AN ASSESSMENT OF LEXICAL SENSE RELATIONS BASED ON WORD ASSOCIATION TEST

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Abstract

The present study intends to investigate lexical sense relations through the application of linguistic knowledge, cognitive processes in colloquial speech and word association test. In a word association test, a list of words is presented to subjects, who is asked to respond with the first word that comes into their mind, and this gives information on the way knowledge structures in the human mind. To achieve this purpose, first, it has been needed to prepare appropriate words; therefore, 300 students of the faculty of letters and humanities have been asked to write the first word which comes to their mind. Totally, 3000 words have been assembled. 22 words, which have had the highest frequency, have been chosen among those words to be applied in the questionnaire. To achieve the aim of the research, 17 lexical relations have been proposed by the researchers. This study has convenience sampling with 110 subjects. It has been concluded that the lexical storage system is strongly dependent upon sense relations. Language speakers can radically alter the relation between words on the basis of their mental conceptions, although Attributive relation, Functional relation and Social-cultural relation had the most frequency in this research. Attributive relation, 25.9%; Functional relation, 17%; Social-cultural relation, 11.9%; Synonymy, 9%; Collocational relation, 8%; Place relation, 3.3%; Meronymy, 3%; Need relation, 1.4%; Instrumental relation, 1.3%; Semantic opposition, 1.1%; Material relation, 0.6%; Negative relation, 0.5%; Time relation, 0.4%; Causal relation, 0.3%; Hyponymy, 0.13%; Specific relation, 0.1% and Member-collection, 0.1% are frequencies of each relation.

Keywords: Sense relations, collocation, mental lexicons storage, word association test

Introduction

What is meaning? What does it mean when someone says, "I know the meaning of this word"? Various linguistics, philosophers and psychologists have defined some important aspects of a word's meaning such as the difference between concept and reference. The conceptual model is a kind of cognitive structure which demonstrates some environmental aspects and represents different linguistic, psychological and pragmatic characteristics. Therefore, humans can have a conceptual model from their environment correspondent with words. When someone hears a word, he draws a model in his mind according to that word's feature. Thereby, investigating conceptual models and lexical relations has become common in the field of psycholinguistics and interdisciplinary researches since the 1960's (Steinberg, 2002, p. 108). The current study aims to appraise lexical sense relations through the application of this concept model.

Studying lexical relations and discovering the dominant conceptual model is rooted in different interdisciplinary domains, one of which is psycholinguistics. Psycholinguistics is a science which examines the relationship between language and mind. This field deals with the process of speaking, its mental factors and existing relationship between language and knowledge. In fact, psycholinguistics is the knowledge of comprehension, production, and acquisition of language. It puts emphasis on language knowledge and cognitive processes in the application of everyday language (Carroll, 2008, 3).

Psycholinguistics intend to assess the infrastructural processes of the human mind through the examination of linguistic performance. Psycholinguists have proposed some ideas about lexical relations and models of comprehension, storage and retrieval. Modular model is one of the suggested models, and word association test is an approach of storage and access to the lexicons of the same field. Spreading-activation is one of the evidences which have been offered for lexical relations (Molavi, 2007, 77).

For instance, if someone hears the word 'doctor', other words such as 'nurse', 'patient', 'hospital', and 'drug' come to his mind. This event is similar to the flow of electricity which turns on some lights simultaneously; therefore, the recognition of these words becomes easier. But the aforementioned feature is inconsistent, transient and obligatory; it means that the listener cannot choose whether being reminded or not, he is subconsciously reminded of related words such as nurse, patient, hospital and so forth. Although this event is different from contextual effect, it can be influenced by it.

As Sinopalnikova (2003) states, the term association is used in psycholinguistics to refer to the connection or relation between ideas, concepts, or words, which exists in the human mind and manifests in a following way: an appearance of one entity entails the appearance of the other in the mind. For Miller (1996) word associations show the familiarity effect: responses are faster to familiar words and if a word has been presented before, it takes a shorter time to respond to that word. According to Kess (1992), context is an important factor in giving responses: if subjects must respond quickly, clang responses are common, if there are no time limitation more idiosyncratic responses occur. This study aims at investigating lexical sense relations in mind of some university students.

