SEMANTIC CATEGORIZATION IN 8 TO 10 YEARS OLD KANNADA SPEAKING CHILDREN

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A Dissertation Submitted in Part Fulfilment of Degree of Master of Science
(Speech Language Pathology)
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May, 2017

CERTIFICATE

This is to certify that this dissertation entitled **"Semantic categorization in 8 to 10 years old Kannada speaking children"** is a bonafide work submitted in part fulfilment for degree of Master of Science (Speech Language Pathology) of the student Registration Number: 15SLP007. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

Mysuru
May, 2017

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CERTIFICATE

This is to certify that this dissertation entitled "**Semantic categorization in 8 to 10 years old Kannada speaking children**" has been prepared under my supervision and guidance. It is also been certified that this dissertation has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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DECLARATION

This is to certify that this dissertation entitled **"Semantic categorization in 8 to 10 years old Kannada speaking children"** is the result of my own study under the guidance of Dr. R Rajasudhakar, Lecturer in Speech Sciences, All India Institute of Speech and Hearing, Mysuru, and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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DEDICATED TO

AIISH

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Chapter I

Introduction

We human beings communicate and exchange information by means of language. Language can be characterized as a socially shared code or regular framework for representing ideas through the use of arbitrary symbols and rule-governed combinations of the symbols (Owens, 2000). Acquisition of language is individualistic human capacity that allows us to use words and sentences for communication. The successful use of language can depend on the acquisition of 1) Syntax: The grammatical aspect of sentences. 2) Semantics: The meanings given to the sentences. 3) Pragmatics: The usage of the language. Acquisition of these components of language has been extensively studied. Skilful development of each of these components is crucial for development of language as it involves phonology, lexical, semantic, syntactic and pragmatic aspects. The linguistic component of meaning that is semantics is the most abstract and least researched. Semantics encompasses individual meaning of the words. It is also known as lexical meaning. It represents the relationship between each of the words and their respective semantic roles.

Semantic development is clearly significant in children in their pre-school years. Day to day effortless learning is seen in children.Lexical securing starts as right on time as 5-7 months of age (Saffran, Aslin & Newport, 1996). At 8 months, kids perceive around 15 words, and at 10-14 months they commonly talk their first words. Amid the school-age period and grown-up years, the individual expands the size of their vocabulary.

Progressively, the child acquires an abstract knowledge of meaning that is independent of particular contexts or individual interpretations. This development is unlike the semantic complexity or profundity of understanding the overall development of child's semantic system (Pease & Berko-Gleason, 1985). Semantic domain mature as the child's ability to relate words to each other with increasing flexibility happens. Words become categorized and organized through contexts that overlap in a physical or conceptual way. Categorizing the words based on the superordinate/subordinate classes (e.g., the "lion" as part of the superordinate category of animals) and at the level of exemplar relations (e.g., both the lion and the cat are examples of the category of animals) is known as semantic categorization.

One crucial role of semantic knowledge is the ability of semantic categorization (Jerger & Damian, 2005). In fact, semantic arrangement has been generally used to pick up knowledge into the association of the semantic memory framework and the important unmitigated relations have been found to progressively expand amid the first couple of years of primary school (Nguyen & Murphy, 2003). Semantic acquisition is a progressive learning of words and the implications they convey. It is a slow however a steady process in which a child, maybe, takes in a few words at a time. Some social words like bye-bye, hi, and so on. Object words, and instruction words are at first learnt. It is assessed that the normal five year old child acquires around 6000 words, in light of the fact that a child is expected to know 100 words at 18 years old months, which is equivalent to 5900 words throughout the following 3.5 years, around 5 words a day. A child has the understanding that everything has a name and there is a name for everything (Sugarman, 1983).

The interior structure of category knowledge in semantic memory is additionally expected to have an organizing principle in adults (Rosch, 1973). A pervasive hypothesis, named probabilistic or model (Medin et al., 2005), recommends that association depends on the properties portraying many, however not all, members (e.g., ""dog"" and ""cat"" for animals). The conveyance of a classification's typical features shifts within individuals, and individuals with a higher recurrence of typical properties are seen as more ordinary. The main reason forabstracting the category's prototype is the effect of typicality. Contrasts in typicality impact both grown-ups and youngsters' execution on a range of tasks, named the typicality impact (Medin et al., 2005). In grown-ups, for instance, typical exemplars of a classification show special preparing (faster response time and less errors) contrasted with atypical exemplars. In children, prototypical items are classified as members of a category formatively sooner than the non-prototypical things (Marvis, 1989). Developmental changes in category membership may again be seen up to the preadolescent years and may mirror children's expanding (a) determination of the properties characterizing a category; (b) appreciation about the factual regularities of, and intercorrelations among, properties; and (c) affirmation that a few features are more basic to membership than are others (Younger & Mekos, 1992).

A corresponding way to approach the issue of categorization concerns the path in which children spontaneously manipulate and categorize objects from different categories, for example, an arrangement of four boxes and four balls. Children's unconstrained sorting of articles changes subjectively in the 12 to 24 month time period (Langer, 1982; Sugarman,

1982, 1983). A few sorts of dynamic order of categorization happen at early stages. Starkey (1981) found that 9 month olds would touch every one of the objects in a category in sequence; for instance, an infant may touch each of the four balls in an array without touching the boxes. When the child begins to categorize items into two distinctly specific categories, sorting balls and boxes into different categories, active categorization is said to be emerged. Typically, 18 to 24 month old children are seen showcasing such behaviours. This kind of categorization behaviour appears to rise at around year and a half, it might be identified with other critical cognitive developments in this period, such as development of the ability to deduce the location of invisibly displaced objects, or to use insight to solve complex means ends tasks. Semantic categorization is additionally accepted to be connected with linguistic development. Differentiating items into separate groups and assigning names to the items both require an ability and indeed an inclination to place objects into categories. The acquisition of concepts that are involved in naming seem to be relevant to the skill of categorization.

Categorization is also believed to act as mental process and influence organization and stability of cognition and its process. The way we group things together or classify them decides how we find out about the connections amongst objects and how we generalise these connections to novel things. Semantic categorization is an integral part of language learning. The important role of semantic knowledge may therefore be particularly true for children and adults.

Typicality alludes to the degree to which a model is illustrative of the exemplar it represents. As verbalized by Rosch (1973), category items appear to exist on a continuum with a couple of things that are more illustrative of the category than others. The most typical feature from a category may be the feature with mean (Rosch & Mervis, 1975) or, then again measured (Neumann, 1974) values on the components or qualities related with the category. It might be highlighted by an individual feature, which is judged to be pretty much typical, contingent on the quantity of different features of the category it looks like, and upon how similar is the feature (Medin & Schaffer, 1978). Things that are more typical of a category are required to have the most number of features in a similar manner as different items from that category, and in this way would enhance inside-category similarity. They likewise have the least number of features just the same as individuals from different categories, and in this manner would improve various-category contrast (Rosch & Mervis, 1975).

In recent times semantic categorization is one of the main focus, it is mainly based on meaning, knowledge facts (Grossman, Smith, Koenig, Glosser & DeVita, 2002) and also on sets of characteristic properties (Smith, 1995). Studies showed that better exemplars of category were identified more by children and adults (Jerger & Damian, 2005). In Indian context similar results were found in a study done by Lagishetti and Goswami (2014) on bilingual adults aiming to explore semantic categorization of words based on their typicality effects.

