# SIZE OF WORD ASSOCIATION FIELDS
# IN LITHUANIAN AND AMERICAN ENGLISH

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### Introduction

Word associations and word association fields are a neglected area of study at present, largely because they were investigated in behaviorist tradition in its classical form. However, after several decades' investigation it became possible to view the connectionist empirical data in a completely new perspective. A number of psychologists and linguists recognize the necessity to superimpose symbolic upon connectionist (see, e.g., Kimble, 1994), the connectionist approach being the main source of empirical data (Rowlands, 1994). A. Garnham (1994, 1140) in his review of future directions in psycholinguistics writes explicitly: "One suggestion that is often made informally is that a symbolic system should, in some sense, "sit on top" of a connectionist one." K. Holyoak and P. Thagard (1989) labeled this approach "symbolic connectionism".

In network theories of semantic representation word association plays a certain role, though that role is largely unknown. Possible types of word association, their distribution, concrete responses etc. are often introduced arbitrarily. That is why data concerning word association fields in languages may be conducive to the consideration of a number of psycholinguistic issues.

Firstly, data about word association norms in languages might throw some light upon the questions of speech production and comprehension. Discarding the stimulus-response pattern of behavior and learning, it is necessary to bear in mind the representational pattern of word association in languages. This pattern influences language processing through priming (Moss,

Ostrin, Tyler, Marslen-Wilson, 1995) and other manifestations. V. Andrijev-skaja (1971) has shown that strong syntagmatic links are conducive to speech production fluency. Disclosing representational patterns in different langua-ges as norms of word association, and especially comparing those patterns in languages, may help in answering the question of how associations are repre-sented in speech processing. K. Bock and W. Levelt (1994, 954) write this about the role of word association in speech production: "It is not clear whe-re word associations should be represented in a network model (such as the one in Fig. 2). It may be a special form of conceptual relation, but it might also involve direct lemma-to-lemma connections." If word association fields are universal in their structure, that might lead to the conceptual relationship hypothesis. Whereas if there is structural specificity in languages, that would corroborate the lemma-to-lemma connections existence.

Secondly, comparison of word association fields across languages might help to investigate the problems of semantic memory as a semantic network. Though this issue is controversial (see, e.g., Ratcliff and McKoon, 1994; McNamara, 1994), semantic network approach is a widely accepted one. Be-sides, different languages may require different organization of the mental lexicon (Aitchison, 1987), and the study of the distribution of types of asso-ciation in different languages may produce insightful data.

Word association field cannot be opposed to the categorical hierarchi-cal structure of the word, because the word association field encompasses superordinate, coordinate and other relations the word may be in. Besides, word association fields may help to see how units in working short-term memory activate images, other words, circumstances of their encoding into long-term memory, because, as it is known, verbal units in short-term memory are not clear-cut discrete conceptual ones. Their information load is increased by circumstantial information connected with them (Reed, 1992). This process is to a certain degree individual, but it cannot be wholly so, because in such a case communication, and especially understanding of in-ference, would be impossible. As one instance, it would be quite impossible to comprehend works of literature written in the stream-of-consciousness technique. An individual pattern is always a variant of s possible social and

physiological pattern, in this particular case – a certain linguistic pattern. It may be argued that alongside universal and individual features network representations may have linguistic features, as language is one of the main vehicles of the representation of national identity, national culture with its values, attitudes and beliefs.

Thirdly, besides theoretical issues, investigation of word association fields has direct practical implications in teaching vocabulary in a foreign language and enlarging vocabulary in the native tongue. To know a word means the ability (Wallace, 1988): to recognize it in its spoken form; to recognize it in its written form; to recall it at will; to relate it to an appropriate object, situation and concept; to use it in an appropriate grammatical form; to be able to pronounce it in a recognizable way; to be able to spell it correctly in writing; to be able to use it in correct collocation following language norms; to be able to use it at an appropriate level of formality; and last, but not least, to be aware of its connotations and associations. Without the latter the word loses part of its psychological content. The word as a full-fledged unit of memory is not only a concept, it presupposes certain sensory, emotional, evaluative, volitional characteristics too.

Thus, the study of word association norms in languages may serve as data helping the investigation of a number of psycholinguistic issues. The types of association must be universal in character, but it is possible that the distribution of those types, the quantity of associates to the word are different in languages. That is, word association fields may have linguistically specific structural properties alongside universal and individual ones.

In this article the results of a quantitative analysis of the size of the word association fields in Lithuanian and American English are presented. The analysis was carried out with the following objective in view: to establish whether the size of the word association field is a haphazard phenomenon, or there is some kind of linguistic regularity in it. For that purpose it was necessary:

1. To compare the sizes of the word association fields of the same words in Lithuanian and American English.

2. To answer the question whether the same words in Lithuanian and American English tend to have larger or, conversely, smaller association fields.