Review of literature

According to Sinopalnikova (2003), the simplest experimental technique to reveal the association mechanism is a free association test (FAT). In FATs, a list of words (stimuli) is presented to subjects (either written or orally), which are asked to respond with the first word that comes into their mind (responses), and FAT gives the broadest information on the way knowledge is structured in the human mind. The results of FAT series reported in a form of tables, was given the name Word Association Norms (WAN). Word Association Thesaurus (WAT) is a more developed form of WAN because it includes several thousands of stimuli.

Some researchers such as Randal (1980), den Dulk (1985) and Kruse et al. (1987) (all cited in Wolter, 2002) tried to demonstrate a link between proficiency and responses on a multiple response word association test. They claimed that WAT could function as a means of assessing proficiency. However, there appeared some problems with these studies and they were criticized because they used words from Kent-Rosanoff (1910) list. Wolter's (2002) study revealed that word associations in a foreign language are not clearly linked to proficiency.

Read (1993) carried out a study with university students of English and tested their knowledge of "academic" words. Read's test consisted of a target word followed by eight other words, four of which are semantically related to the target word, and four of which are not. Read's test aimed to assess receptive word knowledge and knowledge about the meaning of a word, the words with which it is associated, and the collocations in which it occurs. He distinguished three types associations on the basis of "preliminary drafting of items": (a) paradigmatic ("The two words are synonyms or at least similar in meaning, perhaps with one being more general than the other"); (b) syntagmatic ("The two words are collocates that often occur together in a sentence"); (c) ("The associate represents one aspect, or component,

of the meaning of the stimulus word and is likely to form part of its dictionary definition"[ibid.: 359;]).

One of the most striking results of word association studies was summarized by him as follows: second language learners produce associations that are much more diverse and unstable; often their responses are based on purely phonological, rather than semantic, links with the stimulus words (ibid: 358).

As Schmitt (1998) states the elicitation of word associations is a relatively simple procedure, which is one of its attractions. Traditional subjects are given a stimulus word and asked to produce the first response which comes to mind. According to him, the use of word associations holds a great deal of promise in the areas of L2 vocabulary research and measurement. He further claims that word association procedures can be used as an alternative way to test vocabulary.

For Kess (1992), an association theory looks for latent relationships, the covert links that words have with other words, images and thoughts. He believes that word association system is like a spider web in which words in the mental network are related to other words.

"Word Association Test", which was invented by F. Galton, was widely used in psychology by psychiatrists such as C. Jung, G. H. Kent and A. J. Rosanoff. Kent & Rosanoff's study was the first large scale study which was carried out in English with 1,000 men and women. They used 100 probe words and read one word at a time for a person who was to give the first word that came into his/her mind. After analyzing the data, they claimed that there was uniformity in the organization of associations and people shared stable networks of connections among words.

According to Bahar and Hansell (2000), the word association test is one of the commonest and oldest methods for investigating cognitive structure and has been used by several researchers. The underlying assumption in a word association test is that the order of the response retrieval from long-term memory reflects at least a significant part of the structure within and between concepts. In a word association test, the degree of overlap of response hierarchies is a measure of the semantic proximity of the stimulus words.

As Wolter (2002) states devising a word association test (WAT) as a means of assessing proficiency in a foreign language has always had something of an inherent appeal to it. For Wolter when developing a WAT, it should be kept in mind that

1) WAT would be relatively quick and easy both to administer and to score,

2) Be a nice complement to other methods of assessing learner performance and

3) Tend to suggest that there may be something of a connection between psycholinguistic knowledge and more general proficiency in a foreign language. In respect to this last point, he states that the underlying argument is that we would expect learners of higher proficiency to have more highly developed semantic networks in the L2 mental lexicon. However, his study with a group of language learners and native speakers did not support his views since he could not find any evidence that word associations in a foreign language are linked to proficiency.