Need of the present study

Most of the study has been done in western population and few of the studies done in Indian context has focused on semantic categorization in adults. There is a dearth of literature on semantic categorization in typically developing children. Hence, the need arises to study the semantic categorization in typically developing Kannada speaking children.

Semantic categorization significantly influences the organization of the semantic memory system which plays a crucial role in the acquisition of language and its components. Therefore, there is a need to study the semantic categorization in children at the age where language is being acquired to understand their semantic representations and processing.

Aim of the study

The aim of the present study is to explore the semantic categorization of words based on their typicality effects in 8 to 10 years old typically developing children and to investigate the developmental trend in semantic categorization task across the ages.

Objectives of the study

- To compare the reaction time between the two semantic categories (Clothing & Non-Clothing).
- To compare the reaction time across the four sub categories (Strong Clothing, Weak Clothing, Strong Non-Clothing, Weak Non-Clothing).

- To compare the reaction time of the four sub categories across the three groups (I, II & III).
- To compare the reaction time of the four subcategories between boys and girls.
- To compare the response accuracy between the two semantic categories (Clothing & Non-Clothing).
- To compare the response accuracy across the four sub categories (Strong Clothing, Weak Clothing, Strong Non-Clothing, Weak Non-Clothing).
- To compare the response accuracy of the four sub categories across the three groups (I, II & III).
- To compare the response accuracy of the four subcategories between boys and girls.

Implications of the study

- This study will give us an insight into the semantic representation and processing pertaining to clothing and non-clothing in typically developing children.
- It will also augment the understanding of the developmental trend pattern on the semantic categorization task in typically developing children.
- The results of the present study would enhance the clinician's knowledge about the typicality effect in selection of items to work on the semantic categorization tasks.

Chapter II

Review of Literature

Language is a combination of several components and its rule system. It is divided into 3 major components: form, content and use (Bloom & Lahey, 1978). Here, the form includes phonology, morphology and syntax, whereas, language content and use encompasses semantics and pragmatics, respectively. The rules in each of the components are mastered simultaneously and not sequentially.

One imperative role of semantic knowledge is the proficiency of semantic categorization. (Jerger & Damian, 2005). This has been analysed with respect superordinate/subordinate relations (e.g., “bee” as part of the superordinate category of “insects”) and at the level of exemplar relations (e.g., both the “bee” and the “mosquito” belongs to the category of “insects”).

Semantic memory is our collected learning of fundamental meanings and concepts (Tulving, 1972). Categorization assumes an extremely vital part in our comprehension and utilizing the ideas in semantic memory, as this procedure is included in sorting out our insight and correlate a real object with its imagery form. Categorization additionally enables us to participate in general things, for example, understanding unfamiliar items and finding out about novel articles.

Duncan and Kellas (1978) inspected the development of the cognitive representation of semantic categories through the methods for reaction latencies on a characterization task of 132 high contrast line drawing of birds, animals, vehicle, toys, weapons, kitchen utensils, furniture and clothing. 57 subjects were incorporated into the review from four age gatherings. The 44 children were primary school from the second, fourth, and 6th grade with an age of 8, 10, and 12, separately. The 13 adults were college going students. Subjects were given two pictures that represented either typical or atypical category exemplars. One-portion of the trials were primed by introducing a class name ahead of time of the stimuli. With that, stimulus degradation was controlled with a specific end goal to survey the locus of priming impacts. A critical correlation was found for physically indistinguishable stimuli for age, priming and typicality. This correlation showed that the way of the interior representation of categories developed from the second graders to the adults. For the older children and adults, priming encouraged reactions to typical category exemplars and hindered reactions to atypical category exemplars. For second graders, priming did not encourage reactions to typical exemplars. Another fascinating finding of the review was priming and degradation had impacts on the reaction latencies of all subjects under every condition, which demonstrates congruency from model of semantic memory. It was proposed that the second graders may measure features improperly in producing semantic prototypes. The way that that stimulus degradation and priming did not associate at any age level for any of the match type demonstrates that priming influenced a conceptual encoding stage instead of a perceptual encoding stage.

David, Barbara and Ornstein (1983) examined the developmental patterns in children's typicality judgment. They considered Seventy-two youngsters, 24 (12 boys and 12 girls) from kindergarten (mean age: 5.8 years), third grade (mean age: 8.5 years), and 6th grade (mean age: 11.5 years), filled in as the subjects. And also, 45 undergraduates (10 males and 35 females) of mean age 25 years 9 months were also subjected for the study. The subjects were solicited to choose from list of words those that were examples of categories, and afterward to rate every item on a 3-point scale as far as how "typical" it was of its category. 3 point scale had a rating of 'good', "alright" and "poor", where 3 meant "good" and so on. The quantity of things per category extended from 8 to 13. Eight of the categories (birds, clothing, fruit, furniture, tools, vegetables, vehicles, and weapons) was utilized. Results revealed that with an expansion in the grade level there was an increment in the rate of things included as suitable exemplar of the category.

Similarly in another study done by Gopnik and Meltzoff (1987) who aimed to provide a developmental trend of the active categorization in the second year and the relationship between the development of categorization and other cognitive developments like object permanence and means-end understanding. 12 monolingual children (9 males and 3 females) of mean age 15.46 months were recruited for the study. Subjects were tested once every 3 weeks for object permanence, means-end understanding and object categorization. In categorization task children were presented with a set of eight objects, four of one type and four of another. They looked into 3 types of behaviours while analysing the performance of categorization: 1) Single Category Grouping- this response was scored if

the child was able to spatially group one kind of objects together.2) Serial Touching of two kinds of objects- this response was scored if the child sequentially touched first the four objects from one group and then the four from the other group. 3) Two Category Grouping- this response was scored if they displaced all eight objects from the original location. Results reported that in the task of object categorization mean age of children were 16.04 months when they displayed single category grouping, 16.39 months when they displayed serial touching and 17.24 months when two category grouping was emerged. From the findings of the study, authors concluded a strong link between the development of the categorization and other cognitive features.

Categorization of groups can be done by two important functions (Barrett, Abdi, Murphy & Gallagher, 1993). These are linguistic knowledge (e.g. food, fruit, & banana), similarities and differences. Categorization based on properties of characters is the classical view in semantic categorization. Better exemplars of category were identified more quickly compared to poorer exemplars in both children and adults (Jerger & Damian, 2005). Fujihara, Nageishi, Koyama, and Nakajima (1998) Studied semantic categorisation of typical category (e.g. `carrot', `spinach') and atypical (e.g. `parsley', `asparagus') members through Event-related brain potentials (ERPs). Participants included 14 healthy students (5 females and 9 males; mean age: 22.6 years). Subjects were required to judge whether every stimulus had a place with an objective class (`vegetables' or `sports') or a non-target classification. For the non-target classification, the normality impact was neither found in ERPs nor in response times. For the objective class, average words were reacted more

rapidly than were atypical words and the ERP amplitudes between 300–450 msec period were more negative after the atypical words than after the common words (typicality impact). These outcomes proposed that typical words of the target were more primed (the portrayal of the typical words is more identified with that of an target classification like `vegetable' or `sports' than is the portrayal of the atypical words) by a target classification than were the atypical expressions of the target and in this way a concept is represented by a prototype, the central tendency of all members of the category. This type of pattern is termed as the 'typicality effect' i.e. the performance advantage of faster reaction time (RT) and fewer errors for better exemplars and prolonged RT and more errors in poorer exemplars.

