Understanding the semantic distance in adolescent's bilinguals.

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ABSTRACT*: The words in the lexicon are assumed to be arranged in networks or semantic fields. This view is the basis for priming experiments. The priming experiments believe that when the target word is preceded by a semantically related word, the word is activated earlier when compared to conditions where the word occurs in isolation or it is preceded by a semantically unrelated word. This view is universally related but the magnitude of semantic relationship may not be the same for all kinds of words. A word in the lexicon can be related to other words by four types of relationships namely super ordinate, derivative, category coordinate and derivative. The aim of the study was to study the semantic organisation in adolescent, young and older adults. A total of 200 participants were considered for the study. A paper-pencil test was administered on these participants, where they were asked to encircle the word which would go well with the target word. The findings of the study showed that the semantic organisation did not vary much between the three groups. Associative semantic ordinate was proximally related to the target word, while super ordinates were distally related to the target word*

KEYWORDS*: semantic, fields, distance, adolescent's bilinguals*

INTRODUCTION

The organisation of words in the lexicon (i.e the mental map representing information about words) has fascinated researchers. This arrangement of information based on its meaning is known as semantic organisation. This kind of a "semantic network" in other words, a comprehensive organisation of information in the lexicon is necessary to identify human performance in processing of language.

The lexical semantic organisation is popularly expressed through two views; the proponents of the first view (ex Martin, 2007) postulate that semantic organisation is based on the features shared; this view further assumes that items belonging to the same lexical category are stored in the same part of semantic memory. The proponents of the second view (Harper, 2005; Nopney, 2009) believe that the lexical items related in

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terms of concept are stored in the same part of semantic memory. The commonality between the views is that the lexical items are stored in some pattern in the semantic memory. In other words any given word belonging to a lexical category is stored in the lexicon and is related to the other word in the lexicon in terms of semantic relationship. Semantic organisation is also explained using various models, some of which include the feature comparison model and the exemplar model. The former proposes that lexical items are stored in the lexicon based on a relationship between these items as having similar attributes, processing of which requires a two step judgement process. The latter model focuses more on the categories that these items belong to. Each item is referred to as a 'prototype' and commonality is mentioned with respect to presence or absence of this prototypicality. For example, *apple* is a prototypical fruit whereas *tomato* is a non-prototypical fruit.

Some lexical items may be strongly/proximally related, for example apple and orange while some items may be distally or weakly related such as orange and seed. Certain hypotheses (Riding, 1975) state that semantic organisation variably affects reception and recall. The study also reveals that information having greater semantic distance is found to be relatively easier to process than those which have a lesser semantic distance between them. On the other hand, it is easier to retrieve items from the lexicon which fall under the same category than otherwise.

Four different types of semantic relationships namely superodinate, category coordinate, derivative and associative relationships have been identified. These four types of semantic relationships can be explained for any given word. For example if the given word is "Mango" - superodinate would be the name of a lexical category i.e. "Fruit", category coordinate would be a lexical item belonging to the same lexical category such as "Orange", While derivative would be a feature associated with the lexical item such as "Sweet". Associate can be a feature associated with the target word for example the word mango may be associated with the words "season". The extent of relationship may vary with respect to the four types of semantic relationships. This is dependent on age to a great extent because normal children are only exposed to concrete and specific relations between words at an early stage of acquisition which later grows into a semantic network of larger categories. For example, at an early stage a child might learn words such as *orange*, *apple*, *potato* and *tomato* and at a later stage he might group these words into pairs on a super ordinate level such as *fruits* and *vegetables*. This is supported by the generalization hypothesis (Anglin, 1977). It may also vary with respect to lexical items, frequency of occurrence, language proficiency etc. The concept of semantic sets is also assumed to facilitate the development of second language. (Hashemi & Gowdasiaei, 2005; Hatch & Brown, 1995; Johnson, 1995; Machalias, 1991; Menon, 1991; Seal, 1991).

