Geographical Stability of Generation Frequency Norms for Russian Language

Olga P. Marchenko (olga.marchenko@psyexp.ru)
Center of Experimental Psychology, MSUPE, 2A Shelepihinskaya Quay
Moscow, 123390 Russia

Yury G. Pavlov (yury.pavlov@urfu.ru)
Laboratory of Psychophysiology and Psychophysics, Ural Federal University, Mira str., 19
Ekaterinburg, 620002 Russia

Tatyana N. Bandurka (bandurka@list.ru)
Pedagogical Institute of Irkutsk State University (ISU), Nijnyaya Naberejnaya, 6
Irkutsk, 664013 Russia

Abstract

This study was aimed to examine geographical stability of generation frequency norms for semantic categories in Russian language. Participants from three different regions of Russia carried out a standard procedure for generating exemplars of 45 semantic categories. For each exemplar, overall generation frequency was calculated in each of three regions. Correlations of generation frequency data between all three regions were high providing evidence of the geographical stability of these norms in Russia.

Keywords: Category norms; exemplar generation frequency; geographical stability.

Introduction

It was shown that there are a number of variables, that affect performance on different cognitive tasks with words. Such variables include generation frequency ratings (Battig and Montague, 1969), typicality (Rosh, 1975), imageability (Chiarello et al., 1999), familiarity (Stadthagen-Gonzalez and Davis, 2006), Age-of-Acquisition (Johnston and Barry, 2006, Tainturier et al., 2005, Hernandez, Fiebach, 2006), etc. It has been shown that when these variables are not controlled results of studies might not be valid (Stewart, 1992).

In order to study categorization it is necessary first to identify which words are used by native speakers in specific semantic categories (like “A Bird” or “A Tree”), and to determine generation frequency of these words within categories. This variable was also named instance dominance by some researches (Mervis et al., 1976, Neely, 1977). First attempts to create category norms of generation frequency were made by Cohen at al. (1957) in USA. Their work was continued by Battig and Montague during the next decade. Battig and Montague’s (1969) database, which contains 56 categories of English language is the most frequently cited database of generation frequency. The citation search made by Van Overschelde et al. (2004) on 2002 demonstrated that it was cited over 1600 times in papers published in more than 220 different journals.

Cross-cultural and linguistic research has revealed that the content of categories varies across different cultures (Yoon et al., 2004) and that patterns of phenomena and variable ratings for those categories may also vary with cultural milieu (Medin and Atran, 2004). Thus using a database, that was collected from subjects of another culture, is not always acceptable. That is why similar studies were conducted in other countries as well, for example in Belgium (Storms, 2001, Ruts et al., 2004), France (Bueno & Megherbi, 2009), New Zealand (Marshall, Parr, 1996), Canada (Kantner, Lindsay, 2014), Israel (Henik & Kaplan, 1988), China (Yoon et al., 2004), Great Britain (Hampton, Gardiner, 1983), Spain (Marful et al., 2014), etc.

It is claimed that a number of new objects have been created since 1969 in some categories such as vehicles etc. Furthermore, a decline in knowledge about biological categories during the 20th century has been observed, while non-biological categories have experienced evolution (Wolff et al., 1999). Thus, Battig and Montague’s database was updated in 2004 (Van Overschelde et al., 2004).

In order to study categorization in Russia as well it was important to create generation frequency norms for the Russian language. Some data has been published regarding 13 categories for Russian language in year 1997 (Vysokov & Lyusin, 1997), serving as a starting point for this line of research. Considering the ongoing changes, evolution of language content, it was important to enlarge the quantity of categories documented. Generation frequency database for 45 semantic categories was collected for Russian language later (Marchenko, 2011). This database was collected in Moscow. Many of selected categories were the same as in the study by Battig and Montague. However, some new categories were included (for example "A Domestic Appliance", "An Organ of the Human Body").