Little is known about the development of semantic categorization during childhood. It is broadly demonstrated that capacity to categorize emerges right on time in earliest stages and has vital consequences for the procurement of other cognitive capacities.

At 4 months, infants can learn new categories, with either real or artificial stimuli (Quinn & Eimas, 1996). The age at which a child learns to group things in an indistinguishable way from an adult relies on upon the sort of categorization required. At 4 –5 years, children comprehend that living animals have specific properties that recognize them from non-living (Gutheil, Vera, & Keil, 1998) and by 5– 6 years old, children accurately classify creatures versus non-creatures (Thibault, 1999). Just not many reviews have analysed categorization past the preschool age. Rosch (1976) found that while children of 3 years

old can categorize known stimuli at the fundamental level, superordinate characterizations develop amid school-age years. Subsequently, the ability to categorize is seen ahead of schedule in earliest stages (Eimas & Quinn, 1994) yet the capacity for progressively unique or complex characterizations seems to keep on evolving over childhood (Gutheil & Gelman, 1997).

Bauer, Dow, and Hertsgaard (1995) highlighted the impact of exemplar prototypicality on global- and basic-level categorization in children offspring of age range 1 to 2 year old. They looked at global level and basic level categorisation in Thirty-six children. . 12 children with a mean age of 13 months, 18 days (range = 13.5 to 14.4), 12 children with a mean age of 16 months, 18 days (range = 16.3 to 17.4), and 12 children with a mean age of 20 months, 5 days (range = 19.2 to 20.15). There were six undertakings, each of which utilized three dimensional scale models of different creatures and vehicles in an assortment of hues. One-a large portion of the things were prototypical portrayals of the category and one-half were non-prototypical portrayals.

Results shows within- both category similarity and between-category contrast have been shown to be major determinants of categorization, and thus they are likely to affect differentiation as well. Categorization of prototypical exemplars was superior to that of non-prototypical exemplars. Children responded better toward categories of prototypical exemplars at an earlier age than toward categories of non-prototypical exemplars. The gap between categorization of prototypical and non-prototypical exemplars narrowed first at

the global level of contrast (i.e., at 24 months) and later at the basic level of contrast (i.e., at 28 months).

Ellis and Nelson (1999) researched categorisation in 10 adults (mean age = 26.6 years) and 10 children (mean age = 6 years 13 weeks) of prototypical and non-prototypical things. Members were given pictures of prototypical and non-prototypical dogs and cats and was asked to press a button for items from one of the categories. Event-related potentials (P300 and N400) and reaction time were utilized to discover capacity of categorisation. Behavioural information showed that adults reacted more quickly than children and both adults and children reacted more quickly to typical than to atypical items. These discoveries propose that, as a rule, the task was more complex for children than it was for adults, while additionally affirming that the task was well inside the scope of the children's capacities. ERPs showed a P300 and a N400 evident at midline (Pz, Cz, and Fz) leads. For adults, P300 amplitudes were more prominent to target events than to non-target events at Pz, while N400 amplitudes were more prominent to atypical items than to typical items at all leads that can be a direct result of updated working memory. For children, P300 peak amplitudes were more prominent to target than to non-target events at Pz and Cz. It might be because of favourable position of prototypical, in light of the fact that these are the first to be learned and stored. Subsequently, for youngsters, prototypical illustrations might be all the more effortlessly learnt and recalled when the task demands are high. Furthermore, for children, N400 peak-to-peak amplitudes were shorter to target than to non-target events. P300 peak amplitudes and latencies additionally recognized prototypical and non-

prototypical classification things. For children, peak amplitudes were greater to prototypes than to non-prototypes. For adults, latency-to-peak was shorter to prototypes than to non-prototypes. These information underscore the significance of prototypically in categorization and show age contrasts in the electrophysiological corresponds of this procedure.

Batty and Taylor (2002) studied categorisation differences in children (7-15 years) and adults (23.9±1 years) through electrophysiological measures. Behavioural results for simple categorisation of animals and landscape showed no significant differences although faster response time was observed in adults. Whereas, 30 active electrodes (Ag/Agcl) applied with an Easy Cap (FMS Falk) and electrode cap responses showed decrease in latencies (N2, P3) and amplitudes (P1, N2, P3). The study showed continues development of categorisation and authors additionally found children have similar latencies of P1, N2 and P3 at the age of 7, 9 and 11 years, respectively.

Similarly, study done by Grossman et al (2002) examined the neural basis for categorization in semantic memory. They studied 30 young adults of mean age 21.7 years. Stimuli used were 20 written object descriptions consisting of brief description of a feature of an object or a quantitative measure of the features. They were instructed to categorize into one of two categories based on a rule or on overall similarity, while they monitored regional brain activity with functional magnetic resonance imaging (fMRI). They found significantly greater recruitment of left dorsolateral prefrontal cortex for rule-based

categorization in direct comparison with similarity-based categorization. Recruitment of right ventral frontal cortex and thalamus was uniquely associated with rule-based categorization as well. These findings give us an insight into different neural network associated with forms of categorization in semantic memory.

The ability for categorization has important ramifications for the acquisition of other cognitive capacities, playing a critical role in memory, reasoning, and problem solving, and learning to learn (O'Sullivan, 1996; Thibault,1999).

Typicality and relatedness effects in children were contemplated by Jerger and Damian (2005). Target of the study was to look at how category typicality and out-of-category relatedness influence speeded classification confirmation (vote "yes" if image is clothing) in 120 children (67 girls and 53 boys, age range = 3 years 11 months to 14 years 9 months) and 12 adults (5 women and 7 men, age range = 20–27 years). Stimuli considered for the study included colour pictures of 32 concrete nouns from young children's vocabularies, representing clothing and ''not clothing''. They were regular and atypical category objects (e.g., jeans, glove) and related and random out-of-category items (e.g., jewellery, soup). Results showed quicker reaction times and less errors as the age increased.

Semantic categorization has been widely used to gain insight into the organization of the semantic memory system and the relevant categorical relations have been found to become increasingly elaborate during the first few years of elementary school (Lucariello, Kyratzis,

& Nelson, 1992; Nguyen & Murphy, 2003). Semantic categorization influences inhibitory processes, which is significant for the development of many underlying higher-order cognitive tasks. Maguire, White, and Brier (2011) investigated categorisation for middle childhood participants who were divided into two groups from age of 7-8 years (5 females & 12 males) and 10-11 years (12 females & 8 males), respectively. The study investigated the age at which children master the inhibitory strategies using behavioural and Event Related Potentials (ERP) measures of response inhibition for three Go/No Go tasks. They aimed to find out categorisation ability for single, multiple and semantic task. Stimuli in each of those tasks included 160 'Go' stimuli for which participants were instructed to press a button and 40 'No Go' stimuli for which they were instructed to withhold a response. Go stimuli included line drawings of cars whereas 'No Go' stimuli were line drawings of dogs. Responses were measured using behavioural and electrophysiological means via 64 electrode Neuroscan QuickCap. Behavioural results were discussed with respect to errors of omission which is the failure to respond to a 'Go' item, errors of commission that is responding with a button press for a 'No Go' item and reaction time for correct responses were measured. Along with this amplitude and latency differences between 'Go' and 'No Go' responses for each of the task and between the tasks were measured using ERPs. Results of the study indicated faster reaction time and higher amplitude of P3 No Go for older groups as compared to younger groups in simple task but not significant in complex task. However, within group comparison shows that younger group shows differences in simpler tasks (i.e. single and multiple) but not in complex task. Whereas, older groups shows higher amplitude for P3 No Go responses for complex tasks

not for simple tasks. These results demonstrate that efficient inhibitory systems are creating all through childhood which in parallel upgrades the capability of semantic order.