The present study aims to study the semantic organisation in adolescents, young and older adults. Need for the study: Semantic relationship is a well explored theoretical aspect and is practically implemented in priming studies (semantic paradigm). When people consider stimuli for semantic paradigm, the relationship between the prime and

target is randomly considered and the semantic distance between the two words is not taken into consideration. This variable (semantic distance) would often decide the magnitude of priming. The present study focuses on studying the extent of relationship or semantic distance between lexical items on a closed choice task.

METHOD

Two hundred participants were enrolled for the study. The participants were divided into three groups. The first group comprised of 100 participants in the age range of 12-15 years (25 students each from 7th, 8th 9th and 10th grade). Second group included 60 participants in the age range of 18-25 years. While the third group comprised 40 participants in the age range of 45-60 years (see table 1).

Table 1. *Details of participants*

Group	Age Range (in years)	Number of Participants
Group 1	12 – 15	100 (25 each in 7th,8th,9th.10th)
Group 2	18 - 25	60
Group 3	45 – 60	40

11 words each from four different lexical categories (animals, common objects, fruits and vegetables) were randomly selected. Four closed choices (super-ordinate, category coordinate, derivative and associative) were coined for each lexical item. A list with the name of lexical category and the four choices underneath it was made. The list comprised of 44 words in total. This final list was circulated to three experienced SLP's in order to verify that the choices shortlisted for the lexical items were apt. The operational definitions of the four semantic relationships were given to the judges in prior. Based on their inputs the final list was modified. The final list was circulated to all the participants. The participants were asked to read the name of the lexical category and read the four choices mentioned underneath and were asked to encircle the first word which would come into their mind when they hear the name of the lexical category. The examiners scrutinised the list for each participant and the number of superordinate, derivative, category coordinate and associative marked each of the lexical categories were shortlisted and tabulated.

Results and Discussion- Eleven lexical items grouped under four lexical categories were used. Each lexical item had four choices as mentioned earlier. The number of superordinate, derivative, category coordinate and associative marked for each the lexical category was tabulated for each participant initially and for all the three groups eventually. The data was subjected to test of normality by employing Shapiro Wilks

test and the test depicted non-normality. Group I individuals had overall median score of 9,11,4 and 21 for super ordinate, derivative, category coordinate and associative relationships respectively (see figure 1). While Individuals in group II secured overall median scores of 5, 8, 9 and 22 for the four semantic relationships (see figure 2: mentioned in the same order,). 10,12,6 and 17 were the overall median scores across the four semantic relationships for participants in group III (see figure 3).
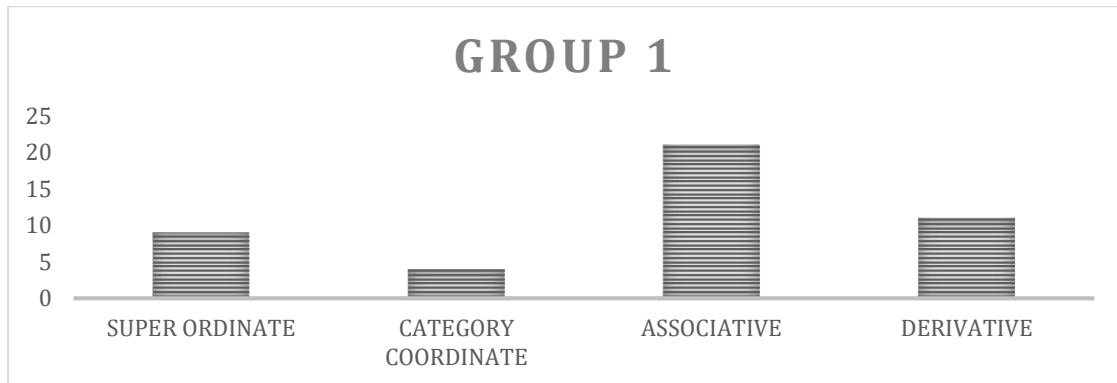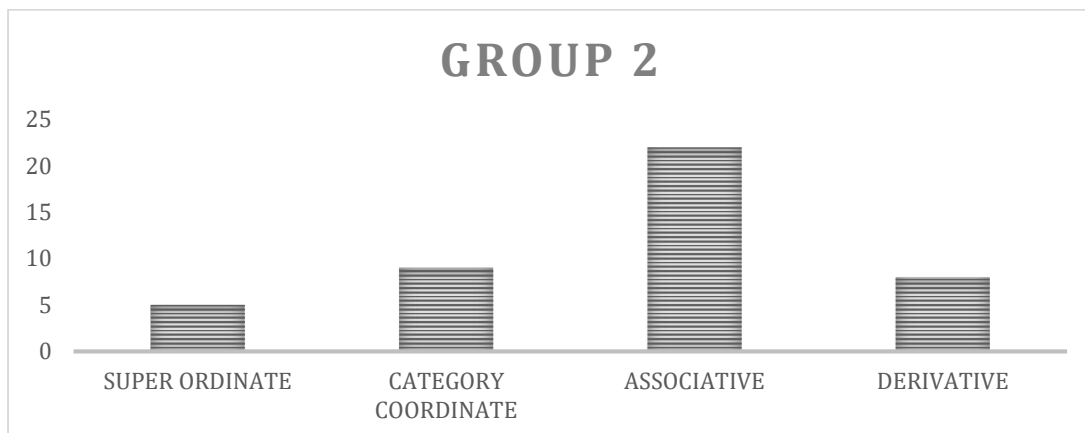

