fast mapping and slow mapping

Children often make correct guesses about the meaning of novel words. This is true not only with respect to the context of that speaker but also any or all the other instances including various categories. Understanding children's ability to learn novel words has been the theoretical and empirical concern of research in linguistics and developmental psychology. Hence many researchers have been studying the process of novel word learning in children experimentally. The findings from the experiment show that the children are able to acquire new words by the age of 3 and they make appropriate use of information from various sources to determine what the speaker is referring to at that instance and evaluate how those novel words could be used in different other future situations.

A mere exposure to novel words will evoke learning and this process is termed as 'fast mapping.' This term 'fast mapping' was introduced by Carey & Barlett (1978.) This concept eventually became central to developmental psychology's narrative about the process of novel word learning. Fast mapping refers to the mechanism by which a new word or a concept is learned based on the presentation of information just once. It is thought to be a crucial component of language development by some researchers and it serves to some extent, to explain the rapid acquisition of vocabulary during the first two years of life. Researchers have found children's abilities to recall and sustain certain information, like, facts, but their ability to extend the same in novel words looks to be unique. This indicates that fast mapping is a clearly defined mechanism for novel word learning.

2.6. Studies in western context supporting fast mapping abilities in children

A study from the past on novel word learning in two, three and four year olds by Heibeck and Markman (1987) revealed that children as young as 2 year old quickly infer meaning from a new term indicating the use of the process of fast mapping in novel word learning.

To check whether the fast mapping skills are facilitated by repetition of the novel word, Axelsson and Horst (2014) conducted a similar fast mapping study on 2 groups of 3 year olds. One group received the presentation of novel words without repetition, while the other group received the presentation of the novel words with 5 repetitions with same number of test trials. The children were then subjected to word recall testing, which showed that the children who experienced contextual repetition during the fast mapping task demonstrated better word learning.

To investigate fast mapping abilities in tasks other than repetition, Spiegel and Halberda (2011) conducted a study on 2 year olds where they used picture pointing task to check their ability to infer meaning from a novel word learnt through fast mapping and their ability to retain this mapping over time. In this experiment, the children were asked to identify the novel word by pointing the picture across 6 critical trials which involved familiar and non-familiar objects. They were given a time period of 3 seconds for each trial. In a final post-test trial, all the previously named novel objects appeared and children were asked to point to one of them (e.g., "Could you point at the stalk?") Children had to map the novel words onto its meaning correctly and retain the mappings over the course of the study to succeed in the experiment

conducted. Though the demands of the task were difficult, children exhibited successful identification of the target object on the retention trial. Thus it was concluded that 2-year-olds are able to fast map novel words from a brief single exposure in ambiguous labelling conditions.

To examine the effects of practice and priming on fast mapping, Stowe & Hahn (2013) conducted a study on 2 groups of 8 year olds matched on productive vocabulary. They were taught the names of 24 novel objects in the first set. One group received training for 12 sessions and the other group was exposed to novel words only in the first and last sessions. Following this, a second set of novel words were taught to the same groups of children over a session. The results showed that for children in the first group, extended practice with a first set of high-practice novel words led to the rapid acquisition of a second set of low-practice novel words. This effect of lexical advantage was not observed in the second group of children. The data also revealed that learning some words primes the system to learn more words. Vocabulary development can thus be conceptualized as a continual process of fine-tuning the lexical system to enable increased accessibility to information.

To compare fast mapping ability of children in different conditions of object-word associations, Horst & Samuelson (2008) studied novel word learning in typical 2-year-olds using 4 experiments, where they presented the names for unfamiliar objects and tested immediate and delayed recall of novel words. In their analysis, participants did not show difficulty with fast mapping the object-word sets, but they demonstrated their ability to retain or extend novel words at better than chance levels only in the experiments that included control of the novel objects and direct naming.

In other words, if the examiner directly showed, pointed to and labelled the object, the child was able to extend that name to other category items and retain its name.

Another study supporting mapping abilities in children by Capone and McGregor (2005) revealed that when the children were taught each novel word in the context of a gesture that emphasized its meaning, they developed a deeper knowledge of the word and were able to recall the words more readily than those which were taught without any gestural support.

When children hear a novel word, they tend to experiment by using a novel object rather than a familiar one. This bias is known as disambiguation bias. A study was conducted to investigate the relation between disambiguation biases and fast mapping by Bion, Borovsky, Fernald (2013) in 18-, 24-, and 30-month-olds. The results indicated that the amount of time children focused at a novel object after listening to a novel word. The initial success of using the novel word would further provoke children to use it further and subsequently this word would become a part of their vocabulary. The retention of the novel word post the focus period is assumed to emerge with age. Children who are as young as 18months may not be able to retain the word post exposure. 24 months children were able to retain few words while 30 months children used most of these words subsequently. The researchers concluded that the skills would improve from 18 to30 months of age. However, Word learning is characterized as an incremental process that is related to, but not dependent on the emergence of disambiguation biases.

It is often considered that fast mapping is the result of language learning mechanism, but it is possible that the same mechanism relies on domains other than language learning. Markson & Bloom (1997) conducted an experiment to test the same. They taught novel words and facts to a group of 3 to 4 year old children and a group of adults aged above 18. Both the groups were tested on the retention abilities immediately, after a delay of 1-week and then after a month. The findings revealed that fast mapping does not reflect new word learning by employing linguistic processes. The word may be acquainted by mere exposure or is facilitated through memory.

To compare the mapping process of novel word learning between typically developing children and a pathological group, Sakhon et al (2018) investigated immediate recall (after 5-min) and delayed recall (after 1-week) across two conditions (explicit encoding and fast mapping) and two groups (twenty-six 3 to 5 year old typically developing children and twenty-six 11-28 year old individuals with Down's syndrome with comparable verbal and nonverbal scores on the Kaufman Brief Intelligence Test - second edition.) Results showed that there was no benefit of fast mapping mechanism in either group.

To compare the skill of fast mapping between the typically developing children and children with Specific Language impairment, Plante & Creusere (2004) conducted experiment on these groups. They investigated their ability to fast-map semantic features of objects and actions. They were exposed to novel words and novel words on a computer. Then they were asked questions on the semantic features of those novel actions and objects. Comparatively, the questions on novel objects were

easier than those on the novel actions. Results showed that children with SLI were able to recognize fewer semantic features than their peers with normal language. Also, they performed poorly on lexical label recognition task.

To check the fast mapping abilities in bilingual children, Kan (2014) studied novel word learning in sequential bilingual children. In this study, pre-school children were taught sixteen novel words in each language, following which immediate recall testing (after a day) and delayed recall testing (after 3 months) was done. Results showed that children retained more words in L1 than in L2 for both of the retention interval conditions (immediate recall and delayed recall.) In addition children's word retention was associated with their existing language knowledge and their fast-mapping performance within and across language.

A study to investigate fast mapping abilities and non-word repetition of varying phonotactic probability was conducted by Mac Roy and Dalton (2015) across late talkers and typically developing children. It revealed that children repeated non-words containing high phonotactic probability sequences more accurately than the non-words containing low phonotactic probability sequences. Typically developing children showed an early advantage for fast mapping high phonotactic probability words and children who were late talkers required more exposures to the novel words to show the same advantage for fast mapping high phonotactic probability words.

A basic question in new word learning addresses the role of phonemic cues and semantic cues in word learning. Grey & Brinkly (2011) conducted an experiment on 42 preschoolers with SLI and same number of typically developing preschoolers

matched with age and gender were enrolled. Fast mapping, word learning, and post-task performance were assessed. The results showed that encoding cues had no effect on fast mapping performance for both the groups. But these cues appeared to be detrimental to word production for children with typical development.