Lagishetti and Goswami (2014) aimed to explore the semantic categorization of words based on their typicality effects. 10 native Kannada speaking monolinguals and 10 bilingual adults whose native language was Kannada and English as second language were subjected to the test. Stimuli included 20 Clothing and 20 non-clothing stimuli (strong and weak exemplars). NeuroScan Inc. data acquisition system gentask program was used to measure reaction time. All participants were instructed to press the appropriate option in response pad for all stimuli. Comparison of reaction time between monolingual and bilingual groups and comparison between first language and second language in bilinguals was measured. Results showed that a typicality effect was observed in both monolinguals and bilinguals and no differences were observed between clothing and non-clothing stimuli except in one category. Also, results showed significant difference between languages in bilingual groups. The study highlighted only the typicality effect in bilinguals giving less importance to the semantic categorization in the control group (monolinguals) and also the study considered only male participants.

Most of these study has been done in western population and there are very few studies done in Indian context focusing on semantic categorization in adults. There is a dearth of literature on semantic categorization in typically developing children. Hence, the study was taken on the semantic categorization in typically developing Kannada speaking children to

highlight the typicality effect by measuring the reaction time and response accuracy between the strong and weak exemplars of two different semantic category.

Chapter III

Method

Participants

60 typically developing children in age range of 8 to 10 years participated in the present study. They were divided into 3 groups. Group I consisted of twenty 8 year old Kannada speaking children. Group II consisted of twenty 9 year old Kannada speaking children. Group III consisted of twenty 10 year old Kannada speaking children. 10 girls and 10 boys were considered in each group. All the participants were taken from different schools in Mysore.

Subject Selection Criteria : Participants inclusion criteria is as follows:

- All the participants were native speakers of Kannada language.
- The participants had no significant history of current or past hearing difficulties, or any history of neurological diseases.
- The participants were selected from middle socioeconomic status according to NIMH Socio Economic Status Questionnaire (Venkatesan, 2011).

Stimuli

The stimuli were taken from the study by Lagishetti (2013). The category used in the study was ‘Clothing’ (refers to any covering for the human body) vs. non- clothing (refers to other than clothing items). Each category consisted of 2 sub-category i.e strong clothing (SC) exemplar, weak clothing (WC) exemplar and strong non-clothing (SNC) exemplar,

weak non-clothing (WNC) exemplar. Out of 20 stimuli under each category of Lagishetti(2013) study, only 10 stimuli were selected for the study. The selection of 10 stimuli in each sub-category depends on the vocabulary of the children. This was carried out by seeking the help of parents of 8 to 10 year old children using a familiarity check scale. Hence, the study had a total stimuli of 40 in number (10 stimuli in 4 sub categories) and another 6 stimuli were used for the purpose of practice trail. (Appendix 1).

Pictures were selected for each of these 40 items and it was rated by 3 Speech Language Pathologists (SLPs) on how well the picture represents the item. The best rated pictures were selected for the study.

Programming & Presentation of the Stimuli

The target pictures weredisplayed on a Hewlett Packard 15 inch laptop with windows 10 operating software using a freely downloadable DMDX (Automode Version 5.0.1) software (Foster & Foster, 2003) developed by Jonathan and Ken in the Department of Psychology at the University of Arizona. The picturesweredisplayed on the screen for 1000 msec and 2000 msec duration was given to the participant to respond. An inter-stimulus interval of 500 msec was set in DMDX. For each of the participant presentation of the stimuli (pictures) were randomized.

Procedure

The participants/parents/teachers were explained regarding the objectives of the study and their respective oral and written consent were taken before subjecting the participants to the study (Appendix 2). Participants were made to sit comfortably in a noise free room. The display screen were set up in accordance with each participant's eye level. Theywere

instructed to press the button “1” if the presented stimulus is clothing and to press “2” if the presented stimulus is non-clothing.Each participant were given a practice trail to make the participants familiar with the test procedure. Practice trails (consisted of 6 stimuli)were given to each participant for familiarizing the test procedure.

Measured Variables

Responses were analysed to measure the ***reaction time*** (Reaction time is a measure of time duration between the onset of the stimulus and the onset of the response) and ***accuracy*** (percent of correct responses) in three groups of children between clothing and non-clothing semantic category and also between each semantic sub-categories.

Scoring and Analysis

All the correct responses were assigned by a “positive” value (+1), incorrect responses were assigned by a “negative” value (-1). If the participant not made a response even after 2000 msec, “no response was considered for the presentation”.

At the completion of the task, the software automatically computed reaction time for each sub categories and this was saved as respective output file for each participant based on the responses of the respective participant. From the output files the reaction time (RT) measures for each sub categories of clothing (SC, WC, SNC, and WNC) were derived for every participant in the study and then RT was averaged.

Accuracy measures were analysed for each participant for each sub category (SC, WC, SNC, and WNC). Correct responses were scored as a positive value and error responses were scored as negative value. Total number of correct responses for SC, WC, SNC, and WNC were calculated out of 10 in each sub category.The average reaction time measures and accuracy measures for each of sub category were separately analysed for each participant.

Statistical Analysis

All the scores were tabulated and analysis was done using Statistical Package for Social Sciences 20.0 (SPSS, Inc, Chicago) software. Descriptive statistics were carried out to calculate the mean and standard deviation for the measured two parameters for each group. All the measured parameters were subjected to testing of normality using SHAPIRO-WILK's test of normality. Based on the normality criteria, parametric and non-parametric tests were employed.

In the study, dependent variables were reaction time and accuracy and independent variables were the two semantic categories (clothing, non-clothing), four sub categories (SC, WC, SNC, and WNC), three groups (group I, group II, group III) and gender (boys, girls).

Following Statistical tests were applied on the data:

a. Descriptive statistics was done on the three groups for both reaction time and accuracy scores to arrive at mean, median and standard deviation across all the independent variables.
b. Tests of normality were applied to check for the skewness of the data obtained.
c. Mixed ANOVA was applied on reaction time measures to see within subject factor effect and between subject effects across the groups.
d. Pair wise comparison was done using Mann Whitney U Test to find statistical significance of each sub category between the three groups in reaction time measure.
e. Similarly Mann Whitney U test was done to examine the gender differences within each group and Kruskal Wallis test was done to identify the gender differences between the groups.
f. Wilcoxon's signed rank test was employed to observe statistical significance between the sub categories in accuracy measure.

Chapter IV

Results

The present study aimed to explore the semantic categorization of words based on their typicality effects between clothing and non-clothing in 8 to 10 years old typically developing children and to investigate the developmental trend in semantic categorization task across the ages. This was done by comparing the reaction time and response accuracy between semantic categories (clothing and non-clothing), between the sub categories (strong versus weak exemplar) of each category and also across the three age groups (I, II and III). Gender differences were also studied.