According to Richards (1991), the responses to free association tests give much information about the psychological structuring of vocabulary in an individual and offer a way of investigating the syntactic and semantic relationships among words.

In classifying word associations, different classification systems which have some common characteristics were applied by different researchers. Kess (1992) divided word associations into 3 types:

1. Members of the same part of speech class

a) paradigmatic responses (responses which fall in the same syntactic category such as synonyms or antonyms such as thin-skinny, black-white)

b) syntagmatic responses (responses which fall into other categories such as dig/hole)

2. Members of the same taxonomy

a) Subordinate (dog/retriever)

b) Super ordinate (dog/animal)

3. Rhyming or clang responses (sister/blister, yellow/fellow).

Miller (1996) reports that associative responses of adults can be investigated by using four types of semantic relations which were found to be salient in the lexical organization of most speakers of English:

1. Super ordinate, coordinate and subordinate terms

2. Attributive terms

3. Part-whole relations

4. Functional terms.

An important point is that examiners should answer the questionnaires in a specific short time, since if they are given long time to answer them, their answers will be mostly the reflection of their experiences and personal thoughts (Namvar, 2007, p. 46). In the following part, some kinds of sense relations will be introduced to clarify the conceptual model of lexical sense relations.

Different types of sense relations

Words which are symbols retain their relationship with objects or attributive objects. For instance, ‘desk’ reminds us of a wooden object or other objects which are attributed to the desk. Words which are related to nonphysical affairs and abstract concepts are considerably broader. For example, ‘religion’ can remind a person of the following chain:

Religion → symbol → concept → { morality – society – faith – language – family} (Ekhtiyar, 1992 , p. 104).

We can examine the sense relations between words. Various types of sense relations will be discussed below.

Hyponymy relation

Hyponymy is a less familiar term to most people than either synonym or antonym, but it refers to a much more important sense relation. It describes what happens when we say 'An X is a kind of Y'--*A daffodil is a kind of flower*, or simply, *a daffodil is a flower* (Crystal, 2003). "*House* is a hyponym of the subordinate *building*, but *the building* is in turn, a hyponym of the subordinate *structure*, and, in its turn, *structure* is a hyponym of the subordinate *thing*. A subordinate at a given level can itself be a hyponym at a higher level" (Griffiths, 2006).

Meronymy relation

An important and interesting type of semantic relations is the relation between the parts of things and the wholes which they comprise. Relationships which are expressed either with the term *part,* or which by their position in a part-whole expression signal *part,* are considered to be *meronymic* and to ‘structure semantic space in a hierarchical fashion’ (Winston et al. 1987: 417 & 418). However, meryonymy or part-whole relations turn out to be quite complex, probably because there is no single meronymic relation. Rather, there are several different ones, each having their own semantic properties.

Member-collection relation

Member-collection is a type of meronymic relationship which manifests a relation between a part (a member) and a whole such as the existing relationship between tree and forest, or horse and herd (Safavi, 2005, p. 104).

Synonymy relation

Synonymy is one of the most common sense relations. Two synonymous words are mostly used interchangeably although there are no two terms with completely identical meaning (Yule, 1996, p. 118). Synonymy can be also classified as hyponymy, for example two words ‘car’ and ‘automobile’ are synonymous, and whereas automobile can be also considered as super ordinate term and car can be regarded as hyponymy.

Owing to the fact that there are no total synonyms in the sense of being mutually interchangeable, substitution of one word for another is not always possible (Palmer, 1981, 108- 110). For example, 'house' and 'home' have similar meanings but they are not totally synonymous. By and large, we can classify synonymy into three categories: context-dependent, analytical and implicit synonymy.

Semantic opposition relation

The relation seems semantic opposition or antonym when the meanings of the words are opposite (Safavi, 2006, p.35 & 36). Antonym is considered as a type of opposition, and opposition has various kinds which can be explained in the following manner.