3. If the answer to the previous question is positive, to establish what kind of words tend to have larger and what kind of words tend to have smaller word association fields.

### Method

It is common knowledge that the main method of establishing word association fields is a free verbal association experiment. It is important that the level of norm be achieved in the experiment. Writing on this issue, A. Leontyev (1977) maintains that the data of 1,000 subjects give grounds for formulating the norms which are a source of linguistic and psychological information. The status of the norm allows to disregard individual differences (if the purposes of the investigation do not require that), and to consider word association fields as representative of the language investigated.

In American English, the 1952 Minnesota word association norms were used (Russel, Jenkins, 1970). In Lithuanian – the Lithuanian word association norms (Steponavičiene, 1986). The data are comparable. In both the experiments the Kent-Rosanoff 100 word list was used. The first response to the word-stimulus was asked for and fixed. The subjects were students of different specialities, male and female native speakers, 1,008 subjects in the English experiment and 1,000 subjects in its Lithuanian counterpart.

The sizes of word association fields were established by counting the number of different words-associates to each word-stimulus.

For preliminary analysis the following data were looked into: the mean size of word association fields in Lithuanian and American English; the maximum size of word association fields in the respective languages; the minimum size of word association fields in the respective languages; the range of the size of word association fields in the respective languages.

The main method of comparing the sizes of word association fields in Lithuanian and American English was that of rank. The words in each language were ordered in ranks according to the sizes of their association fields, then the first halves and the second halves of the rank orders were compared in the two languages. The correlation coefficient of the two ranking orders was counted.

83

## Results

The preliminary results of the comparison are shown in table 1.

*Table 1.* The size characteristics of word association fields in Lithuanian and American English

| Languages | Mean of the size of 100 words | Maximum size | Minimum size | Range of size |
|---|---|---|---|---|
| Lithuanian | 147 | 284 | 68 | 216 |
| American English | 105 | 260 | 41 | 219 |

Thus, the preliminary results of count show that the word association fields in English are larger than in Lithuanian. The closeness of range figures shows that there may be certain regularities in the size structure of the two fields.

Table 2 and Chart 1 give the Lithuanian and English word ranking order according to the sizes of their association fields.

*Table 2.* The ranking orders of Lithuanian and English words according to the size of their association fields

| Rank | Lithuanian | | American English | |
|---|---|---|---|---|
| | Word | Number of associates | Word | Number of associates |
| 1 | Pyktis (anger) | 284 | Trouble | 260 |
| 2 | Teisingumas (justice) | 251 | Working | 174 |
| 3 | Žmogus (man) | 248 | Anger | 168 |
| 4 | Religija (religion) | 245 | Memory | 160 |
| 5 | Darbas (working) | 242 | Afraid<br>Command | 158<br>158 |
| 6 | Vagis (thief) | 237 | Wish | 157 |
| 7 | Berniukas (boy) | 226 | Comfort<br>Street<br>Rough<br>Sheep | 151<br>151<br>151<br>151 |

*Table 2 (continued*

| Rank | Lithuanian | | American English | |
|---|---|---|---|---|
| | Word | Number of associates | Word | Number of associates |
| 8 | Kunigas (priest) | 221 | Music | 145 |
| 9 | Pilietis (citizen) | 217 | House | 142 |
| 10 | Kareivis (soldier) | 213 | Thief | 137 |
| 11 | Mergaitė (girl) | 210 | Beautiful | 135 |
| 12 | Nemalonumas (trouble)<br>Baisu (afraid) | 205<br>205 | Child<br>Joy<br>Whiskey<br>Earth | 131<br>131<br>131<br>131 |
| 13 | Komanduoti (command) | 204 | Soldier | 130 |
| 14 | Karalius (king)<br>Patogumas (comfort) | 199<br>199 | Citizen | 129 |
| 15 | Vaikas (child) | 193 | Dream | 128 |
| 16 | Valgymas (eating) | 90 | Health<br>Lion | 126<br>126 |
| 17 | Moteris (woman) | 184 | Religion<br>Head<br>Yellow<br>Square | 125<br>125<br>125<br>125 |
| 18 | Juodas (black) | 178 | Heavy | 121 |
| 19 | Švilpti (whistle) | 176 | Baby<br>Doctor | 119<br>119 |
| 20 | Ranka (hand) | 171 | Smooth<br>Cottage | 117<br>117 |
| 21 | Vasarnamis (cottage) | 169 | Mountain<br>Hungry | 116<br>116 |
| 22 | Tylus (quiet) | 168 | Moon | 114 |
| 23 | Baltas (white) | 167 | Long | 113 |
| 24 | Daktaras (doctor) | 164 | Justice | 112 |
| 25 | Šiurkštus (rough)<br>Namas (house) | 161<br>161 | River | 111 |