Figure 1. Median scores for group 1

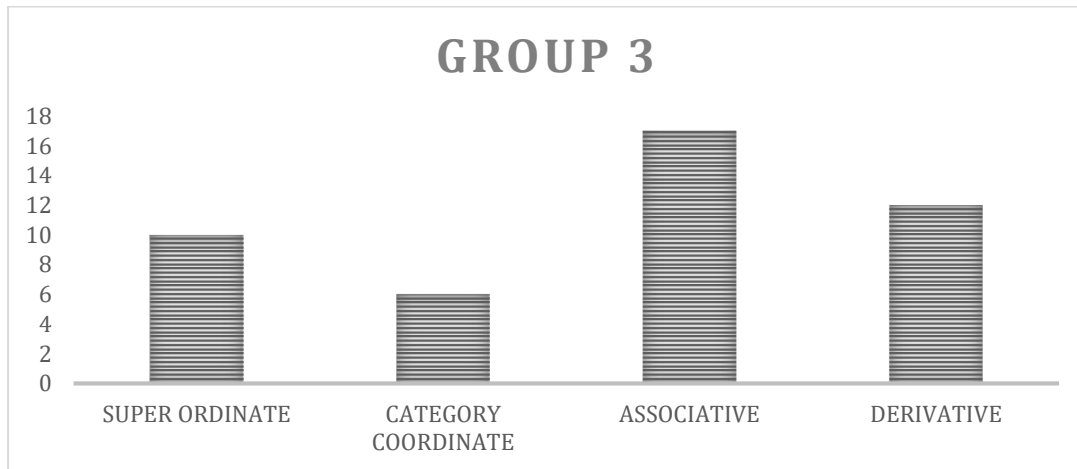*Figure 2*. Median scores for group 2

Figure 3. Median scores for group 3.