Results of the study were discussed in terms of reaction time and response accuracy measurements.

Reaction Time

The mean reaction time was calculated for each participant with respect to each sub category i.e. SC (Strong Clothing), WC (Weak Clothing), SNC (Strong Non-Clothing), WNC (Weak Non-Clothing) and was subjected to descriptive statistical analysis. The results indicated the mean reaction time was longer in group I compared to the other two groups (II & III). Whereas, mean reaction time of group III was the shortest compared to group I and group II. The study found significant gender differences across the three groups, where the reaction time of boys was longer than girls. Table 1 shows the mean and standard deviation of reaction time (in milli seconds) across the three groups and between genders.

Table 1.

Mean and standard deviation values of reaction time (in msec) in Group I to Group III

GROUPS	Sub Catg	GENDER			
		Boys		Girls	
		Mean	SD	Mean	SD
I	SC	1007.0	112.95	762.88	96.22
	WC	981.87	155.55	746.92	112.7
	SNC	801.30	135.79	729.48	84.37
	WNC	919.18	151.84	739.58	64.46
II	SC	935.81	62.57	747.00	143.63
	WC	1096.6	100.92	891.46	196.96
	SNC	987.87	90.20	831.40	167.28
	WNC	1092.2	71.9	916.70	237.45
III	SC	657.01	94.22	442.51	42.04
	WC	792.18	45.63	609.16	97.23
	SNC	772.78	61.23	695.80	54.05
	WNC	791.09	65.80	733.80	54.02

[Note: SC = Strong Clothing, WC=Weak Clothing, SNC=Strong Non-Clothing, WNC= Weak Non-Clothing]

Shapiro-Wilk's test was employed to verify if the data are normally distributed. The data of group I, group II boys and group III abided by the properties of normal distribution as the result did not indicate skewness ($p > 0.05$) whereas group II girl's data was not distributed normally. In view of this, parametric tests were applied on overall reaction time measures for group I and group III.

Within Subject Comparison(Group I and Group III)

Mixed group comparison of a 2 (Group I, Group III) X 2 (Clothing & Non-clothing) X 2 (Boys & Girls) X 2 (Strong & Weak) factorial ANOVA was performed on the data for group I and group III to measure within group variables (clothing, non-clothing and sub

categories). Results revealed that within the groups there was significant interaction effect seen between the semantic category and gender [F (1, 37) = 13.20, p < 0.05]. Other two, three and four factorial interaction effect within the groups is listed in the table 2. Table 2 shows the results of mixed ANOVA for within group comparison.

Table 2.

Results of Multifactorial ANOVA within group comparison

Source	df	F	Sig.	PartialEta Squared
Semantic category (Clothing,Nonclothing)	1	1.84	0.18	0.04
Semantic category * gender	1	13.20	0.00*	0.26
Semantic category * GROUP	1	35.23	0.00*	0.48
Semantic category * gender * GROUP	1	0.06	0.79	0.00
Error(Semantic category)	37	-	-	-
Strongweak	1	28.2	0.00*	0.43
strongweak * gender	1	0.32	0.57	0.00
strongweak * GROUP	1	10.49	0.00*	0.22
strongweak * gender * GROUP	1	3.2	0.08	0.08
Error(strongweak)	37	-	-	-
Semantic category * strongweak	1	0.46	0.49	0.01
Semantic category * strongweak * gender	1	1.3	0.25	0.03
Semantic category * strongweak *GROUP	1	13.8	0.00*	0.27
Semantic category * strongweak * gender * GROUP	1	0.88	0.35	0.02
Error(Semantic category *strongweak)	37	-	-	-

(indicates significant at 0.05 level)*

Between Subject Comparison (Group I & Group III)

Results of mixed ANOVA for between subject comparison revealed significant main effect found for gender [F (1, 37) = 69.42] and groups [F (1, 37)= 62.10]. The study also found no significant interaction effect for gender X group domain [F (1, 37) = 1.72; p>0.05].

Since there was an interaction effect present, paired Sample t test was done for within group comparison in boys and girls.The groups included group I, group III and group II boys only, as group II girls didn't abide by the test of normality it was not subjected to paired Sample t test.

Within Group Comparison in Boys: Results paired Sample t test indicated that in group I boys, reaction time differed significantly between SC and SNC ($t(9) = 3.10$, $p < 0.03$). Similarly in group II, significant difference was found between the reaction time of SC and WC ($t(7) = 3.28$, $p<0.01$) along with differences between SNC and WNC ($t(7) = 2.65$, $p<0.03$).While in boys of group III, differences were significant between SC and WC ($t(9) = 3.73$, $p<0.05$) and also between SC and SNC ($t(9) = 3.01$, $p<0.01$).

Within Group Comparison in Girls: Results of paired Sample t test revealed that reaction time of group I girls did not differ significantly within the group across the sub categories. On the other hand in group III girls, significant differences were noted between all the four sub categories i.e. SC and WC ($t(7) = 7.65$, $p<0.05$), SNC and WNC ($t(7) = 3.06$, $p<0.05$), SC and SNC ($t(7) = 14.53$, $p<0.05$), WC and WNC ($t(7) = 7.10$, $p<0.05$). Since group II girl's data didn't follow normal distribution, Wilcoxon signed rank test was done to compare within group. Results showed significant differences between SC and WC ($|Z| = 3.18$, $p<0.05$), SNC and WNC ($|Z| = 2.55$, $p<0.05$), SC and SNC ($|Z| = 2.27$, $p<0.05$) in

group II girls. Table 3 shows the results of Wilcoxon signed rank test for RT comparison in girls of group II.

Table 3.

Results of Wilcoxon signed rank test for reaction time comparison for girls in group II

Sub Catg	/Z/	p value
SC-WC	3.18	0.00*
SNC-WNC	2.55	0.01*
SC-SNC	2.27	0.02*
WC-WNC	1.29	0.19

(indicates significant at 0.05 level)*

Between Group Comparison

Parametric test was done to analyse the overall difference between the Group I and Group III on reaction time. Non-parametric test was done for group II as it did not fulfil the normality criteria. The mean, standard deviation and median of RT for boys and girls of group II are shown in table 4.

Table 4.

Mean, Standard deviation and median values of RT for group II

Sub Catg	GENDER					
	Boys			Girls		
	Mean	SD	Med	Mean	SD	Med
SC	935.81	62.57	937.5	747.00	143.63	800.33
WC	1096.6	100.92	1071.16	891.46	196.96	914.43
SNC	987.87	90.20	970.53	831.40	167.28	884.95
WNC	1092.2	71.9	1102.39	916.70	237.45	937.41

[Note: SC (Strong Clothing), WC (Weak Clothing), SNC (Strong Non-Clothing), WNC (Weak Non-Clothing)].

Results of between group comparisons indicated no significant differences between the categories i.e. clothing and non-clothing. Significant differences were noted between thesub categories i.e. strong and weak exemplars in both the categories and gender differences were noted in each of the groups. A significant difference was seen across the groups signifying the developmental trend.