To explore fast mapping abilities in children with Specific Language Impairment, Jackson, Lietao and Claessen (2015) conducted a study on this group hypothesising that their phonological short term memory capacity and receptive vocabulary would significantly predict fast mapping. They presented nine novel word objects and nine novel word labels through fast mapping method to twenty-three children with SLI and twenty-six typically developing children and assessed the production accuracy. They also administered Peabody Picture Vocabulary Test-Fourth edition (PPVT- IV) and a Non- word repetition task to measure the receptive vocabulary and phonological short term memory respectively. Results indicated that children with SLI had significantly poorer fast mapping production scores than typically developing children. Scores from the non-word repetition task were also significantly lower for the SLI group, revealing reduced phonological short term memory capacity. Receptive vocabulary and Phonological short term memory capacity emerged as significant predictors of fast mapping abilities when the group data were combined in a multiple regression analysis.

The ability of novel word learning in word-object associations following minimal exposure (i.e., fast mapping) in children with Autism spectrum disorder (ASD) was studied by Venker, Cover and Ellis (2016.) Children who were poor learners at the age of three and a half years had significantly lower receptive language

abilities than children who successfully learned the new words, both concurrently and 2 years later lending ecological validity to experimental fast-mapping tasks.

Fast mapping abilities were investigated in children with hearing impairment by Lederberg, Prezbindowski & Spencer in 2003. They conducted a study on 19 children with hearing impairment in the age range of 5 to 8 years. The children were taught novel words in 2 contexts. In the first context, they were asked to learn the novel words merely by associating a novel object with a novel word, which is known as novel mapping strategy. In the second context, the novel words were explicitly established for novel objects but they received minimal exposure for the same. The results showed that the children displayed three levels of word-learning strategies. 11 children learnt words in both the contexts. 5 were able to learn novel words rapidly only when they were explicitly established. Two children did not learn novel words rapidly in either context. The latter seven children were followed longitudinally. This study suggested that word-learning strategies were acquired even when children were severely delayed in their language development and learnt language in an atypical environment.

To examine the process of word learning in boys with fragile X syndrome (FXS), who are likely to have intellectual impairment, language delays and symptoms of autism, McDuffie, Kover, Hagerman & Abbeduto (2013) conducted a study on this group. In this study, the novel word abilities were tested using a fast mapping task and the results were compared across 4 to 10 year-old boys with FXS, age-matched boys with autism spectrum disorders (ASD) and younger typically developing boys. The results indicated that there was no significant difference

between the 3 groups in the number of novel words learnt; however, boys with FXS outperformed boys with ASD, despite having lower levels of nonverbal cognition. Memory task demands significantly impacted performance only for boys with typical development. For boys with FXS or ASD, fast-mapping uniquely accounted for small but significant variance in concurrent levels of vocabulary comprehension as did chronological age and nonverbal IQ, but not autism severity.

2.7. Studies in Indian context supporting fast mapping abilities in children

A study on novel word learning in Malayalam- English bilinguals and Tulu-Kannada- English multilingual children was conducted by Sushma, Amulya, Ranjini, & Swapna (2010.) They included referent identification task and picture naming task in their experiment. The results of the study indicated that Bilingual children learnt novel words faster in L1 (Malayalam) then L2 (English) and the multilingual children learnt novel words faster in L3 (English) followed by L1 (Tulu) and L2 (Kannada.) The study also indicated that the language proficiency, degree of exposure to the languages and the opportunities to use the languages played an important role in novel word learning.

Another study on fast mapping abilities in bilingual children was conducted by Deepak & Shyamala (2016.) They considered 5-8 year old 30 Kannada- English bilinguals. These children were presented with 24 novel words, 12 in each language. The words were of equal word length and phonological complexity. One group of children received 5 repetitions while the other group received 10 repetition of the novel word. Then the children were subjected to recognition task and production task.

In recognition task, they were asked to say ‘yes’ or ‘no’ as a response to the novel word indicated by the investigator. In production task, they were asked to name the picture of the novel word shown by the investigator. Both the tasks were carried out in 2 conditions, immediate recall and delayed recall. The results of this study indicated that the novel word learning was better in L1 (Kannada) then L2 (English) in recognition task. This was attributed to factors like, proficiency and exposure to the language. Also, children who received ten repetition of novel word scored better compared to those who received 5 repetitions. This was attributed to strengthening of lexical activation and lexical semantic connections. When the immediate recall and delayed recall conditions were compared, it showed that the scores were better in the immediate recall condition. Thus it was concluded that the bilingual children were better off in fast mapping skills in their native language compared to their second language.

Further, investigations were carried out in pathological groups. Bincy & Shyamala (2017) conducted a fast mapping study on a group of 10 Malayalam speaking children with ASD in the age range of 4-7 years and compared the results with the group of 10 typically developing children. Both the groups received training in 2 phases. In the first phase, they were introduced with novel words in visual and auditory modes simultaneously, where the visual stimulus was presented for 7000ms and the corresponding audio file was presented 5 times. In the second phase, same procedure was followed but the corresponding audio files of the stimulus were presented 10 times. In both the phases children were instructed to listen carefully and remember the novel words. This was followed by immediate recall testing and

delayed recall testing (after 2 days) which included recognition and production tasks. In recognition task, they were asked to identify the picture of the target word from the other choices. In the production task, they were asked to name the target picture shown. Each correct response was given a score of '1'. The scores were then analysed using statistical measures. The results showed that the typically developing children performed better than the ASD group in both recognition and production tasks. On examining the effect of repetition of stimulus (5 vs. 10 times) the results indicated that in children with ASD the words with 10 repetitions had superior scores compared to those with 5 repetitions. This was attributed to the strengthening of lexical activation and lexical-semantic connections.

A similar study was conducted on children with Specific Language Impairment (SLI) by Jagacharan & Shyamala (2017) which included 10 Kannada speaking children with ASD in the age range of 4-7 years and age matched typically developing children. The method included was same as that of the previous study. The results showed that both the groups performed better in recognition task, but in the production task, children with SLI performed poorly. This was attributed to the impaired association of attaining phonological memory and retrieval access for production. When the results were examined to see the effect of repetition of stimulus on word learning and retrieval, it showed that there was no significant difference between the two repetition phases (5 vs. 10 repetitions.) This could be assumed to the fact that the presentation of 5 repetitions was sufficient or could be as effective as 10 repetitions.

Similar findings were obtained when the study was conducted in children with Intellectual disability (Rakshatha & Shyamala, 2018.) They employed the same method as that of the previous study. The results highlighted the poor performance of children with Intellectual disability in both recognition and production tasks.

However, research findings from the recent past are contradicting to the previous findings. It indicates that children do not learn novel words using 'fast mapping' but rather learn by associating predictive or probabilistic relationships between objects/actions and words which develop over time. Evidence for this comes from children's struggle to understand colour words. By the age of 4 years, children learn to distinguish between basic colour categories (Bornstein, Kesse & Weiskopf, 1976.) But, most of the sighted children use the colour words in the same way that blind children do *(*Landau & Gleitman, 1985.) Usually, colour words like "blue" and "yellow" will be present in their lexicon and they use them appropriately in their speeches, but their application of individual colour words is interchangeable and haphazard. If they are given a green cap and asked its colour, typical three-year-olds are likely to answer "green" as "yellow." These difficulties persist up until around age 4, even after hundreds of explicit training trials (Rice, 1980.) This inability of children to understand colour words can be explained by the cognitive process of whole object constraint. It is an idea that the child will understand that a novel word represents the entirety of that object. When an adult labels an object, the child assumes that it refers to the entire object and not any part or characteristic of that object. However, colour is the last attribute to be considered because it explains the least about the object itself. Children's behaviour clearly suggests that they have knowledge of these words, but

this knowledge is far from complete, rather it appears to be predictive, as opposed to all-or-none. This mechanism of word learning is known as “slow mapping." Recent studies indicate that an increase in the prominence of cues enhances slow mapping and extension (Stroke, 2001.)

The investigators opined that, although children learn novel words with a single exposure using fast mapping skills, it may not be sufficient for the development of the lexicon. To retain the words learnt through fast mapping, a subsequent extended slow mapping would be required for novel word learning. Slow mapping is mediated through semantic associations, hence teaching semantic associations would be necessary for slow mapping to operate. It is also important to know which mechanism (fast mapping or slow mapping) enhances novel word learning process in children because this is the age at which the child’s vocabulary get boosted up.