The overall median scores was better for associative followed by derivatives, super ordinate and category coordinate. Interestingly the pattern was uniform across the four lexical categories (analysed separately) and for all the age groups indicating that the semantic distance was proximal for associative semantic relationship. The overall median scores obtained for the four choices were compared statistically by employing Friedman's test and Z score obtained on comparison was 5.34 and p value ($p<0.05$) showed significant difference and further paired wise comparison was carried out by employing Wilcoxon's signed rank test and the p values showed that there was significant difference between associative and the other three semantic relationships (compared across pairs). For the other paired comparisons no significant differences were seen.
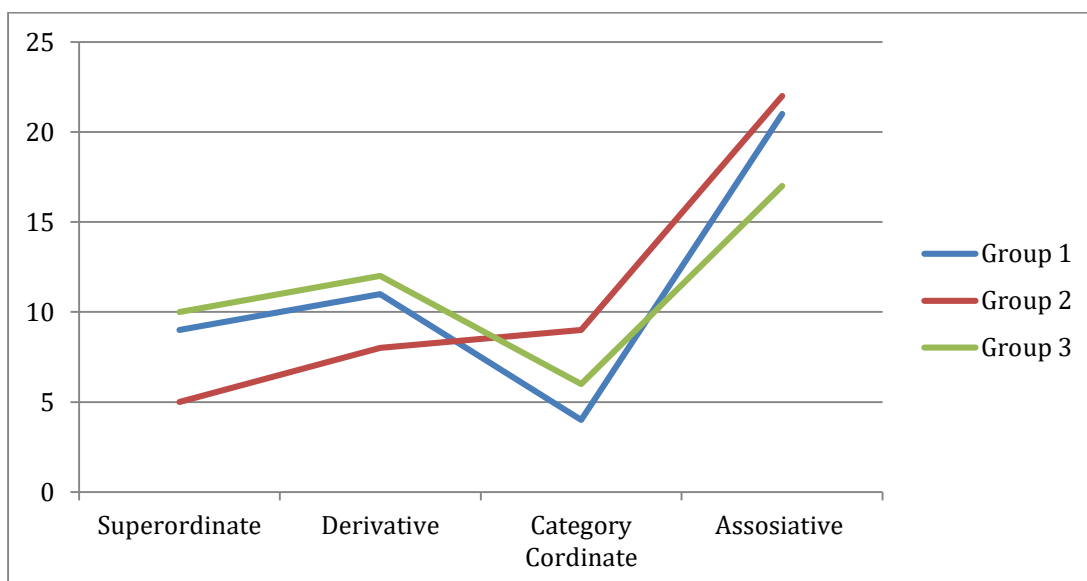

Figure 4. Pattern of the four semantic ordinates for the three groups.

The semantic distance could be traced through the overall median scores. The order of semantic ordinates was Associative followed by derivative followed by category coordinate for group 1 and group 3. For Group 2, the order was slightly different. It was Associative followed by category co ordinate followed by derivative followed by super ordinate. However significant statistical difference was seen only between associative and the three other semantic relationships. This showed the clear dominance of associative over the other semantic relationships.

Thematic and taxonomic relations are used in describing lexical semantic organisation. thematic relations deals with co-occurrence in event schemas (e.g: dog-bone) and taxonomic relations would involve hierarchical category membership (eg: dog- hoarse, animal) these organization principles are explained in grounds to a model proposed by Collins& Loftus,1975. According to this model words are represented by conceptual nodes. Each node is connected to other nodes that share semantic relations. In other words the semantic attributes would gel the words in the lexicon. When a node is processed or stimulated, activation spreads out along the network path to other nodes. In a rich semantic network, there are many links connecting the nodes such that the activation of one node primes (or co activates) many related nodes. According to the spreading activation model of semantic networks (Collins & Loftus, 1975), upon hearing a prompt (e.g., finger) in a word association task, the conceptual node representing that word is activated. Then the activation spreads from one node to others. Nodes bearing strong links to the activated node (e.g., toe or hand) are immediately activated and are produced early on in free or repeated word association. Weakly linked nodes (e.g., glove) receive a smaller and/or delayed activation and are produced later in free or repeated word association. Further, a word like bookshelf is probably not accessible at all by the activation and never occurs as a response to finger. Through repeated probing, the word association task can yield information about the number and strength of links between semantically related words in a speaker's lexicon.

The word association test is generally used to probe lexical–semantic organization (De Groot,1992; Entwisle,1966; Henriksen,1999). This task has different variants. In a discrete word association task, the participant produces a single response to a word prompt. For a free word association task on the other hand, the participant produces as many responses as possible to a prompt within a set time limit. In a repeated word association task (Sheng, McGregor, &Marian, 2006), the prompt is repeated multiple times, and each time the participant gives a single response.