Between Group Comparison in Boys: MANOVA was employed to compare the reaction time of boys across the three groups. Results indicated that boy's reaction time varied across the three groups. Table 5 shows the results of MANOVA for group comparison across 4 sub categories.

Table 5.

Results of MANOVA for group comparison across 4 sub categories in Boys

Sub Catg	df	F	p value
SC	2	37.92	0.00*
WC	2	17.50	0.00*
SNC	2	11.42	0.00*
WNC	2	17.83	0.00*

*[Note: * indicates P<0.05 , SC = Strong Clothing, WC = Weak Clothing, SNC = Strong Non-Clothing, WNC = Weak Non-Clothing]*

Results also revealed that reaction time of boys' differed significantly across the three groups with respect to all the four sub categories (SC, WC, SNC, and WNC). Therefore, to compare the reaction time of boys between the three groups with respect to each of the

sub category, post hoc analysis was done and Tukey's post hoc test was considered. Results are as follows:

1 **Strong Clothing**: Reaction time of Group I and Group II boys were comparatively longer than the group III boys for strong clothing.

2 **Weak Clothing:** Reaction time for weak clothing between the groups in boys followed the same pattern as in strong clothing.

3 **Strong Non-Clothing:** For strong non-clothing, group II boys' had the longest reaction time compared to group I and group III.

4 **Weak Non-Clothing:** The reaction time of group III boys were the least for weak non-clothing, followed by group I and then group II. Table 6 depicted the above results. Table 6 shows the reaction time (in milli seconds) for 4 sub categories across three groups in boys.

Table 6.

Mean reaction time (in msec) across three groups and for different sub categories

Sub Catg	GROUP I	GROUP II	GROUP III
SC	1007	935.81	657.01
WC	981.87	1096.67	792.18
SNC	801.30	987.87	772.78
WNC	919.18	1092.25	791.09

[Note: SC (Strong Clothing), WC (Weak Clothing), SNC (Strong Non-Clothing), WNC (Weak Non-Clothing)].

Between Group Comparison in Girls: Results derived from Kruskal Wallis test revealed that reaction time of girls differed significantly across the three groups for all the four sub categories. Chi-square value for each of the sub categories for girls is tabulated in table 7.

Table 7.

Results of Chi-square test for group comparison in girls

Sub Catg	X^2	df	p value
SC	17.83	2	0.00*
WC	11.35	2	0.00*
SNC	6.23	2	0.04*
WNC	6.78	2	0.03*

[Note: indicates significant at 0.05 level, SC = Strong Clothing), WC = Weak Clothing, SNC = (Strong Non-Clothing), WNC (Weak Non-Clothing)]*

As there was significant group differences with respect to all the sub categories, pair wise comparison was done between the groups. Henceforth, Mann Witney U test was done for pair wise comparison of groups in girls. Results indicated that between Group I and Group II, significant difference was seen for all except SC (lZl = 0.077, p> 0.93). Between Group I and Group III except for SNC (lZl = 0.79, p>0.42) and WNC (lZl = 0.07, 0.9), significant differences were seen in others. There was significant difference across all the sub categories SC (lZl= 3.7, p<0.05) WC (lZl= 2.6, p<0.07) SNC (lZl = 2.0, p<0.4) WNC (lZl = 2.0, p<0.4) between Group II and Group III.

Response Accuracy Measurements

Consequently, the accuracy scores obtained were subjected to test of normality and results revealed that the data did not satisfy the properties of normality (p<0.05). Henceforth, non-parametric tests were applied for further statistical analysis. Descriptive statistical analysis was performed on the response accuracy of all the participants. Results showed similar pattern as that observed in the mean scores of reaction time with group III with more

accurate responses compared to group I and II. And also girls had more accurate responses than boys across the three groups. Table 8 shows mean accuracy (raw scores), standard deviation and median across three groups.

Table 8.

Mean, standard deviation and median values of accuracy (raw scores)in Group I to Group III

GROUPS	**Sub Catg**	**GENDER**					
		Boys			**Girls**		
		Mean	**SD**	**Med**	**Mean**	**SD**	**Med**
I	SC	7.7	1.25	8	7.1	2.51	7.5
	WC	9.2	0.78	9	7.4	1.64	7.5
	SNC	8.6	0.96	8.5	7.1	2.13	7.5
	WNC	9.2	0.78	9	7.8	2.93	10
II	SC	9.4	0.69	9.5	9.5	0.70	9
	WC	9.6	0.51	10	9.5	0.52	10
	SNC	8.8	0.91	9	9.5	0.70	9.5
	WNC	8.6	0.84	9	9	0.81	9
	SC	9.5	0.70	10	9.9	0.31	10
III	WC	8.7	0.94	9	9.9	0.31	10
	SNC	9.1	0.87	9	9.8	0.42	10
	WNC	9.4	0.69	9.5	9.7	0.48	10

[Note: SC = Strong Clothing, WC=Weak Clothing, SNC=Strong Non-Clothing, WNC= Weak Non-Clothing]

Gender Comparison within the three Groups (I, II, III)

The raw scores were converted into percentage before subjecting the data for inferential statistics. Mann-Whitney U test was done to compare the gender differences within each group. The mean scores of the response accuracy in each group comparing between boys and girls is tabulated in the table 9 below. Results indicated that in Group I, there was significant gender difference found only for SC (Strong Clothing) response accuracy

between boys and girls. Gender differences were not evident in group II in all the sub categories for accuracy measurements. In Group III there was significant gender differences found for all the sub categories except for WNC between boys and girls.

Table 9.

Results of Mann Whitney U test for gender comparison within each group

Sub Catg		Group I	Group II	Group III
SC	lZl	3.11	4.99	1.96
	p value	0.02*	0.61	0.05*
WC	lZl	0.00	0.94	3.14
	p value	1.00	0.34	0.00*
SNC	lZl	1.01	1.24	2.09
	p value	0.31	0.21	0.03*
WNC	lZl	0.65	0.66	1.13
	p value	0.51	0.5	0.25

(* indicates *significant at 0.05 level*)

Group comparison for response accuracy in both the gender

Table 10.

Results of Kruskal Wallis Test across the three groups for response accuracy

Sub	**BOYS**			**GIRLS**		
Catg	**X^2**	**df**	**p value**	**X^2**	**df**	**p value**
SC	14.95	2	0.00*	6.28	2	0.04*
WC	6.59	2	0.03*	6.67	2	0.03*
SNC	1.39	2	0.49	9.26	2	0.01*
WNC	3.65	2	0.16	6.33	2	0.04*

(*indicates *significant at 0.05 level)*

Comparison of accuracy response across the three groups in boys: Kruskal Wallis Test was done to compare the overall difference in accuracy response in boys across the three groups. As indicated in the above table 10, significant differences for SC and WC across the three age groups in boys were noted whereas no difference was found for SNC and WNC. Since there was group differences present across the age groups in boys, Mann-Whitney U test was done across pair of groups with respect to SC and WC, whereas SNC and WNC was not subjected to the test as there was no overall group differences noted. Between group I and Group III, significant differences were seen for SC in boys and similar results were seen between group I and group II. Accuracy response of WC differed significantly between group II and group III in boys. Table 11 shows the results of Mann Whitney U test.

Table 11.