Hence the present study is aimed at exploring the fast mapping and slow mapping abilities through lexical and semantic methods of novel word learning in young neuro-typical children and compare novel word learning across the two methods.

CHAPTER III

Methods

The current study was an attempt in understanding and comparing the lexical and semantic methods of novel word learning in Kannada speaking children. The experiment of tapping novel word learning was conducted in 3 phases; stimulus selection phase, training phase and testing phase. Further, the testing phase was divided into immediate recalling testing phase and delayed recalling testing phase.

3.1. Hypothesis

a) There is no significant difference in the number of novel words learnt across lexical method and semantic method on immediate recall.
b) There is no significant difference in the number of novel words learnt across lexical method and semantic method on delayed recall.
c) There is no significant difference in the number of novel words learnt across gender in both the groups (lexical and semantic) on immediate and delayed recall.

3.2. Participants

The study involved a total of 20 participants. Equal number of males and females in the age range of 5 to 6 years were considered for the study. Individuals with normal dexterity and normal/corrected vision were included; participants with the history of any communication, psychological and other sensory impairments were excluded from the study. Informed consent was taken by the teachers and parents before enrolling the participants for the study.

Table 1

Participant details

Serial number	Age	Gender	Grade
1	5.11 years	Female	LKG
2	5.3 years	Female	LKG
3	5.3 years	Female	UKG
4	5.6 years	Female	UKG
5	5.2 years	Female	UKG
6	5.10 years	Female	UKG
7	5.4 years	Female	UKG
8	5.6 years	Female	UKG
9	5.5 years	Female	UKG
10	5.6years	Female	UKG
11	5.2 years	Male	UKG
12	5.2 years	Male	UKG
13	5.10 years	Male	LKG
14	5.3 years	Male	LKG
15	5.8years	Male	LKG
16	5.6 years	Male	LKG
17	5.11 years	Male	UKG
18	5.7 years	Male	UKG
19	5.2 years	Male	UKG
20	5.6 years	Male	UKG

The participants' selection in the age range of 5 to 6 years was based on the following criteria;

The Institute of learning and brain sciences has given data on children's expressive vocabulary that it contains more than 2600 words at the age of 6 years. Moats in 2001 said that linguistically "rich" first graders knew 20,000 words. Gawley in 2011 found that the vocabulary development is at its peak between 48 and 68 months. Shipley and Mc Afee in 2015 claimed that a 5-year-old child would be able to recognize more than 10,000 words. Fenson et al studied vocabulary growth in pre-school children and found out that they knew around 10,000 words by the age of 6 years.

3.3. Study design

Between group comparison

3.4. Experiment

3.4.1. Stimuli

A total of 40 meaningful words were shortlisted from an earlier dissertation on fast mapping by Deepak & Shyamala, 2014. These words were checked for equal word length, phonological complexity and cultural aspects. They were presented in the visual mode in the form of coloured pictures as well as in the auditory mode using the presentation software- Pawtoon.

Powtoon is freely available online software which helps in creating animated presentations. Using this software, the picture of the stimulus and the recorded audio clip of the stimulus can be presented simultaneously. There is provision for online

audio recording as well. The duration of presentation of each stimulus can be specified. The software is user friendly and easy to access.

3.4.2. Phase 1: Word selection

Novel words are the unfamiliar words to all the participants. They are usually assumed to be acquired beyond the stipulated age (6 years in the present study.) In order to ensure that the words are unfamiliar, they were subjected to testing. All the 20 participants of the study were asked to name the pictures presented using the software- powtoon. The words that were not named by 90% of the participants were considered as the 'novel words' and subsequently used in the training phase. No feedback was given to the participants.

3.4.3. Phase 2: Training phase

In this phase, the participants were divided into two groups on the random basis. One group was trained using the lexical method and the other group was trained using semantic method for novel word learning.

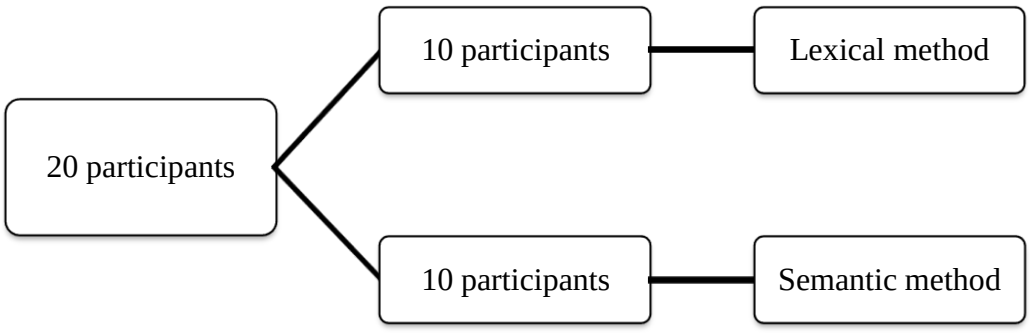


Figure 1: Depiction of the grouping of participants

Presentation for the lexical method

In the lexical method of training, each novel word was presented 5 times in visual and auditory mode in a laptop using Powtoon software. A vigilant stimulus "++++"appeared on the screen followed by the picture of the novel word, synchronized with the audio clip of the novel word. No prompts were given during this training period. The stimulus presentation was set to 3 seconds and an inter-stimulus interval was set to 2 seconds.

Example:

Figure 2: Example of stimulus presented in the lexical method through visual mode.

Presentation of the recorded auditory stimulus- /ni:ra:nE/ (5 times)

Presentation for the semantic method

In the semantic method of training, each novel word was presented along with the semantic cues. A vigilant stimulus "++++" appeared on the screen followed by the picture of the novel word, synchronized with the audio clips of the semantic cues for the novel word. The semantic cues were the name of the lexical category, a category coordinate belonging to the same lexical category and a feature associated with the

target. The stimulus presentation was set to 10 seconds and inter-stimulus interval was set to 2 seconds.

Example:

Figure 3: Example of stimulus presented in the semantic method through visual mode.

Presentation of the recorded auditory stimulus- /Iḏu ni:ra:ne/

/Iḏu onḏu pra:ŋI/

/Iḏu ni:rInallI va:sIsuṯṯaḏe/

/i: gumpIge se:ruva maṯtonḏu pra:ŋI mosa!e/

3.4.4. Phase 3: Testing phase

This phase was common to the lexical and semantic method. Here, immediate and delayed recall of the learnt words was checked. Immediate recall testing was carried out immediately after 5 minutes of training, while delayed recall testing was carried out after a time gap of 5 days. The responses were evaluated for both immediate and delayed recall based on the naming task.

3.5. Scoring

In the naming task, the child was asked to name the picture of the novel word shown on the laptop. A score of '1' was given for the correct response. To rule out the effect of the order of stimulus on the responses, the counterbalancing of the task was done, where the order of presentation of the stimulus was changed for every child.