- Gradable opposition: word pairs whose meanings are opposite and lie on a continuous spectrum such as young and old.
- Complementary opposition: word pairs whose meanings are opposite and do not lie on a continuous spectrum such as dead and alive.
- Symmetrical opposition: such as the existing relationship between sell/buy, and wife/husband
- Directional opposition: such as come/go, and North/South
- Lexical opposition: word pairs whose meanings are opposite and are formed by the use of some prefixes such as un- or non, for example able/unable, conformist/nonconformist
- Connotational opposition: word pairs whose meanings are opposite when their implicit meanings are opposite such as chalk and cheese
- Semantic contrast: According to Geeraert (2010, p. 87), the most common type of multiple opposition antonyms is 'scale' in which there is only one semantic dimension such as the temperature in the case of *hot/warm/tepid/cool/cold*. Typically, the dimension of a scale is continuously gradable, and the terms in the scale indicate various degrees on the graded dimension. 'Ranks' are one-dimensional as well. In 'cycles' such as the days of the week or the months of the year, there is again only a single conceptual dimension, but the dimension does not have a polar structure (in the sense that there are two extremes like hot and cold) (Geeraert, 2010, p. 87).

Instrumental relation

In instrumental relation, one of the pairs is an instrument which is mostly put in a specific place such as *refrigerator/kitchen*, or it is an instrument which is used in an industry or any type of work such as *hammer/carpentry* (Izanloo, 2006, 62 & 138).

Material relation

Material relation exists between two objects, one of which is made of the other. Although it should be noticed that some objects can be constructed of different materials, for example a chair can be made of wood or iron, but there are some things which are composed of just one material such as bread which can be made just from paste.

Place relation

Some words are related to each other on the basis of the place they occupy, for example, a chair is used to sit on, or a room is a place to live in and so forth. Place relation has some subcategories which are as follows:

- High relation: This type of relation shows the existing relationship between word pairs one of which has a higher position in proportion to the other one, such as eyebrow and eye. As it is obvious, if we want to define eyebrow, it is needed to mention its higher position in proportion to eye.
- Inside relation: it demonstrates that there is something inside another thing, for example, head and brain.
- Outside relation: such as smoke and chimney.
- Beside relation: it shows that two things are near each other such as sea and beach.
- Job relation: In this relation, one of the words is introduced as a place in which a job has been done such as a nurse / hospital.
- Cycle relation: in this relation, word pairs have a spatial relationship with each other, and one of them is known apropos of the other one's position, size, shape such as finger/ring, hand/bracelet.

Causal relation

Cause and effect is a relation which can be seen in lots of lexicons, for example bacteria and disease have a causal relationship.

Attributive relation

Attributive relations describe the words, for example, *convenience* describes *chair* (Carroll, 2008, p. 108). One of the most significant subcategories of attributive relation is *being* a relation. On the basis of this relation, one of the words which construct the pair is a noun (being) and the other one is an adjective which has been made through a derivational process, such as disappointment (being disappointed), largeness (being large), smallness (being small), cleanness (being clean), envy (being envious), friendship (being a friend), and so on. Other word pairs can be also described by the usage of this relation, for example, canary/yellow, falcon/hunt.

Specific relation

Specific relation refers to the concepts which are meaningful only in relation to specific words, such as mosque which does not add up out of Muslim environment, or dog collar that is meaningful just in relation to a dog.

Time relation

Time relation exists between word pairs which imply a specific time such as morning/breakfast, evening/dinner, and noon/lunch.

Negative relation

It shows the paucity of a characteristic in the word, for example invalid implies the shortage of validity, or incapable imply the paucity of capability.

Need relation

It can be exemplified in the following instance, *human being/sleep/food/cloths*. It shows that *human being* is in need of *sleep*, *food* and *clothes*, and cannot live without them.

Collocational relation

Collocational relation cannot be categorized in any of the aforementioned relations, although the existing relationship between the word pairs is obvious such as spoon/fork and snow/rain (Yule, 1996, p. 122 & 123).

Functional relation

In functional relation, the word which has been replied does something with the stimulus word, for example, sitting on/chair (Carroll, 2008, p. 108).

Social-cultural relation

Social-cultural relation is an indirect and sense relation which has been made by different social and cultural factors.