Results of Mann Whitney U test for accuracy response between three groups in boys

		Group I & Group III	**Group I & Group II**	**Group II & Group III**
SC	/Z/	3.20	3.26	0.25
	p value	0.00*	0.00*	0.79
WC	/Z/	1.19	1.59	2.47
	p value	0.23	0.11	0.01*

(indicates significant at 0.05 level)*

Comparison of accuracy response across the three groups in girls

Kruskal Wallis Test was done to compare the overall difference in accuracy response in girls across the three groups. Results indicated significant differences across all the sub categories i.e. SC, WC, SNC and WNC between the three groups. Table 9 shows the results

of Kruskal Wallis test across the three groups for accuracy response. This was followed by the Mann-Whitney U test to analyse the accuracy response in girls across the pair of groups with respect to all the sub categories. All the sub categories SC, WC, SNC and WNC differed significantly between group I and group III while no group differences were noted across all the sub categories between group I and group II. SC, WC and WNC significantly differed between the group II and III in girl's accuracy response. Table 12 shows the results of Mann Whitney U test for accuracy response between three groups in girls.

Table 12.

Results of Mann Whitney U test for accuracy response between three groups in girls

Sub Catg		Group I & Group III	Group I & Group II	Group II & Group III
SC	/Z/	2.44	0.51	2.20
	p value	0.01*	0.61	0.02*
WC	/Z/	2.42	0.87	2.21
	p value	0.01*	0.38	0.02*
SNC	/Z/	3.08	1.6	1.61
	p value	0.00*	0.10	0.10
WNC	/Z/	2.11	0.13	2.41
	p value	0.03*	0.89	0.01*

(indicates significant at 0.05 level)*

Within Group Comparison across the sub categories in;

Boys: Wilcoxon signed rank test was done to compare the sub categories within each group in boys. Significant difference on response accuracy was noticed in group I boys between SC and WC (lZl = 2.8, p< 0.05). In group II the response accuracy differed significantly between WC and WNC (lZl = 2.6, p< 0.05) and also between SC and SNC (lZl = 1.89, p<

0.05). SC and WC (lZl= 2.5, p< 0.05) differed significantly on response accuracy in group III.

Girls: Wilcoxon signed rank test was carried out to compare the sub categories in girls on response accuracy within each group. While in girls, there was no significant differences noted between the sub categories in group I and group III on response accuracy. And in group II, significant difference was found between WC and WNC (IZI = 2.13, p< 0.05) on response accuracy.

CHAPTER V

DISCUSSION

The current study aimed to investigate the semantic categorization of words in light of their typicality effects between clothing and non-clothing in 8 to 10 years old typically developing children and to investigate the developmental pattern in semantic categorization over the ages. This was done by looking at the reaction time and response accuracy between semantic categories (clothing and non-clothing), between the sub categories or typicality effects (strong and weak exemplar) and across the three age groups (I, II and III). Differences in the gender were also looked upon.

The results of the present study revealed several points of interest;

First, there is no significant difference in the mean reaction time of the participants across the three age groups on semantic categorization task between clothing and non-clothing items. The results of the present study supports the previous study results done by Lagishetti& Goswami (2014) reported no differences between clothing and non-clothing semantic categories in adults. Likewise, Batty and Taylor (2002) using electrophysiological and behavioural measures found no significant differences between simple categorisation of animals and landscape semantic categories in both children and adults. In another preliminary study by Bauer, Dow, and Hertsgaard (1995)results revealed no statistically significant differences between mean run lengths on the two basic level animal and vehicle categorization tasks in 1 to 2 year olds. These results can be reasoned out as superordinate categorization emerge early whereas other particular features that

facilitate categorization evolve slowly over childhood. And also the categorization at a basic level is developed early while differentiating items at a global level is acquired later in childhood.

Second, there was significant faster reaction time and less errors in categorizing strong exemplars of both the semantic categories compared to weak exemplars of the semantic categories in all the age groups. This can be viewed as children gradually learn that some important categorical features are more important than others for classifying real world objects. The results of the present study are in agreement with the findings of Jerger and Domian (2005) where they explained the advantage of performance and fewer errors for better exemplars than poorer exemplars and they explained the significance of typicality and relatedness in semantic categorization on all ages. Adults and children responded better and faster for better exemplars compared to poorer exemplars (Fujihara et al, 1998; Ellis & Nelson, 1999; Jerger & Damian, 2005). Similar results were put forth by Fujihara, Nageishi, Koyama, and Nakajima (1998) who found that for the target category, typical words were responded more quickly than were atypical words and the ERP amplitudes were more negative after the atypical words than after the typical words (typicality effect), suggesting that typical words of the target were more primed than the atypical words. Present study results supports the study by Ellis and Nelson (1999) who reported that both adults and children responded more rapidly to prototypes than to non-prototypes items. The above outcomes bolster the study done by Mehta, Jerger, Jerger, and Martin (2009). They found that behavioural result showed that average accuracy scores were higher for strong exemplars compared to weak exemplars. The average reaction time was longer for weak

than strong exemplars. Fujihara et al (1998) explained that participants responded faster to target category than a non-target category. In the present study also it has been observed that the accuracy of response is higher for strong exemplars compared to weak exemplars and longer reaction time for weak exemplars. This was further supported in the results ofBauer, Dow, and Hertsgaard (1995) who found marked differences in young children's responses to sets of prototypical as compared with non-prototypical exemplars.

Third, there was a significant faster/lesser reaction time and high accuracy in group III participants (i.e. 10 year old children) compared to the other two groups (I & II). The better performance of group III children in RT and accuracy can be attributed to the age differences between the three groups and group III being 10 year old children they may have better processing capabilities for the task of categorization and they may be quicker in identifying the typical features of a category with more accuracy. Better cognitive processing underlying their behaviour can also be one of the reasons. This decrease in reaction time and error rates with increase in age was ubiquitously seen in other studies like Jerger and Damian (2005). They have found faster reaction times and fewer errors as the age advanced. In another study by David, Barbara and Ornstein (1983) highlighted the developmental trend indicating that with an increase in the grade level there was an increase in the percentage of items included as appropriate category exemplars. Duncan and Kellas (1978) signified the nature of the internal representation of categories and how it changed from the second graders to the adults. Batty and Taylor (2002) demonstrated that some aspects of the superordinate category or the ability to categorize if an image belong to that category or not develop in early childhood and the categorization processes continue to

develop throughout childhood. Hence, the present study supports the developmental aspects in semantic categorization from group I to group III in both genders.

Fourth, there was a significant gender differences found for all subcategories investigated from group I to group III on RT and response accuracy. That is, girls are faster and more accurate in semantic categorization task on clothing and non-clothing when compared to boys. Many studies have been published over different domain that focus on gender differences. This can be due to the cognitive abilities that underlie the behaviour of categorization. There is significant gender differneces in cognition and its process noted in literature. The gender disparities evident in cognitive abilities can be due to biological or environmental factors. Biological factors differ in terms of the development and maturity of the central nervous system, which is seen much earlier in girls compared to boys. Environmental factors like exposure also play a role in increasing the accuracy in the tasks. Our results inidicating difference in the performance of boys and girls on categorization task can be due to the above mentioned reasons. In a study done by Majeres (1990) who found women performed better on tests of psychomotor speed and accuracy. Also, perceptual speed and fine motor skills were beteer in female compared to males (Watson & Kimura, 1991).