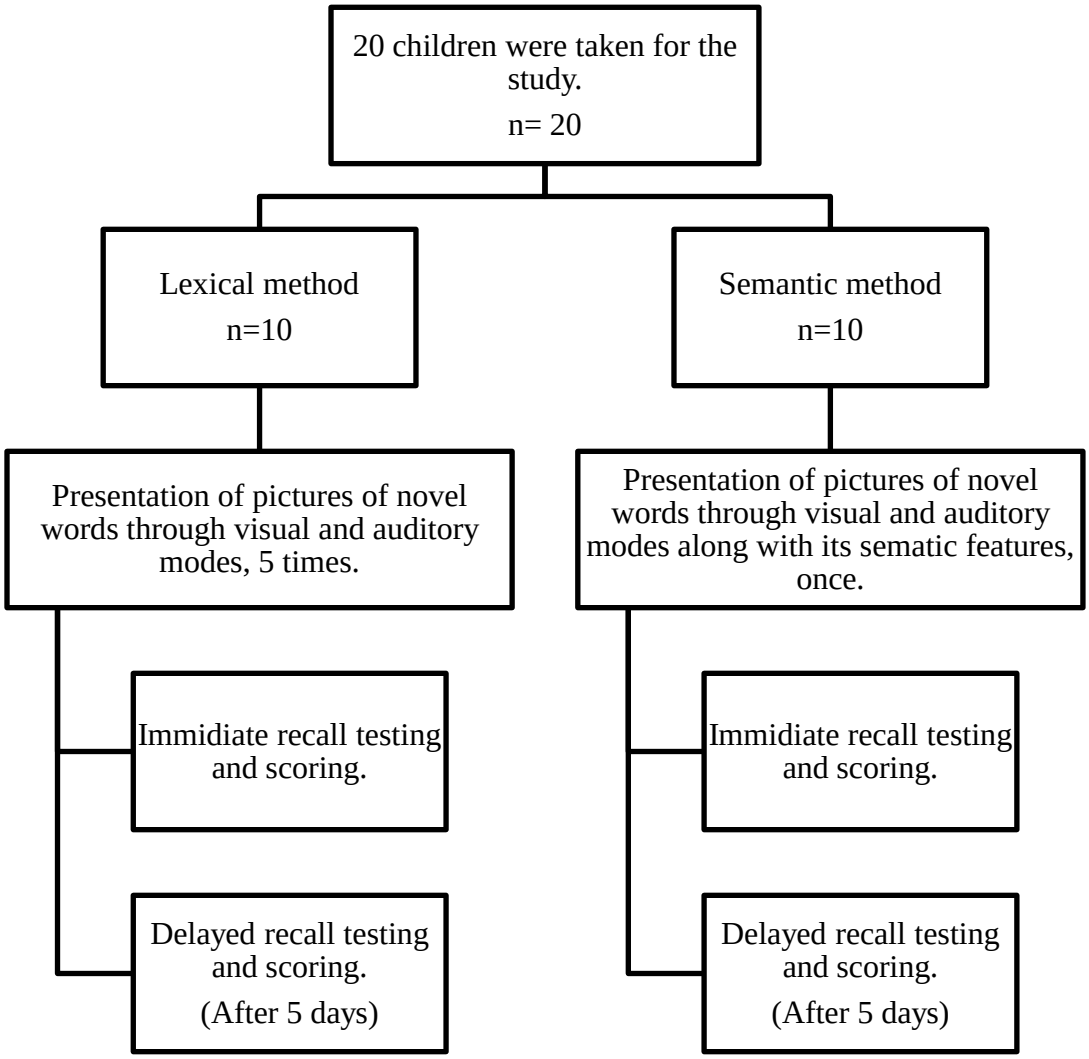


Figure 4: Schematic representation of the method

3.6. Analysis

The number of novel words learnt by each participant was calculated and tabulated. This data were entered in SPSS (version 21) software and subjected to further statistical analysis.

CHAPTER IV

Results

The aim of the study was to explore novel word learning in young neuro-typical children. The experiment on novel word learning included training phase and testing phase. In the training phase, the participants were divided into 2 groups. One group received training through lexical method while the other group received training through the semantic method. This was followed by testing phase, which was common to both the groups. The testing phase was divided into immediate recall testing and delayed recall testing. Immediate recall testing was done immediately after training and the delayed recall testing was done after 5 days of training.

Objective 1: To compare the number of novel words learnt across lexical method and semantic method on immediate recall.

In immediate recall testing, the participants were asked to name the picture of the novel word shown on the laptop. A score of '1' was given for every correct response and a score of '0' was given for every incorrect response. Descriptive statistics was performed to compare the scores across the groups. The Mean, Median and Standard deviation values are tabulated in the table 2.

Table 2

Descriptive values for the number of novel words learnt across Lexical method and Semantic method on immediate recall

	Lexical method	Semantic method
N	10	10
Mean	2.70	4.30
Median	3.00	4.00
Standard deviation (S.D)	1.829	1.37

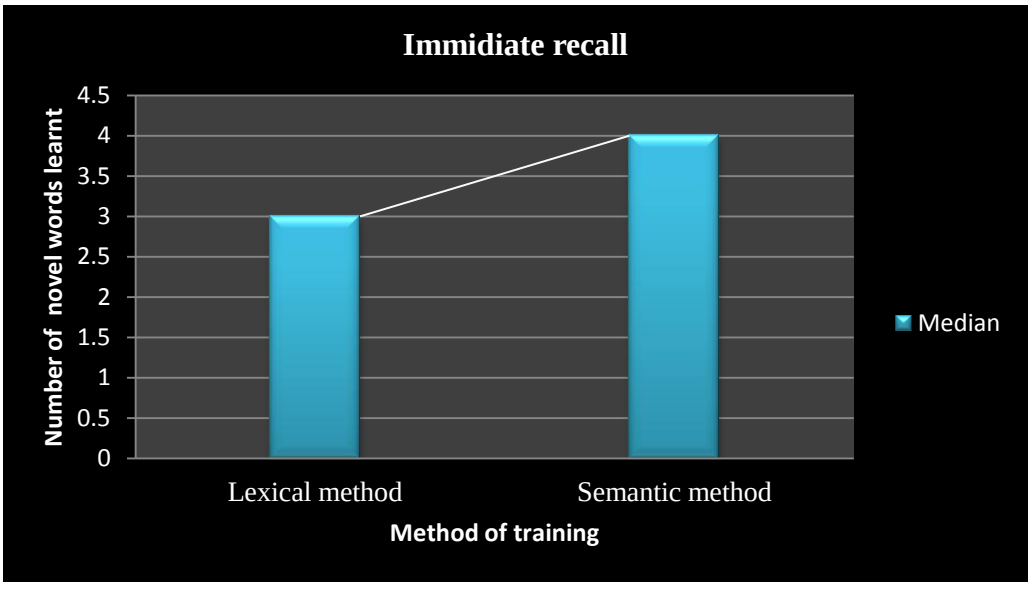


Figure 5: Number of novel words learnt across Lexical method and Semantic method on immediate recall

The mean for lexical method was 2.70 while the mean for semantic method was 4.30. The number of novel words learnt through semantic method was slightly more compared to lexical method. The median values also followed the same direction, the median was better for semantic method (values) compared to lexical method. The Standard deviation was slightly more for lexical method compared to semantic method.

Further, in order to verify if there was any significant difference between the number of novel words learnt across the two methods on immediate recall, Mann Whitney U test was applied on the data. The results revealed that there was no significant difference ($|Z| = 1.863$, $p = 0.062$) between the two groups. Thus, it was evident that that the method of training had no significant effect on the number of novel words learnt on immediate recall. Hence the first hypothesis which says that there is no significant difference in the number of novel words learnt across lexical method and semantic method on immediate recall is accepted.

Objective 2: To compare the number of novel words learnt across lexical method and semantic method on delayed recall.

In delayed recall testing, the participants were asked to name the picture of the novel word shown on the laptop. A score of '1' was given for every correct response and a score of '0' was given for every incorrect response. Descriptive statistics was performed to compare the scores across the groups. The Mean, Median and Standard deviation values are tabulated in the table 3.