The findings of the current study showed that the semantic distance would not vary much with respect to age. The other important finding of the study was that associative semantic ordinate had higher median score suggestive of proximal semantic relationship compared to the other three categories. This indicates that the semantic distances of all the four ordinates are not the same. Better identification of a target word is likely to take place when it is preceded by an associative word in priming experiments. Least median score was seen for super ordinate category showing that the semantic distance was more for this category. Super ordinate normally would mean the

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name of the lexical category. The name of the lexical category is a generic entity and may encompass several lexical items under it. Hence the participants considered for the study would may not have chosen the super ordinate category when asked to encircle to encircle the first thing that came to their mind when they saw the target word. This shows that the super ordinate category would not be an appropriate prime in priming experiments.

Conclusion: The study was carried with aim of understanding the semantic distance between the lexical items and in turn introspecting the semantic organisation in adolescents (n=100), younger (n=60) and older individuals (n= 40). 44 lexical items under four lexical categories (11 each) were chosen and each lexical item had four choices i.e. super-ordinate, category coordinate, derivative and associative. The participants were asked to encircle one of the four choices which would go well with target item. The responses were tabulated for all the three group of participants across the four lexical categories. The results showed the participants had marked associative more than the other three choices followed by derivative, super ordinate and category coordinate. In other words associative semantic relationship had minimum semantic distance with respect to target word. The semantic distance did not vary as a variable of age. However the word frequency and word length may have had an influence on the semantic distance and this can be probed further.

References

Anglin, J.M. (1977) Word, object and conceptual development. New York: W.W. Norton & Co.,

Collins, A. M., & Loftus, E. F. (1975). A spreading-activation theory of semantic processing. *Psychological Review*, *82*, 407–428.

De Groot, A. M. B. (1989). Representational aspects of word imagenability and word frequency as assessed through word association. *Journal of Experimental Psychology; Learning, Memory and Cognition, 15,* 824-845.

Harper . (2005). Systems of Knowledge Organization for Digital Libraries. The Digital Library Federation. Retrieved April 12, 2006, from: http://www.clir.org/pubs/reports/pub91/contents.html

Hashemi, M. R., & Gowdasiaei, F. (2005). An attribute-treatment interaction study: Lexical-set versus semantically-unrelated vocabulary instruction. RELC Journal, 36(3), 341-361.

Hatch, E., & Brown, C. (1995).Vocabulary, semantics, and language education. Cambridge, England: Cambridge University Press

Issa, S. H., Awadh, F. H., & Ahmed, H. R. (2022). The role of proficiency level in the speed of lexical activation. *Cogent Arts & Humanities*, *9*(1), 1999613. https://doi.org/10.1080/23311983.2021.1999613

Issa, S. H., Ahmed, H. R., Alwan, E. E., Mutahar, A. A., Bajiri, M. E., & Abhishek, B. P. (2021). An objective tool for classification of language deficits in adults. *Review of International Geographical Education Online*, *11*(5), 4237-4246.

Johnson, L. M. (1995). Similarity of meaning as a factor in retroactive inhibition. Journal of General Psychology, 9, 377-388

Martin, A. (2007) The representation of object concepts in the brain. Annual Review of Psychology, 58, 25–45

Machalias, R. (1991). Semantic networks in vocabulary teaching and their application in the foreign language classroom. Journal of the Australian Modern Language Teachers' Association, 26(3), 19-24.

Menon, R. N. (1991). The differentiation of lexical microsystems and work on them in Russian as a second language instruction. Russian Philology, 10, 1-12.

Noppeney, U. (2009). The sensory-motor theory of semantics: Evidence from functional imaging. *Language and Cognition*, 1-2, 249-276.

Riding (1975) . Schema-Directed Processes in Language Comprehension, July 1975.

Seal, B. D. (1991). Vocabulary learning and teaching. In M. CelceMurcia (Ed.), Teaching English as a second or foreign language (pp. 296-311). Boston, MA: Heinle & Heinle.

Sheng and Karla K. McGregor (2010) Lexical–Semantic Organization in Children with Specific Language Impairment. *Journal of Speech Language and Hearing Research*2010 Feb; 53(1): 146–159.