8

*Table 2 (continued*

| Rank | Lithuanian | | American English | |
|------|------------|--|------------------|--|
| | Word | Number of associates | Word | Number of associates |
| 26 | Sveikata (health) | 160 | Whistle | 108 |
| | Geltonas (yellow) | 160 | Sleep | 108 |
| | Lėtas (slow) | 160 | Blue | 108 |
| 27 | Garsus (loud) | 158 | Red | 107 |
| | | | Cheese | 107 |
| 28 | Kūdikis (baby) | 157 | Green | 105 |
| 29 | Koja (foot) | 155 | Soft | 104 |
| 30 | Kalnas (mountain) | 154 | Girl | 103 |
| | | | Eating | 103 |
| | | | Eagle | 103 |
| | | | Butterfly | 103 |
| 31 | Liūtas (lion) | 153 | King | 101 |
| | Voras (spider) | 153 | | |
| 32 | Atmintis (memory) | 152 | Swift | 100 |
| | Norėti (wish) | 152 | Foot | 100 |
| | Erelis (eagle) | 152 | | |
| 33 | Ilgas (long) | 151 | Hand | 99 |
| | Lygus (smooth) | 151 | Stomach | 99 |
| 34 | Galva (head) | 149 | Quiet | 98 |
| | | | Priest | 98 |
| 35 | Tabakas (tobacco) | 148 | Slow | 94 |
| | | | Carpet | 94 |
| 36 | Biblija (bible) | 147 | City | 92 |
| | Sapnas (dream) | 147 | | |
| 37 | Muzika (music) | 145 | Light | 91 |
| | Kilimas (carpet) | 145 | | |
| 38 | Žemė (earth) | 144 | Loud | 90 |
| | | | Cabbage | 90 |
| | | | High | 90 |
| | | | Window | 90 |
| | | | Bitter | 90 |

6

*Table 2 (continued*

| Rank | Lithuanian | | American English | |
|------|------------|--|------------------|--|
| | Word | Number of associates | Word | Number of associates |
| 39 | Miestas (city) | 142 | Bed | 88 |
| | Aikštė (square) | 142 | | |
| 40 | Gatvė (street) | 140 | Woman | 87 |
| | Degtinė (whiskey) | 140 | Sweet | 87 |
| | Avis (sheep) | 140 | | |
| 41 | Minkštas (soft) | 139 | Bible | 86 |
| 42 | Peteliškė (butterfly) | 138 | Salt | 85 |
| | Šviesus (light) | 138 | | |
| 43 | Džiaugsmas (joy) | 135 | Hard | 84 |
| 44 | Liga (sickness) | 133 | White | 83 |
| | | | Spider | 83 |
| | | | Ocean | 83 |
| 45 | Sunkus (heavy) | 131 | Boy | 82 |
| | Žalias (green) | 131 | Short | 82 |
| 46 | Raudonas (red) | 130 | Cold | 79 |
| | Plaktukas (hammer) | 130 | | |
| 47 | Graži (beautiful) | 128 | Black | 77 |
| 48 | Greitas (swift) | 126 | Sickness | 76 |
| | Kietas (hard) | 126 | | |
| 49 | Skrandis (stomach) | 125 | Hammer | 75 |
| | | | Chair | 75 |
| 50 | Lempa (lamp) | 123 | Stem | 73 |
| 51 | Mėnulis (moon) | 122 | Butter | 72 |
| 52 | Gilus (deep) | 121 | Deep | 71 |
| 53 | Aviena (mutton) | 118 | Man | 70 |
| | Šaltas (cold) | 118 | Fruit | 70 |
| | | | Bath | 70 |
| 54 | Upė (river) | 117 | Tobacco | 69 |
| | Kamienas (stem) | 117 | | |
| 55 | Vandenynas (ocean) | 116 | Needle | 68 |