Table 3

Descriptive values for the number of novel words learnt across Lexical method and Semantic method on delayed recall

	Lexical method	Semantic method
N	10	10
Mean	1.10	4.40
Median	1.00	4.00
Standard deviation (S.D)	1.197	1.578

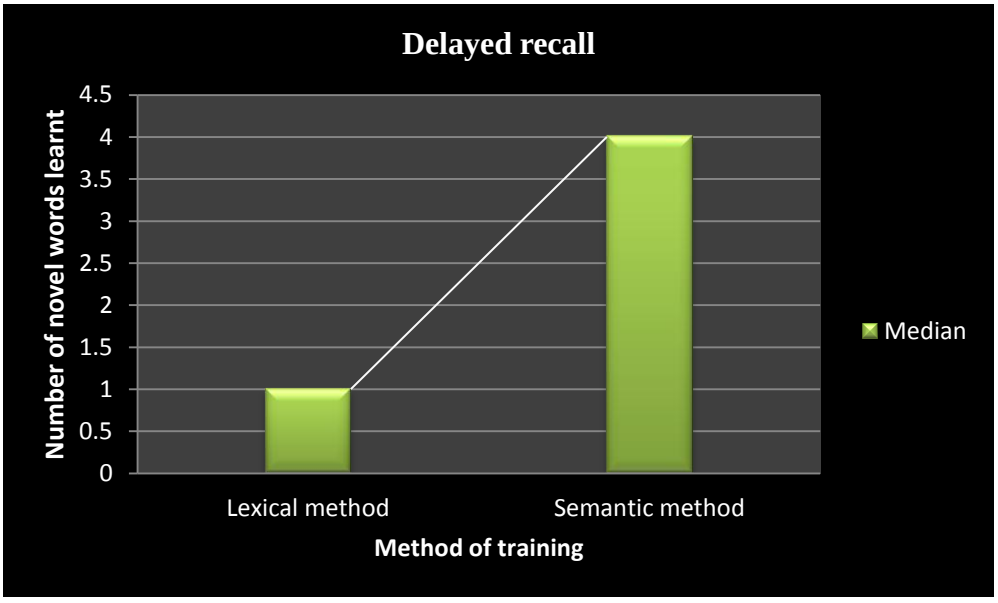


Figure 6: Median of the number of novel words learnt across Lexical method and Semantic method on delayed recall

The mean for lexical method was 1.10 while the mean for semantic method was 4.40. The number of novel words learnt through semantic method was more compared to those learnt through lexical method. The median values also followed the same direction, the median better for semantic method (values) compared to lexical method. The Standard deviation was observed to be more for lexical method compared to semantic method.

Further, to verify whether there was a significant difference in the number of novel words learnt across lexical and semantic methods on delayed recall, Mann whitney U test was applied on the data. The results indicated that there was a significant difference ($|Z| = 3.547$, $p = 0.00$) between the two groups. This shows that the method of training had a significant effect on the number of novel words learnt on delayed recall. Hence, the second hypothesis which says that there is no significant difference in the number of novel words learnt across lexical method and semantic method on delayed recall is rejected.

Objective 3: To compare the performance across gender in both the groups (lexical and semantic) on immediate recall and delayed recall.

The performance was compared across gender in both the groups (lexical and semantic) on immediate recall and delayed recall. Descriptive statistics was performed to compare the scores. The Mean, Median and Standard deviation values are tabulated in the table 4

Table 4

Descriptive values for the number of novel words learnt across gender in both the groups (lexical and semantic) on immediate recall and delayed recall.

	Testing phase	Statistics	Males	Females
Immediate recall	Lexical method	Mean	2.40	3.00
		Median	3.00	4.00
		S.D	1.342	2.345
	Semantic method	Mean	4.80	5.20
		Median	4.00	5.00
		S.D	1.095	1.789
Delayed recall	Lexical method	Mean	1.00	1.20
		Median	1.00	1.00
		S.D	1.225	1.304
	Semantic method	Mean	3.80	3.60
		Median	4.00	3.00
		S.D	1.483	0.894

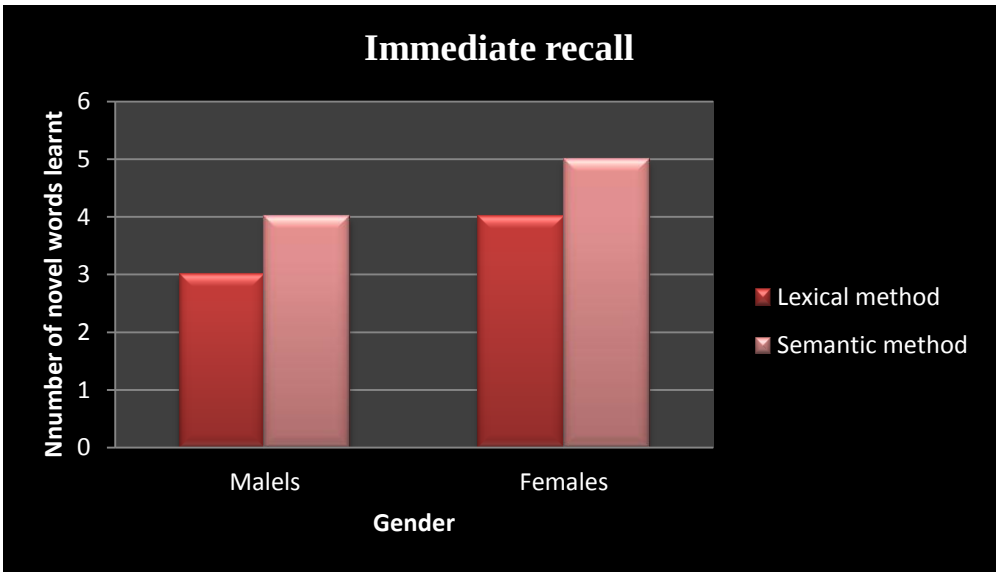


Figure 7: Median of the number of novel words learnt across *gender in both the groups (lexical and semantic) on immediate recall.*

In lexical method, the mean value for males was 2.40 while in semantic method, the mean value for males was 4.80 on immediate recall. The number of novel words learnt through semantic method was more compared to lexical method in males on immediate recall. The median values also followed the same direction, median better for males in semantic method compared to lexical method. But the standard deviation values were better in males of lexical method compared to the males of semantic method on immediate recall.

For females in lexical method, the mean value was 3.00 while in semantic method, the mean value was 5.20 on immediate recall. The number of novel words learnt through semantic method was slightly more compared to lexical method in females on immediate recall. The median values were also better for females in semantic method compared to those in lexical method. But the standard deviation

values were better in females of lexical method compared to the females of semantic method on immediate recall.

Further, to check if there was any significant difference in the number of novel words learnt across gender in lexical and semantic methods on immediate recall, Mann whitney U test was applied on the data. The results showed that there was no significant difference (|Z| =0.078, p = 0.938) Hence it was evident that there was no effect of gender on the number of novel words learnt in lexical and semantic methods on immediate recall.

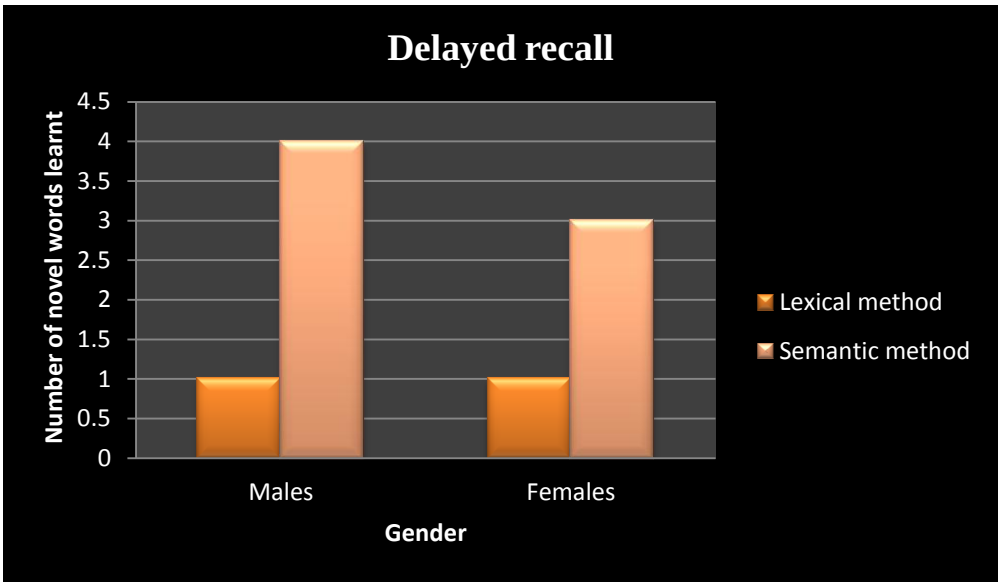


Figure 8: Median of the number of novel words learnt across *gender in both the groups (lexical and semantic) on delayed recall*

In lexical method, the mean value for males was 1.00 while in semantic method, the mean value for males was 3.80 on delayed recall. The number of novel words learnt through semantic method was more compared to lexical method in males on delayed recall. The median and standard deviation values also followed the same

direction, values being better for males in semantic method compared to lexical method.

