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LEXICAL DIVERSITY COEFFICIENT FOR ASSOCIATIVE FIELDS UNDER DIFFERENT CALCULATION CONDITIONS

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Abstract

The article deals with calculation of a lexical diversity coefficient (LDC) for associative fields of the verbal stimulus. The results of linguistic associative experiments carried out in Derbent are presented. On the basis of hypothetical reasoning and results of linguistic associative experiments, it was concluded that the LDC for the associative field of the verbal stimulus should be calculated with regard to central and peripheral associative verbal responses. The LDC for associative fields is calculated under three conditions: 1) LDC-1 is the coefficient of lexical diversity based on logical (central and peripheral) associative verbal reactions; 2) LDC-2 is the coefficient of lexical diversity based on central verbal responses; 3) LDC-3 is the coefficient of lexical diversity based on peripheral verbal responses. Calculations show that while the highest LDC values under LDC-1 (at a conditionally given lower threshold) correspond to similar verbal stimuli, the LDC values under LDC-2 and LDC-3 change dramatically

Keywords: Associative verbal response, associative field of a verbal stimulus, lexical diversity coefficient, central associative responses, peripheral associative responses associative experiment.

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1. Introduction

One of the current areas of fundamental and applied researches is modeling of associative fields of lexical units. As a rule, this operation is carried out according to the results of mass linguistic associative experiments (Bubnova, 2016; Fiecas & Ombao, 2016; Golovashina, 2015; Khlopova, 2018; Tarasenko & Krasnoperova, 2018).

The associative field of a lexical unit is an ordered set of verbal associative responses (R) received on verbal stimuli (S) fixed by linguistic associative experiments and located in associative dictionary entries in descending frequency order (Rn).

The verbal stimulus is an impulse that triggers the activation process in the associative verbal network and "brings a significant part of the network to pre-verbal readiness" (Karaulov, 1993). The verbal associative response (hereinafter - associative response) is verbalization of one of the nodes of the associative verbal network which is in pre-vernacular readiness. One and the same stimulus can make another subject implement a different "node" of the network from the activated zone. Moving from one subject to another, we delineate the entire section of a collective network potentially activated by weak stimuli" (Karaulov, 1993).

The associative field can be analyzed using the following parameters:

N – number of tested subjects

R_G – total amount of verbal associative responses

R_0 – failures

R_1 – single verbal associative responses

R_{Diff} – different verbal associative responses

The ratio of these parameters reveals informative properties of associative fields of lexical units described in associative articles which reproduce "fragments of the associative verbal network of a native speaker" (Karaulov, 1994).

For example, relation of R_{Diff} to R_G is a lexical diversity coefficient (LDC) for the associative field which is calculated by formula

$$LDC = \frac{R_G - R_{Diff}}{R_G}$$

2. Problem Statement

A great number of researches deal with LCD calculations for associative fields (Cherkasova, 2006; Cherkasova, 2015). LDC is traditionally calculated based on all logical responses, i.e. it takes into account both central and peripheral responses. This approach is problematic.

Assume that the following results were obtained by experimental studies of associative fields of lexical units "Birch" and "Oak" at N = 10,:

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Table 01. Parameters of associative fields of lexical units «Birch» and «Oak»

Parameters	Birch	Oak
R_G	8	8
R_0	2	2
R_{Diff}	8	8

Then the LDC value for associative fields «Birch» и «Oak» is equal to 0.

Let us imagine that the researcher has studied in detail dictionary associative entries for these words (the responses presented in the articles are randomly taken from the Russian Associative Dictionary)

“Birch” **10** - zebra, Nibbly-Quibbly the goat, cockchafer, for, autumn, fairytale, film, clarity

"Oak" **10** - tree, green, tall, large, acorns, in the forest, strong, felt boots

If we analyze the associative fields of these words with regard to central and peripheral associative verbal responses (based on the semantic relationship between S and R), it becomes obvious that with the same R_G, R_{Diff} and zero LDC, the associative field of "Oak" and peripheral responses are clearly different from the associative field of "Birch" which will be reflected in the LDC of these associative fields. So, if you calculate the LDC value taking into account central responses, the LDC of "Oak" will be equal to 1

3. Research Questions

These aspects should be considered when calculating LDC values. This will be demonstrated using associative verbal responses obtained by the author in Derbent in December 2017 - January 2018 as a part of the linguistic associative experiment

4. Purpose of the Study

The article aims to compare LCD values for associative fields calculated under three different conditions:

1) LDC-1 is the coefficient of lexical diversity based on logical (central and peripheral) associative verbal reactions;

2) LDC-2 is the coefficient of lexical diversity based on central verbal responses;

3) LDC-3 is the coefficient of lexical diversity based on peripheral verbal responses.

5. Research Methods

The experiment was conducted in lecture halls of Derbent universities in December, 2017 – January, 2018. We tested 100 subjects of both sexes aged 17 to 40 years (mainly representatives of the Dagestan ethnic groups: Lezghins, Tabasaran, Rutuls, etc.) who are full-time and part-time students of Derbent universities living in Derbent and in Derbent, Akhty, Magaramkent and other districts of the Republic of Dagestan.