Research Methodology

This research is a quasi experimental survey. It is based on a single group plan with a post test. This study aims at investigating lexical sense relations in mind of university students in order to find the type of associations students make and if there are any similarities and differences between their associations. To achieve this purpose, first, it has been needed to prepare appropriate words; therefore, 300 students of the faculty of letters and humanities in Ferdowsi University of Mashhad have been asked to write the first word which comes to their mind. Totally, 3000 words have been assembled. 22 words, which have had the highest frequency, have been chosen among 3000 words to be applied in the questionnaire. Words with higher frequency can show stronger relations existing between the word pairs.

It should be mentioned that there was a black area between the two rows to avoid interference. Because of time limitation, the responses of only 110 students were gathered.

The participants have been asked to write the first word that they thought after seeing each word as fast as possible. 110 students (n=110, between the ages of 18- 24) from the first sample have completed the questionnaire and their answers have been analyzed in separate tables to evaluate their lexical sense relations (for questionnaire see appendix A).

The data were collected from the students in their usual class hours by their teachers. The students were given the questionnaire and were wanting to write the first word that comes into their minds. The data were analyzed according writers' classification (based on 17 relations). All responses were counted and ranked according to their frequencies (see Appendix C). Then the response types were compared. In order to provide intra-rater reliability, responses to the word association questionnaire were checked again by the researcher one week after the first check. Then, one linguists and one psychologist checked the responses and the agreement on the classification was 95%.

Results

Considering table 1, this conclusion can be drawn that native speakers have remarkably stable patterns of word association, which can be taken to reflect the sophisticated lexical and semantic networks. The percentages of responses in each category were as follows:

Table 1. The average of total data according to the 17 relations

Sense relations	average
Hyponymy	0.13%
Meronymy	3%
Attributive relation	25.9%
Functional relation	17%
Synonymy	9%
Semantic opposition	1.1%
Instrumental relation	1.3%
Place relation	3.3%
Causal relation	0.3%
Time relation	0.4%
Negative relation	0.5%
Need relation	1.4%
Collocational relation	8%
Member-collection	0.1%
Specific relation	0.1%
Material relation	0.6%
Social-cultural relation	11.9%

As you can see the frequency of each relation in a descending manner is like this: Attributive relation, 25.9%; Functional relation, 17%; Social-cultural relation, 11.9%; Synonymy, 9%; Collocational relation, 8%; Place relation, 3.3%; Meronymy, 3%; Need relation, 1.4%; Instrumental relation, 1.3%; Semantic opposition, 1.1%; Material relation,

0.6%; Negative relation, 0.5%; Time relation, 0.4%; Causal relation, 0.3%; Hyponymy, 0.13%; Specific relation, 0.1%; Member-collection, 0.1%.

As these relations among associative words have percentage frequency distribution from .1% up to 25.9%, it is possible to consider them in five levels from so high frequency up to so low frequency. The following table shows these distributions:

Table 2. Distribution of different kinds of sense relations based on percentage

Frequency scale	So high frequency	high frequency	Middle frequency	Low frequency	So low frequency
Limit of levels	- %25/9 %20/8	- %20/7 %15/6	- %15/5 %10/4	- %10/3 %5/2	- %5/1 %0
Kinds of sense relation	Attributive relation, 25.9%	Functional relation, 17%	Social-cultural relation, 11.9%	Synonymy, 9% & Collocational relation, 8%	Other lexical relations

Conclusion

Psychological researches indicate that lexicons are located in people's minds in the form of semantic connections. As it has been shown in the present article, most of the participants have been replied to the word association test on the basis of Attributive relation and other sense relations between the lexicons. These sense relations play a big role in finding the required word. It can also be concluded that the lexical storage system is virtually the same in people's minds. This hypothesis can be proved by considering the effect of a stimulus word's meaning in the decision of the person to choose the first word that come to mind. It suggests that the lexical storage system is largely based on sense relations.