In lexical method, the mean value for females was 1.20 while in semantic method, the mean value for females was 3.00 on delayed recall. The number of novel words learnt through semantic method was slightly more compared to lexical method in females on delayed recall. The median values were also better in females of semantic method compared to lexical method. But the standard deviation values were better in females of lexical method compared to the females of semantic method on delayed recall.

Further, to check if there was any significant difference in the number of novel words learnt across gender in lexical and semantic methods on delayed recall, Mann whitney U test was applied on the data. The results showed that there was no significant difference ($|Z| = 0.078$, $p = 0.938$) Thus it was clear that there was no effect of gender on the number of novel words learnt in lexical and semantic methods on delayed recall. Hence the third hypothesis which says that there is no significant difference across gender in lexical and semantic methods of training on immediate and delayed recall levels is not rejected.

Objective 4: To conduct qualitative error analysis of responses produced by children employing the lexical method and semantic method of learning.

In addition to the previous statistical analysis, a qualitative analysis was carried out to investigate the lexial semantic organization in children. The responses obtained by children during the testing phase (both immediate and recall testing) were subjected to

qualitative analysis. The incorrect responses were classified as ‘semantically related response or semantic errors’ (when it belongs to the same lexical category as the target word), ‘phonemic errors’ (based on the relationship shared with the target word), and ‘responses produced in the other language’ (any response produced in a language other than the language tested.) The individual percentage values of the qualitative error analysis of responses obtained by children employing lexical and semantic methods (in both immediate and delayed recall levels) are tabulated in the table 5 and table 6 respectively.

Table 5

Group mean values (in percentage) of qualitative error analysis of responses obtained by children in Lexical method of training in both immediate and delayed recall levels.

Recall level	Correct responses	Incorrect responses			
		Semantic errors	Phonemic errors	Responses from another language	No response
Immediate	13.5%	3%	3%	7%	73.5%
Delayed	5.5%	1.5%	2%	6%	85%

Table 6

Group mean values (in percentage) of qualitative error analysis of responses obtained by children in Semantic method of training in both immediate and delayed recall levels.

Recall level	Correct responses	Incorrect responses			
		Semantic errors	Phonemic errors	Responses from another language	No response
Immediate	25.5%	9%	3%	7%	55.5%
Delayed	18.5%	8%	2%	5.5%	66%

The percentage of semantic errors (where semantically related words were used in place of target word) were more in semantic method compared to lexical method while the percentage of phonemic errors were observed to be same across both the methods. The responses from another language (English, in all the cases) were also same across both the methods. These overall responses were also observed to be more at immediate recall level compared to the delayed recall level, in both the groups.

CHAPTER V

Discussion

The present study aimed at exploring fast mapping and slow mapping abilities in young neuro-typical children. It attempted to examine fast mapping skills through lexical method of training and slow mapping skills through semantic method of training. The experiment included training phase and testing phase. In the training phase, one group of participants received training through lexical method while the other group received training through the semantic method. This was followed by testing phase, which was common to both the groups. It employed naming task. It was further divided into immediate recall testing and delayed recall testing. Immediate recall testing was done immediately after training and the delayed recall testing was done after 5 days of training. The responses obtained from the participants were calculated, analysed and processed using SPSS version 20.0 and they were further subjected to qualitative analysis.

The first objective of the study was to compare the number of novel words learnt across lexical and semantic methods of training on immediate recall. The scores obtained from the participants of both the groups on immediate recall were subjected to statistical analysis. The results revealed that there was no significant difference between the two groups. This could be attributed to the factor that immediate recall is triggered by the short term memory. It is merely the representation of the lexical knowledge which is independent of the rehearsals. Thus the result suggests that there is no effect of the method of training for novel word learning on immediate recall

level; rather it could be dependent on other cognitive factors like, short term memory. These findings are in consensus with the findings of a study by Markson and Bloom (1997) which says that mapping does not reflect new word learning by employing linguistic processes. The word may be acquainted by mere exposure or is facilitated through memory.

The second objective of the study was to compare the number of novel words learnt across lexical and semantic methods of training on delayed recall. The delayed recall testing was done after 5 days of training. The delayed recall testing scores reflected the number of words learnt. As the findings from the previous studies states that if the word can be retained 48 hours post training then the word is learnt and is a new entrant in the lexicon.

The scores obtained from the participants of both the groups on delayed recall were subjected to statistical analysis. The results revealed that there was a significant difference between the two groups. It was evident from the descriptive scores (table no. 3) that the number of novel words learnt on semantic method was more when compared to that of the lexical method. This clearly shows that the method of training has an effect on novel word learning and children learn better when the words are taught in semantic method which employs slow mapping. Thus, it can be stated that children may not retain all the words learnt through fast mapping, a subsequent extended slow mapping is necessary for novel word learning. This supports the findings postulated by Deepak & Shyamala (2016) to opine that slow mapping would be required for establishing the word in the lexicon. Therefore, it could be inferred that the process of development of lexicon may be triggered by fast mapping process

but it is not sufficient for complete word learning or retaining the word. There should be a slow mapping process which makes the retaining abilities stronger.

The third objective of the study was to compare the performances of the participants across gender in both the groups (lexical and semantic) on both the recall levels (immediate and delayed). The scores obtained from the participants were subjected to statistical analysis for comparison. The results revealed that there was no significant difference across gender in both the groups on both immediate and delayed recall levels. There are no studies in the past that has compared fast mapping and slow mapping abilities across gender. Hence, the present study was a preliminary attempt in this direction.

The fourth objective of the study was to conduct a qualitative error analysis of the responses obtained from the participants. The incorrect responses were classified into 4 groups. They were, semantically related response or semantic errors (when it belongs to the same lexical category as the target word), phonemic errors (based on the relationship shared with the target word), responses produced in the other language (any response produced in a language other than the language tested) and 'no response.' The individual scores were tabulated and analysed. It was observed that the semantic errors were more in semantic method compared to the lexical method. This could be because of confusion or incorrect representation of the word in the lexicon as the method of learning involved teaching the novel word in a meaningful context associating it with its features. Exposure to more number of words would have resulted in such errors indicating confusion with respect to the word retrieval. The

phonemic errors and responses from the other language were observed to be same across both the groups (lexical and semantic).

The responses were also observed to be more at immediate recall level compared to the delayed recall level, in both the groups, again indicating the role of short term memory. Delayed recall is triggered by the active function of long term memory which depends on frequency of rehearsals and exposure to the word and its associations. Whereas, immediate recall is triggered by the short term memory which is independent of rehearsals. Therefore, to make the older memory stronger, sufficient exposure in the meaningful context and rehearsals are required. This explains why the performances of children are better on immediate recall compared to delayed recall level.

CHAPTER VI

Summary and conclusion

The current study was an attempt in understanding and comparing the fast mapping and slow mapping abilities in Kannada speaking children. It aimed at examining fast mapping skills through lexical method of training and slow mapping skills through semantic method of training. The objectives of the study were, to compare the number of novel words learnt across lexical method and semantic method on immediate recall, to compare the number of novel words learnt across lexical method and semantic method on delayed recall, to compare the performance across gender in both the groups (lexical and semantic) on immediate recall and delayed recall, to conduct qualitative error analysis of responses produced by children employing the lexical method and semantic method of learning at both immediate and delayed recall levels.