CHAPTER VI

SUMMARY & CONCLUSIONS

Categorization is an essential methods for sorting out our general surroundings and offers a simple way to process the mass of stimuli one perceives every day. The capacity to order seems right on time in earliest stages, and has critical implications for the securing of other cognitive capabilities, however little is known about its advancement amid childhood. Categorization are frequently in light of the shared basic elements that are seen as being typical of the category, or on an item's similarity to exemplars or prototypes of the category (Smith & Jonides, 2000). Sorting of similar things (e.g., seats) or, then again extremely disparate things, which share a hypothetical segment, or physical components that give a "family similarity" (Krascum & Andrews, 1998). Along these lines, items within a category can vary extensively relying on the broadness of the category (e.g., living versus non-living, contrasted with crows versus ravens). There are three levels of categories portrayed in the literature, basic (reptiles), subordinate (snakes) and superordinate (animals), with the similarities among members of a level decreasing with the higher levels (i.e. superordinate).

Regardless of the crucial way of this cognitive process, categorization appears to advance with increment in age. Examinations of categorization have exhibited that at 3 months of age, infants could frame perceptual category representations (Mareschal and Quinn, 2001) and recognize birds from cows (Quinn, Eimas, and Rosenkrantz, 1993). At 4 months, newborn children can learn new classifications with either genuine or an image (Quinn and

Eimas, 1996). The age at which a child will categorize things in an indistinguishable path from an adult depends on the kind of classification required (Hickling and Gelman, 1995; Odom and Cook, 1996). At 4–5 years, children understand the concept that items can be categorized based on similarities and disimilarities(Gutheil, Vera, & Keil, 1998), and by 5–6 years old, categorization is completely emerged (Thibault, 1999). Rosch (1976) found that children of 3 years old can categorize known stimuli at the basic level, superordinate classifications mature during school-age years.

Not many studies have examined categorization beyond the preschool age range. Henceforth, the present study aimed to find the developmental trend and the effect of typicality in 8 to 10 year old Kannada speaking children using semantic categorizing tasks. 20 Clothing and 20 non-clothing stimuli was used for the study and stimuli were presented to the participant via DMDX software. The participants were instructed to press “1” if the presented stimuli belong to clothing category and to press “2” if it belonged to non-clothing category. Data acquired was analysed for reaction time and response accuracy. This was done by comparing the reaction time and response accuracy between semantic categories (clothing and non-clothing), between the sub categories (strong and weak exemplar) and across the three age groups (I, II and III). The study also highlighted the gender differences in processing the categories.

Results of the present study indicated a very significant effect of the typical items (strong exemplars) compared to the non-typical items (weak exemplars) in both clothing and non-

clothing category. But, between clothing and non-clothing, there was no difference seen for categorization. There was a developmental pattern observed in the increasing order of the age and the categorizing capabilities of the children. That is, the semantic categorization increases with increase in age. The study also concluded that girls outperformed boys in all the semantic categorization tasks, across the three age group.

Implications of the study

The present study results can expand our comprehension of the developmental pattern on the semantic categorization in typically developing children and it additionally give us a knowledge into the semantic representation and processing relating to clothing and non-clothing in typically developing children. It will improve the clinician's information about the typicality effect in selection of items to work in therapeutic intervention on the semantic categorization tasks.

Limitations of the study

1. The present study considered only clothing versus non-clothing category under semantic categorization task.
2. The participants subjected to the study form a small sample of typically developing children of age range 8 to 10, which hampers the generalization of the study results to a larger extent.
3. DMDX software was employed for the study, as the children needs to respond as quickly as possible. Many a times they get easily distracted.

Future Direction

a. Other semantic categories can be considered for the semantic categorization task e.g. birds, furniture, animals and so on.
b. More number of participants can be included for the study.
c. Difference between the monolingual and bilingual children can be studied.

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Appendix 1

Stimuli for group I & group II

Strong Clothing	Weak Clothing	Strong Non Clothing	Weak Non Clothing
ಸೀರೆ	ಟೈ	ಫ್ಯಾನು	
ಜಾಕೇಟು	ಚಡ್ಡಿ	ಮನೆ	ತಲೆಪಿನ್ನು
ಲುಂಗಿ	ಸ್ವೆಟರು	ಚಾಪೆ	ಓಲೆ
ಲಂಗ	ಕೋಟು	ಸೌತೆಕಾಯಿ	ಕಾಲುಗೆಜ್ಜೆ
ಪ್ಯಾಂಟು	ಕಾಲುಚೀಲ	ಬೀಗ	ಬೊಟ್ಟು
ಬನಿಯನ್	ಬೂಟು	ಮರ	ಬಳೆ
ಕೈಚೌಕ	ರೈನುಕೋಟು	ಲಾರಿ	ಉಂಗುರ
ಟೀಶರ್ಟು	ಟೋಪಿ	ಹಸು	ಪಿನ್ನು
ಫ್ರಾಕು	ಬೆಲ್ಟು	ರೈಲು	ಪರ್ಸು
ಟವಲು	ಚಪ್ಪಲಿ	ಖುರ್ಚಿ	ವಾಚು
			ಕನ್ನಡಕ
			ಸರ

Stimuli for group III

Strong Clothing	Weak Clothing	Strong Non Clothing	Weak Non Clothing
ಸೀರೆ	ಟೈ	ಫ್ಯಾನು	ತಲೆಪಿನ್ನು
ಲುಂಗಿ	ಚಡ್ಡಿ	ಮನೆ	ಓಲೆ
ಜೀನ್ಸ್	ಸ್ವೆಟರು	ಸೌತೆಕಾಯಿ	ಕಾಲುಗೆಜ್ಜೆ
ಲಂಗ	ಕೋಟು	ಮರ	ಬಳೆ
ಪ್ಯಾಂಟು	ಕೈಚೀಲ	ಲಾರಿ	ಉಂಗುರ
ಬನಿಯನ್	ಶಾಲು	ಹಸು	ಪಿನ್ನು
ಕೈಚೌಕ	ಟೋಪಿ	ಬೆರಳು	ಪರ್ಸು
ಟೀಶರ್ಟು	ಬೆಲ್ಟು	ಕಾರು	ವಾಚು
ಫ್ರಾಕು	ಪೇಟ	ರೈಲು	ಕನ್ನಡಕ
ಟವಲು	ಚಪ್ಪಲಿ	ಸೋಫ	ಸರ
		ಖುರ್ಚಿ	

Stimuli for Practice Trail

ಬೆಲ್ಟು
ಎಮ್ಮೆ
ಬೆರಳು
ಪೇಟ
ಚಪ್ಪಲಿ
ಲಂಗ

APPENDIX 2

Consent Form

I, Archana Rao R, Master student, doing dissertation regarding the above mentioned topic under the guidance of Dr. Rajasudhakar, Lecturer in Speech Sciences, Dept of Speech Language Sciences at AIISH. I would be studying the semantic categorization ability in 8 to 10 years old Kannada speaking children. The aim of the present study is to explore the semantic categorization of words based on their typicality effects in 8 to 10 years old typically developing children and to investigate the developmental trend in semantic categorization task across the ages. It will give an insight into the semantic representation and processing pertaining to clothing and non-clothing in typically developing children. All the details will be kept confidential.

I ..... have been informed about the aim and implication of the study as mentioned above. I hereby agree to participate in the study.

Signature