Methods of the free non-chain associative experiment (to identify free associative responses) and the directional chain associative experiment (to identify directional associative responses) were used. These methods are regularly used in linguistic studies on associative fields.

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Experimental forms were given to the texted subjects (white sheets of A4 format) with brief information about experiment organizers and purposes ("we are exploring the ideas of Russian people about cities and republics"). There were such columns as "age", "gender", "place of residence". The forms contained the following instructions:

1. "Answer with any word that comes to your mind when you hear that word" followed by a numbered list of stimuli in the alphabetical order. Opposite each stimulus there was a graph to fill.

2. Answer the questions: ... what is known, famous for; where it is followed by a numbered list of stimuli in the alphabetical order.

These instructions aimed to identify directed associative responses.

Before the experiment (after the forms have been distributed), the experimenter explained how to fill in the forms. The time for filling in the forms was not limited (it took about 15 minutes).

6. Findings

One of the options for processing the results of an associative experiment is integration of free and directional associative responses. However, it is required when it is necessary to interpret associative fields. In this case, free associations can form a basis. They are summarized using a semantic interpretation method — different meta-language designations of the same feature are reduced to the same semantic component and this component is formulated as a separate seme, and the frequency of responses is summarized by this component" (Makhaev, Polekhin, & Sternin, 2018a). The responses of directed associative experiments are consistently added to the results of the free associative experiment, and the total frequency of actualization of each seme is summarized by three experiments" (Makhaev, Polekhin, & Sternin, 2018b).

Due to the fact that the task did not involve semantic interpretation of associative fields, when processing and analyzing experiment results the author dealt with the results of the free non-chain associative experiment (i.e., associative fields of stimuli-toponyms were built exclusively on the basis of free associative responses).

Thus, as a result of the experiment, 750 free associative responses (R*G*) were obtained for 10 stimuli-toponyms, of which 251 (R_1) were single and 353 were different responses (R_{Diff}). The number of failures (R_0) was 239.

Data on responses to each toponym are presented in Table 2. Central (up to a slash) and peripheral (after a slash) responses are shown in parentheses. Single reactions (R_1) are not given, since they are not taken into account when calculating LDC

Table 02. Data on responses to each stimulus-toponym (beginning)

Parameter	Vladikavkaz	Volgograd	Voronezh	Grozny	Dagestan
R_G	72 (49/22)	75 (44/31)	58 (16/42)	83 (50/33)	89 (61/28)
R_0	28	25	41	17	11
R_{Diff}	32 (15/17)	33 (15/18)	28 (9/19)	34 (15/19)	46 (22/24)

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Table 03. Data on responses to each stimulus-toponym (end)

Parameter	Derbent	Ingushetia	Moscow	Saint Petersburg	Chechnya
R_G	90 (64/26)	53 (27/26)	83 (75/8)	64 (45/19)	83 (59/24)
R_0	10	47	15	32	13
R_{Diff}	35 (20/15)	36 (15/21)	30 (22/8)	44 (27/17)	31 (12/19)

The LDC value for each stimulus-toponym is calculated under three conditions: 1) LDC-1 is the coefficient of lexical diversity based on logical (central and peripheral) associative verbal reactions.

Table 04. Data for LDC -1 for each stimulus-toponym (beginning)

Parameter	Vladikavkaz	Vladikavkaz	Voronezh	Grozny	Dagestan
LDC -1	0,55	0,56	0,51	0,59	0,48

Table 05. Data for LDC-1 for each stimulus-toponym (end)

Parameter	Derbent	Ingushetia	Moscow	Saint Petersburg	Chechnya
LDC-1	0,61	0,32	0,63	0,31	0,62

2) LDC-2 is the coefficient of lexical diversity based on central verbal responses.

Table 06. Data for LDC-2 for each stimulus-toponym (beginning)

Parameter	Vladikavkaz	Vladikavkaz	Voronezh	Grozny	Dagestan
LDC-2	0, 69	0,65	0,43	0,70	0,63

Table 07. Data for LDC-2 for each stimulus-toponym (end)

Parameter	Derbent	Ingushetia	Moscow	Saint Petersburg	Chechnya
LDC-2	0,68	0,44	0,70	0,40	0,79

3) LDC-3 – LDC-2 is the coefficient of lexical diversity based on peripheral verbal responses.

Table 08. Data for LDC-3 for each stimulus-toponym (beginning)

Parameter	Vladikavkaz	Vladikavkaz	Voronezh	Grozny	Dagestan
LDC-3	0,22	0,41	0,54	0,42	0,14

Table 09. Data for LDC-3 for each stimulus-toponym (end)

Parameter	Derbent	Ingushetia	Moscow	Saint Petersburg	Chechnya
LDC-3	0,42	0,19	0	0,10	0,20

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The comparison of LDC values calculated under three different conditions is shown in Fig. 1, where the coefficient values are marked on the ordinate axis, and the toponyms are arranged alphabetically (as in experimental forms) on the abscissa axis.