The current study has been conducted by the analysis of 110 participants' answers. Future researchers can use more participants to enhance their validity. Some irrelevant replies have been omitted to retain the research's validity and reliability. Some of the responses could be classified in more than one group and to avoid subjectivity, the authors put them in all possible categorizations. Owing to the fact that Rosanoff and Kent's theory was not adequate, the authors have suggested some other categories for sense relations from other authentic sources of semantics.

When we look at the results generally, it is seen that the students used a variety of responses which were more or less similar. A total of 110 responses were gathered in the study. Then they were classified to 17 relations which was designed by the writers. It was clear that good readers "store" their knowledge of vocabulary in semantically related networks; the activation of a word in a network will automatically "activate" other related words, which will then aid comprehension. The results obtained in this study suggest that the

students gave responses to word association questionnaire using words which rank highly in their lives and which reflect their psychological state.

The last and the main point of this research is that there is a kind of sense relation between words in the mind of every person. Among Persian students which participated in this research, Attributive relation, Functional relation and Social-cultural relation had the most frequency. Although 14 other relations were used to, but with a low or very low frequencies. This indicates that for giving a special model, complementary studies are needed.

Suggestions for Further Research

This study was limited to 110 students. Therefore, we cannot make generalizations. It would be better if more subjects from different levels were used in the study. This study might also be carried out by children and adults of different age groups. 22 stimulus words were used in this study. In a further study, this number can be increased. Sex differences were not taken into account in this study but in other research word associations of males and females can be investigated.

The subjects were asked to write the first word that came to their minds. Instead, they could have been asked to produce two or three responses and this format would have been differentiating between learners at elementary and advanced levels of proficiency. As Schmitt (1998) states, asking for multiple responses gives the subjects additional chances to apply these more typical associations, and thus may well be a fairer measure. Providing multiple typical responses would supply a more convincing illustration that the stimulus word is incorporated into s subject's lexicon in a way similar to a native speaker.

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Appendixes:

Appendix A, The questionnaire:

Bus		love	
money		food	
father		flower	
telephone		computer	
God		book	
pen		bag	
house		classroom	
tree		clothes	
friend		car	
University		mother	
clock		desk	

Appendix B, The following table indicates given responses to the stimulus word of *flower* and their frequencies as an example:

Response	Frequency	Response	Frequency
Beauty	14	Pretty	1
Beautiful	13	Mother	1
Fragrant	8	Cactus	1
Rose	6	Friendship	1
Red	5	Water	1
Freshness	5	White	1
Polianthes tuberosa	4	Shadow	1
Smell	3	Artificial	1
Narcissus	3	Soccer	1
Subtlety	3	Damask rose	1
Thorn	3	Nature	1
Love	3	Sunflower	1
Jasmine	3	wilt	1
Life	2	Stripped of its petals	1
Tulip	2	Tender	1
Colour	3	Useless	1
beloved	2	Just natural	1
Short	1	Solitude	1
Perfume	1	Lily	1
Gift	1	Me	1
Lush	1	Violet	1
Tree	1	My fiancé	1
Clove	1	Breathing	1
Cycle	1		

Appendix C, the results of sense relations among responses to 22 stimuli (T= total number and P= percent):