The study involved a total of 20 participants. Equal number of males and females in the age range of 5 to 6 years were considered. The experiment was conducted in 3 phases; stimulus selection phase, training phase and testing phase. In stimulus selection phase, a total of 40 meaningful words were shortlisted from an earlier dissertation on fast mapping by Deepak & Shyamala, 2016. They were presented in the visual mode in the form of coloured pictures as well as in the auditory mode using the presentation software- Pawtoon. The words that were not named by 90% of the participants were considered as the ‘novel words’ and subsequently used in the training phase. No feedback was given to the participants. In the training phase,

the participants were divided into two groups on the random basis. One group was trained using the lexical method and the other group was trained using semantic method for novel word learning. This was followed by testing phase, which was common to both the groups. Here, immediate and delayed recall of the learnt words was checked. Immediate recall testing was carried out immediately after 5 minutes of training while delayed recall testing was carried out after a time gap of 5 days. The responses were evaluated for both immediate and delayed recall based on the naming task. A score of '1' was given for every correct response and a score of '0' was given for every incorrect response. These scores were tabulated and analysed statistically using SPSS version 20.0

On comparing the number of novel words learnt through lexical method and semantic method on immediate recall, no significant difference was found between the two groups as seen on Mann-whitney U test. This indicated that there was no effect of the method of training on immediate recall of novel words. It is attributed to the factor that immediate recall of novel words depends on short term memory and it is just the representation of lexical knowledge which is independent of rehearsals.

Results for comparing the number of novel words learnt through lexical method and semantic method on delayed recall revealed a significant difference between the two groups. This clearly showed that the method of training played an important role in retaining the words and the semantic method of training which employed slow mapping process, makes the retaining abilities stronger.

On comparing the performances across gender in both the groups, no significant difference was found between males and females.

The qualitative error analysis was conducted to investigate the lexical-semantic organisation and the observations indicate that the semantic errors or semantically related words were more in semantic method compared to the lexical method. This could be because of exposure to more number of words resulting in confusion with respect to the word retrieval. The phonemic errors and responses from the other language were observed to be same across both the groups (lexical and semantic). The responses were also observed to be more at immediate recall level compared to the delayed recall level, in both the groups, again indicating the role of short term memory.

Thus, based on the overall findings, it can be concluded that the method of training plays an important role in novel word learning. Semantic method of training which is based on the concept of slow mapping enables retaining the words better, even after the lapse of time. The fast mapping process may trigger the development of the lexicon but a subsequent slow mapping process is necessary for retaining the words.

Implications of the study

- The results of the study can be used to design intervention procedure in language disordered population.
- It gives insight on how normal children learn the language.

- The present study also intended to do qualitative analysis in addition to quantitative analysis for both the methods. This revealed details on how children retrieve new words, link it with existing words.

Limitations of the study

- The study included less number of participants.
- The study conducted delayed recall testing after 5 days of training because of the problem of attrition. It should have been conducted at least after a gap of 7 days of training.
- For comparing the results across gender, the study had very less data.

Future directions

- The study can be conducted on older children as the performance did not attain plateau.
- The study can be conducted on disordered population to see the effect of various language and behavioural conditions on fast mapping and slow mapping.
- The study can be conducted on bilingual children to see the effect of bilingualism on fast mapping and slow mapping.

REFERENCES:

Alt, M., & Plante, E. (2006). Factors that influence lexical and semantic fast mapping of young children with specific language impairment. *Journal of Speech, Language, and Hearing Research*.

Alt, M., Plante, E., & Creusere, M. (2004). Semantic features in fast-mapping. *Journal of Speech, Language, and Hearing Research*.

Anderson, Stephen (2012). *Languages: A Very Short Introduction*. Oxford: Oxford University Press.

Apel, K., Wolter, J. A., & Masterson, J. J. (2006). Effects of phonotactic and orthotactic probabilities during fast mapping on 5-year-olds' learning to spell. *Developmental Neuropsychology*, *29*(1), 21-42.

Axelsson, E. L., & Horst, J. S. (2014). Contextual repetition facilitates word learning via fast mapping. *Acta Psychologica*, *152*, 95-99.

Behrend, D. A., Scofield, J., & Kleinknecht, E. E. (2001). Beyond fast mapping: Young children's extensions of novel words and novel facts. *Developmental Psychology*, *37*(5), 698.

Behrend, D.A., Scofield, J., & Kleinknecht, E.E. (2001). "Beyond fast mapping: Young children's extensions of novel words and novel facts". *Developmental Psychology*. 37 (5): 698–705

Bincy, K & Shyamala, K. C., 2015. *Fast mapping abilities in children with mental retardation*, unpublished master's dissertation, submitted to the University of Mysore.

Bion, R. A., Borovsky, A., & Fernald, A. (2013). Fast mapping, slow learning: Disambiguation of novel word–object mappings in relation to vocabulary learning at 18, 24, and 30 months. *Cognition*, *126*(1), 39-53.

Bion, R. A., Borovsky, A., & Fernald, A. (2013). Fast mapping, slow learning: Disambiguation of novel word–object mappings in relation to vocabulary learning at 18, 24, and 30 months. *Cognition*, *126*(1), 39-53.

Booth, A. E., & Waxman, S. R. (2002). Word learning is 'smart': evidence that conceptual information affects preschoolers' extension of novel words. *Cognition*, *84*(1), B11-B22.

Bornstein, M. H., Kessen, W., & Weiskopf, S. (1976). Color vision and hue categorization in young human infants. *Journal of Experimental Psychology: Human Perception and Performance*, *2*(1), 115.

Carey, S. & Bartlett, E. (1978). Acquiring a single new word. Proceedings of the Stanford Child Language Conference. 15. pp. 17–29. (Republished in Papers and Reports on Child Language Development 15, 17–29.)

Carey, S. (2010). Beyond fast mapping. *Language Learning and Development*, *6*(3), 184-205.

Casenhiser, D., & Goldberg, A. E. (2005). Fast mapping between a phrasal form and meaning. *Developmental science*, *8*(6), 500-508.

Chapman, R. S., Bird, E. K. R., & Schwartz, S. E. (1990). Fast mapping of words in event contexts by children with Down syndrome. *Journal of Speech and Hearing Disorders*, *55*(4), 761-770.

Deák, G. O., & Wagner, J. H. (2003). "Slow mapping" in children's learning of semantic relations. In *Proceedings of the Annual Meeting of the Cognitive Science Society* (Vol. 25, No. 25).

Deepak, P & Shyamala, K. C., 2015. *Fast mapping abilities in young bilingual children*, unpublished master's dissertation, submitted to the University of Mysore.

Dickinson, D. K., Cote, L., & Smith, M. W. (1993). Learning vocabulary in preschool: Social and discourse contexts affecting vocabulary growth.

Dollaghan, C. A. (1987). Fast mapping in normal and language-impaired children. *Journal of speech and hearing disorders*, *52*(3), 218-222.

Dollaghan, C. A. (1987). Fast mapping in normal and language-impaired children. *Journal of speech and hearing disorders*, *52*(3), 218-222.

Eyer, J. A., Leonard, L. B., Bedore, L. M., McGregor, K. K., Anderson, B., & Viescas, R. (2002). Fast mapping of verbs by children with specific language impairment. *Clinical Linguistics & Phonetics*, *16*(1), 59-77.

Eyer, J. A., Leonard, L. B., Bedore, L. M., McGregor, K. K., Anderson, B., & Viescas, R. (2002). Fast mapping of verbs by children with specific language impairment. *Clinical Linguistics & Phonetics*, *16*(1), 59-77.

Fong Kan, Pui; Sadagopan, Neeraja; Janich, Lauren; Andrade, Marixa (June 2014). "Effects of Speech Practice on Fast Mapping in Monolingual and Bilingual Speakers". Journal of Speech, Language, and Hearing Research.

Gershkoff-Stowe, L., & Hahn, E. R. (2007). Fast mapping skills in the developing lexicon. *Journal of Speech, Language, and Hearing Research*, *50*(3), 682-697.

Gershkoff-Stowe, L., & Hahn, E. R. (2007). Fast mapping skills in the developing lexicon. *Journal of Speech, Language, and Hearing Research*.

Golinkoff, R. M., Hirsh-Pasek, K., Bloom, L., Smith, L. B., Woodward, A. L., Akhtar, N., ... & Hollich, G. (2000). *Becoming a word learner: A debate on lexical acquisition*. Oxford University Press.

Gray, S., & Brinkley, S. (2011). Fast mapping and word learning by preschoolers with specific language impairment in a supported learning context: Effect of

encoding cues, phonotactic probability, and object familiarity. *Journal of Speech, Language, and Hearing Research*.