*Table 2 (continued,*

| Rank | Lithuanian | | American English | |
|------|------------|--|------------------|--|
| | Word | Number of associates | Word | Number of associates |
| 56 | Alkanas (hungry) | 115 | Thirsty | 67 |
| | | | Stove | 67 |
| 57 | Ištroškęs (thirsty) | 114 | Lamp | 66 |
| | Aukštas (high) | 114 | | |
| 58 | Žirklės (scissors) | 113 | Mutton | 64 |
| 59 | Kopūstas (cabbage) | 112 | Blossom | 62 |
| | Langas (window) | 112 | Bread | 62 |
| 60 | Kartus (bitter) | 111 | Sour | 57 |
| 61 | Vonia (bath) | 110 | Scissors | 51 |
| 62 | Stalas (table) | 109 | Table | 47 |
| 63 | Kėdė (chair) | 106 | Dark | 41 |
| 64 | Duona (bread) | 104 | | |
| 65 | Žemas (short) | 103 | | |
| 66 | Lova (bed) | 101 | | |
| 67 | Mėlynas (blue) | 100 | | |
| 68 | Krosnis (stove) | 95 | | |
| | Druska (salt) | 95 | | |
| 69 | Vaisius (fruit) | 91 | | |
| 70 | Sviestas (butter) | 90 | | |
| | Tamsi (dark) | 90 | | |
| 71 | Adata (needle) | 89 | | |
| 72 | Saldus (sweet) | 88 | | |
| 73 | Sūris (cheese) | 87 | | |
| 74 | Miegoti (sleep) | 79 | | |
| 75 | Rūgštus (sour) | 76 | | |
| 76 | Žydėjimas (blossom) | 68 | | |

In order to establish whether the same words in Lithuanian and American English tend to have larger or, conversely, smaller association fields, the amount of identical words in the first and second halves of the ranking order was counted. There appeared to be 33 identical words out of 50 in each half of the ranking order, what constitutes 66 per cent. The correlation coefficient of the lists for the ranking order in sizes is 0.55.

The last stage of analysis was the study of the nature of words having larger or, conversely, smaller word association fields in Lithuanian and American English. In both the languages words of more abstract nature have larger association fields. Words of more concrete nature have smaller association fields. Thus, the following Lithuanian words rank high according to the size of their association fields: pyktis (anger), teisingumas (justice), žmogus (man), religija (religion), darbas (working), pilietis (citizen), baisu (afraid), nemalonumai (trouble), patogumas (comfort), komanduoti (command), etc. The following English words rank high according to the size of their association fields: trouble, working, anger, memory, afraid, command, comfort, music, joy, citizen, etc.

**Chart 1**. The ranking orders of Lithuanian and English words according to the sizes of their association fields
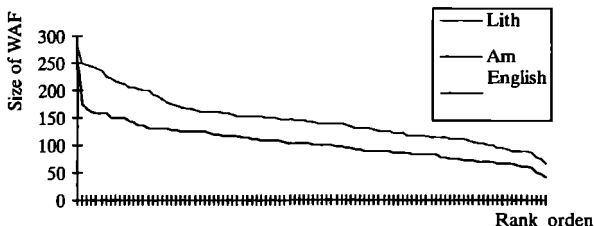


The following Lithuanian words rank low according to the size of their association fields: rūgštus (sour), sūris (cheese), saldus (sweet), adata (needle), sviestas (butter), krosnis (stove), druska (salt), lova (bed), duona (bread), kėdė (chair), stalas (table), vonia (bath), langas (window), kopūstas (cab-

bage), žirklės (scissors), etc. The following English words rank low according to the size of their association fields: table, scissors, sour, bread, mutton, lamp, stove, needle, tobacco, bath, butter, stem, hammer, chair, etc.

## Conclusions

1. Word association fields in Lithuanian are consistently larger than those in English. Another comparison shows that the sizes of word association fields in Polish are slightly larger than the sizes of association fields for respective words in Lithuanian (Steponavičiene, unpublished data). Thus it may be concluded that the size of the word association field may be language-specific.

2. The list of 100 words is not quite sufficient to conclude about the fact whether the same words in the two languages have larger or, conversely, smaller word association fields. The data analyzed show that there is such a tendency. The correlation coefficient of the lists for the ranking order in sizes is 0,55. In the first and second halves of the ranking order there are 66 per cent of identical words.

3. Both in Lithuanian and American English words of abstract nature have larger association fields, words of concrete nature have smaller association fields.

The conclusions may be used as data in the consideration of the questions, mentioned in the introduction.

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# ŽODŽIO ASOCIACIJŲ LAUKO DYDIS: GRETINAMOJI LIETUVIŲ IR ANGLŲ (AMERIKIEČIŲ VARIANTO) KALBŲ ANALIZĖ

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R e z i u m ė

Buvo gretinami lietuvių ir anglų (amerikiečių varianto) kalbų žodžių asociacijų laukų dydžiai. Žodžių sąrašas ir asociacijų laukų nustatymo metodika abiejose kalbose tie patys. Nustatyta, kad lietuvių kalbos žodžių asociacijų laukai visais atvejais didesni negu atitinkamų anglų kalbos žodžių asociacijų laukai. Abiejų kalbų tie patys žodžiai gali turėti didesnius ar mažesnius asociacijų laukus. Abiejų kalbų abstraktūs žodžiai turi didesnius asociacijų laukus, konkretūs žodžiai – mažesnius.

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