Stimuls words	Bus		money		father		phone		God		pen		house		tree		friend		university		clock	
Sense relations	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P
Hyponymy	4	39	6	7.5	2	1.8	14	13.3	-	-	6	6.3	7	6.7	33	31.4	-	-	15	15.4	17	16.1
Meronymy	-	-	1	.9	1	.9	9	8.5	-	-	6	6.3	-	-	6	5.7	-	-	4	4.1	14	13.3
Attributive relation	4	3.9	10	9.6	15	14.1	16	15.2	30	28	3	3.1	10	9.6	1	.9	11	10.7	4	4.1	1	.9
Functional relation	8	7.8	13	12.5	18	16.9	32	30.4	3	2.8	23	24.4	46	44.2	17	16.1	11	10.7	9	9.2	33	31.4
Synonymy	5	4.9	10	9.6	15	14.1	16	15.2	30	28	3	3.1	10	9.6	1	.9	11	10.7	4	4.1	1	.9
Semantic opposition	-	-	6	7.6	-	-	-	-	-	-	-	-	-	-	-	-	1	.9	-	-	-	-
Instrumental relation	-	-	-	-	-	-	-	-	-	-	20	20.6	1	.9	-	-	-	-	-	-	-	-
Place relation	8	7.8	4	3.8	-	-	2	1.9	4	3.7	-	-	4	3.8	1	.9	1	.9	5	5.1	-	-
Causal relation	5	4.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Time relation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	5.7	-	-	-	-	4	3.8
Negative relation	-	-	-	-	-	-	-	-	-	-	-	-	1	.9	-	-	6	5.8	-	-	1	.9
Need relation	-	-	5	4.8	-	-	3	2.8	-	-	3	3.1	-	-	-	-		3.9	2	1.9	4	3.8
Collocational relation	19	18.6	10	9.6	9	8.4	1	.9	7	6.5	14	14.8	7	6.7	2	1.9	2	1.9	4	4.1	-	-
Member-collection	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	.9	-	-	1	.9	-	-
Specific relation	-	-	-	-	1	.9	-	-	1	.9	-	-	1	.9	-	-	5	4.9	2	1.9	-	-
Material relation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3.8
Social-cultural relation	49	48	28	26.9	4	3.7	12	11.4	5	4.6	10	10.6	-	-	-	-	6	5.8	30	30.9	4	3.8
Total number of related answers to each stimulus word among 110 participants	102		104		106		105		107		97		104		105		102		97		105	

Stimulus words	love		Food		Flower		Computer		Book		Bag		Classroom		Clothes		Car		Mother		Desk	
Sense relations	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P
Hyponymy	4	3.8	27	25.2	35	31.8	1	.9	19	17.7	16	15.8	26	25.2	15	14.4	23	22.1	2	1.9	18	20
Meronymy	-	-	-	-	-	-	2	1.9	1	.9	2	1.9	7	6.7	3	2.8	11	10.5	-	-	2	1.9
Attributive relation	32	30.7	23	21.4	43	39	20	19.4	14	13	28	27.7	16	15.5	40	38.4	31	29.8	41	37.6	19	21.1
Functional relation	5	4.8	17	15.8	7	6.3	33	32	52	48.5	3	2.9	8	7.7	18	17.3	15	13.6	16	14.6	10	9.1
Synonymy	37	35.5	1	.9	11	10	13	12.6	8	7.4	2	1.9	1	.9	1	.9	3	2.8	31	28.4	-	-
Semantic opposition	1	.9	14	13	2	1.9	-	-	-	-	-	-	1	.9	-	-	-	-	-	-	-	-
Instrumental relation	-	-	-	-	-	-	1	.9	-	-	-	-	-	-	-	-	5	4.8	-	-	2	1.9
Place relation	1	.9	5	4.6	-	-	1	.9	2	1.9	18	17.8	10	9.7	-	-	2	1.9	-	-	7	6.7

Causal relation	-	-	-	-	-	-	-	-	2	1.9	-	-	-	-	-	-	-	-	-	-	-	-
Time relation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Negative relation	2	1.9	1	.9	-	-	1	1	.9	-	-	-	-	-	-	-	1	.9	-	-	-	-
Need relation	-	-	4	3.7	-	-		2.9	-	-	1	.9	-	-	1	.9	3	2.8	-	-	1	.9
Collocational relation	10	9.6	15	14.6	7	6.3	16	15.5	3	2.8	10	9.9	4	3.8	13	12.5	15	4.8	12	11	20	19.2
Member-collection	-	-	-	-	1	.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific relation	2	1.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Material relation	-	-	-	-	-	-	-	-	-	-	2	1.9	-	-	1	.9	-	-	-	-	-	-
Social-cultural relation	5	4.8	3	2.8	4	3.6	9	8.7	28	26.1	11	10.8	22	21.3	12	11.5	11	10.5	16	14.6	2	1.9
Total number of related answers to each stimulus word among 110 participants	104		107		110		103		107		101		103		104		104		109		90	