Griebel, U., & Oller, D. K. (2012). Vocabulary learning in a Yorkshire terrier: Slow mapping of spoken words. *PLOs one*, *7*(2), e30182.

Hansen, M.B.; Markman, E.M. (2009). "Children's use of mutual exclusivity to learn labels for parts of objects". *Developmental Psychology*. 45 (2): 592–596

Heibeck, T. H., & Markman, E. M. (1987). Word learning in children: An examination of fast mapping. *Child development*, 1021-1034.

Horst, J. S., & Samuelson, L. K. (2008). Fast mapping but poor retention by 24-month-old infants. *Infancy*, *13*(2), 128-157.

Horst, J. S., & Samuelson, L. K. (2008). Fast mapping but poor retention by 24-month-old infants. *Infancy*, *13*(2), 128-157.

Horton-Ikard, R; Weismer, S (2007). "A Preliminary Examination of Vocabulary and Word Learning in African American Toddlers from Middle and Low Socioeconimc Status Homes". *American Journal of Speech-Language Pathology*

Huttenlocher, J., Haight, W., Bryk, A., Seltzer, M., & Lyons, T. (1991). Early vocabulary growth: Relation to language input and gender. *Developmental psychology*, *27*(2), 236.

Jaghacharan & Shyamala, K. C., 2015. *Fast mapping abilities in children with hearing impairment*, unpublished master's dissertation, submitted to the University of Mysore.

Kan, P. F., & Kohnert, K. (2008). Fast mapping by bilingual preschool children. *Journal of Child Language*, *35*(3), 495-514.

Kan, P. F., & Windsor, J. (2010). Word learning in children with primary language impairment: A meta-analysis. *Journal of Speech, Language, and Hearing Research*, *53*(3), 739-756.

Kirk, E.; Howlett, N.; Pine, K. J.; Fletcher, B. (2013). "To Sign or Not to Sign? The Impact of Encouraging Infants to Gesture on Infant Language and Maternal Mind-Mindedness". *Child Development*.

Kucker, S. C., McMurray, B., & Samuelson, L. K. (2015). Slowing down fast mapping: Redefining the dynamics of word learning. *Child Development Perspectives*, *9*(2), 74-78.

Landau, B., & Gleitman, L. R. (1985). *Language and experience: Evidence from the blind child*. Cambridge, MA: Harvard University Press

Landau, B., Gleitman, L. R., & Landau, B. (2009). *Language and experience: Evidence from the blind child* (Vol. 8). Harvard University Press.

Manjunath, S., Rao, A. P., & Mohan, R. (2010). Fast mapping in typically developing kannada speaking toddlers. *Journal of the All India Institute of Speech & Hearing*, *29*(1).

Marian, V; Faroqi-Shah, Y; Kaushanskaya, M; Blumenfeld, H; Sheng, L (2009). "Bilingualism: Consequences for Language, Cognition, Development, and the Brain". *ASHA Leader*. 14

Markson, L., & Bloom, P. (1997). Evidence against a dedicated system for word learning in children. *Nature*, *385*(6619), 813.

Marston, L., Peacock, J. L., Calvert, S. A., Greenough, A., & Marlow, N. (2007). Factors affecting vocabulary acquisition at age 2 in children born between 23 and 28 weeks' gestation. *Developmental Medicine & Child Neurology*, *49*(8), 591-596.

McDuffie, A., Yoder, P., & Stone, W. (2006). Fast-mapping in young children with autism spectrum disorders. *First Language*, *26*(4), 421-438.

McDuffie, A., Yoder, P., & Stone, W. (2006). Fast-mapping in young children with autism spectrum disorders. *First Language*, *26*(4), 421-438.

Mills, A. (1987). Landau B. & Gleitman LR, Language and experience- Evidence from the blind child. Cambridge MA: Harvard UP, 1985. Pp. xi+ 250. *Journal of Child Language*, *14*(2), 397-402.

Muluk, N. B., Bayoğlu, B., & Anlar, B. (2014). Language development and affecting factors in 3-to 6-year-old children. *European Archives of Oto-Rhino-Laryngology*, *271*(5), 871-878.

Nair, V., Ranjini, R., & Shyamala, K. C. (2011). Lexical learning of novel words in bi/multilingual children. *Journal of the All India Institute of Speech & Hearing*, *30*.

O'malley, J. M., O'Malley, M. J., Chamot, A. U., & O'Malley, J. M. (1990). *Learning strategies in second language acquisition*. Cambridge university press.

Rakshatha, C & Shyamala, K. C., 2015. *Fast mapping abilities in children with autism spectrum disorders*, unpublished master's dissertation, submitted to the University of Mysore.

Rice, M. (1980). *Cognition to language: Categories, word meanings, and training*. University Park Press

Rice, M. L., Buhr, J. C., & Nemeth, M. (1990). Fast mapping word-learning abilities of language-delayed preschoolers. *Journal of Speech and Hearing Disorders*, *55*(1), 33-42.

Sahlén, B., & Hansson, K. (2006). Novel word learning and its relation to working memory and language in children with mild-to-moderate hearing impairment and children with specific language impairment. *Journal of Multilingual Communication Disorders*, *4*(2), 95-107.

Shanbal, J. C., & Prema, K. S. (2007). Languages of School-going Children: A Sample Survey in Mysore. *Language in India*, *7*(6).

Sheng, L., McGregor, K. K., & Marian, V. (2006). Lexical–semantic organization in bilingual children: Evidence from a repeated word association task. *Journal of Speech, Language, and Hearing Research*, *49*(3), 572-587.

Sheng, Li; McGregor, Karla; Marian, Viorica (June 2006). "Lexical-Semantic Organization in Bilingual Children: Evidence from a Repeated Word Association Task". Journal of Speech, Language, and Hearing Research.

Spencer, E.J; Schuele, C (2012). "An Examination of Fast Mapping Skills in Preschool Children from Families with Low Socioeconomic Status". *Clinical Linguistics & Phonetics*. 26(10): 845–862

Stelmachowicz, P. G., Pittman, A. L., Hoover, B. M., & Lewis, D. E. (2004). Novel-word learning in children with normal hearing and hearing loss. *Ear and hearing*, *25*(1), 47-56.

Swingley, D. (2010). Fast mapping and slow mapping in children's word learning. *Language learning and Development*, *6*(3), 179-183.

Swingley, D. (2010). Fast mapping and slow mapping in children's word learning. *Language learning and Development*, *6*(3), 179-183.

Swingley, D. (2010). Fast mapping and slow mapping in children's word learning. *Language learning and Development*, *6*(3), 179-183.

Vlach, H., & Sandhofer, C. M. (2012). Fast mapping across time: Memory processes support children's retention of learned words. *Frontiers in psychology*, *3*, 46.

Vlach, Haley; Sandhofer, Catherine (February 2012). "Fast mapping across time: memory processes support children's retention of learned words". *Frontiers in Psychology*.

Walton, K. M., & Ingersoll, B. R. (2013). Expressive and receptive fast-mapping in children with autism spectrum disorders and typical development: The influence of orienting cues. *Research in Autism Spectrum Disorders*, *7*(6), 687-698.

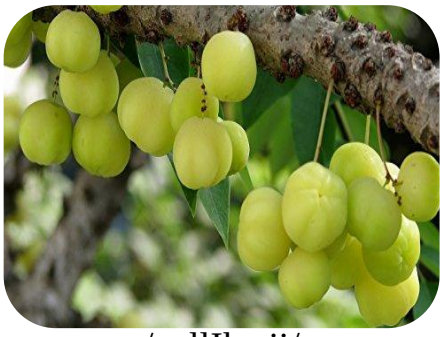
Weismer, S. E., Venker, C. E., Evans, J. L., & Moyle, M. J. (2013). Fast mapping in late-talking toddlers. *Applied Psycholinguistics*, *34*(1), 69-89.

Wilkinson, K., & Green, G. (1998). Implications of fast mapping for vocabulary expansion in individuals with mental retardation. *Augmentative and Alternative Communication*, *14*(3), 162-170.

Woodward, A. L., & Markman, E. M. (1998). Early word learning.

APPENDIX

Stimuli used for the study



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