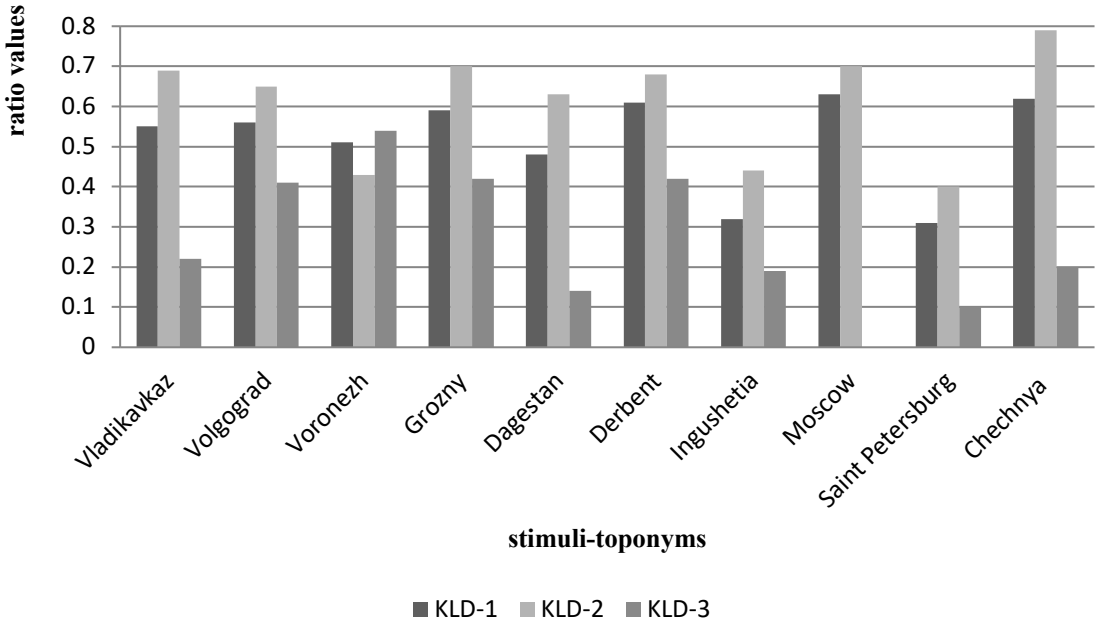

Figure 01. Comparison of LDC calculated under LDC-1, LDC-2, LDC-3

7. Conclusion

The largest values of LDC-1 at the low threshold of 0,59 correspond to the toponyms “Moscow” (0,63), “Chechnya” (0,62), “Derbent” (0,61), “Grozny” (0,59).

When calculating LDC-2, the values of many toponyms increase dramatically (except for "Voronezh"). The largest values of LDC-2 at the low threshold of 0,68 correspond to “Chechnya” – 0,79; Grozny – 0,70; Moscow: 0,70; Vladikavkaz – 0,69; Derbent – 0,68.

Under LDC-3, values of many toponyms decrease except for “Voronezh”. Thus, at a low threshold of 0,41, the LCD value is high for “Voronezh” – 0,54; “Derbent” – 0,42; “Grozny” – 0,42; “Volgograd” – 0,41.

Thus, if under LCD-1, “Moscow” (0,63) has the highest LCD value with regard to all logical (central and peripheral) responses (LDC-1), under LCD-2, "Chechnya" (0.79) has the highest LCD value. The stimulus-toponym “Moscow” increases its LCD value under LDC-2 (0,70).

Under LDC-1, “Grozny” has a LCD value of 0,59, and under LDC-2, the LCD value increases to 0,70. The same is true for the toponym “Vladikavkaz” (the LCD value increases from 0, 55 to 0,69).

Under LDC-3, only peripheral responses were taken into account. The stimulus-toponym “Moscow” which has the highest LDC values under LDC-1 and LDC-2, has a zero value, while the LDC value for the stimulus-toponym “Voronezh” increases. This is due to the fact that under LDC-3, the total number of responses (Rg) for all stimuli-toponyms decreases (see Table 3), and RDiff increases (except for three stimuli-toponyms).

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The results of hypothetical reasoning and experimental studies allow for conclusion that it is necessary to use a traditional LCD value calculation method taking into account all logical responses (LDC-1) along with a method based on differentiated calculation of central and peripheral responses (LCD-2 and LCD-3) which establishes lexical diversity of associative fields based on semantic criteria.

In general, experimental psycholinguistic studies are an effective tool for learning the laws governing the language, its structure and internal mechanisms (Yang & Liang, 2018; Kenedy, 2017). Experimental researches on bilingualism are also promising (Fernandez, De Souza, R. A., Carando 2017; Fabbro, 2018).

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