It has been shown that some categorization phenomena depend on human experience and can vary between urban citizens and people who live in close contact with nature (Medin and Atran, 2004). Thus, it is important to take into account not only cultural but also experiential factors (Winkler-Rhoades et al., 2010, Taverna et al., 2014).

Task that which is used to gather generation frequency norms can be quite sensitive not only to language and to culture aspect but to experiential factors as well (Winkler-Rhoades et al., 2010). It gives an impression about concept structure in population. Along with universality of concepts,

it can reveal some differences between subjects, who speak the same language but live in different countries and have different environment (Marshall, Parr, 1996), or who lives in the same environment but belongs to different cultural groups in the same country (Winkler-Rhoades et al., 2010).

Category norms collected previously in Moscow were shown to be reliable (Marchenko, 2011). Nevertheless, taking into account that Russia covers more than one-eighth of the Earth`s inhabited land, some differences could be suggested between distant regions. Thus, before making inferences and generalizing generation frequency norms collected in Moscow to the Russian language and the whole country, geographical stability of these results needs to be tested. Thus, it is important to test how similar generation frequency data from distant regions will be. Moscow, Irkutsk and Ekaterinburg regions were chosen for this aim (Figure 1).

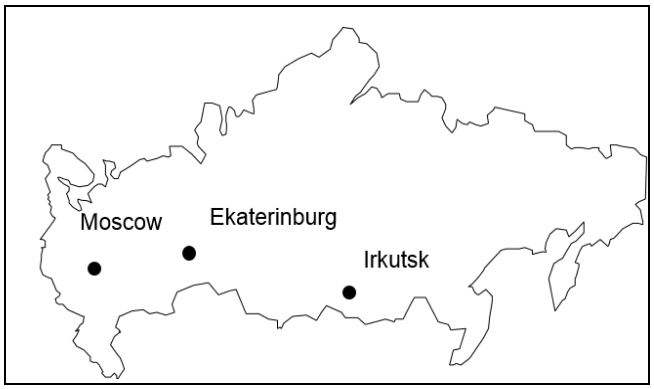

Figure 1: Schematic map of Russia.

Moscow is located on a central part of Russia. The city playing role of political, economic and cultural center in Russia. Ekaterinburg is located on a borderline between Europe and Asia on the eastern side of the Ural Mountains. Wooded hills and small lakes surround it. Irkutsk is one of the biggest cities of Eastern Siberia. The city lies on the Angara River not far away from Lake Baikal and surrounded by rolling hills within the taiga.

Geographical stability of psychometric data is traditionally tested through correlations between data collected in different regions.

The following suggestions can be made. Generation frequency data can be accepted as geographically stable and reliable when there are high correlations between samples of different regions. The same level of correlations between regions provide additional evidence for geographical stability of generation frequency norms. Strength of correlations can be related to distance. As cities are closer to each other, stronger correlation levels can be observed. Correlations between the Moscow sample and samples of other cities could be greater than correlation between these cities as Moscow, being a melting pot due to constant migration processes, is more similar to other cities culturally than these cities to each other. On the other hand, correlation between samples from Irkutsk and Ekaterinburg could be stronger than between samples from Moscow and Ekaterinburg and Moscow and Irkutsk as it was suggested that culture in Moscow is quite different from cultures of other regions.

Method

Participants 312 students of different universities of Moscow aged 18-23 years participated in the study as volunteers (258 females and 54 males, m=19, SD=1.19).

One hundred seven students from Ekaterinburg aged 18-23 years (51 females and 18 males, m=19, SD=.94) and one hundred six students from Irkutsk aged 18-24 years (94 females and 12 males, m=19, SD=1.26) participated in this study as well. According to Kruskal-Wallis test there were no significant age differences between samples of these three regions (Chi-square=3.779, *df*=2, *p*=.151). There were no significant difference in proportion of male and female participants in samples (Pearson Chi-square=2.178, *df*=2, two-sided *p*=0.337).

All of participants were native Russian speakers.

Procedure The procedure used to gather the Russian category norms was similar to the procedure of Battig and Montague (1969). Participants were provided with a small notebook. The following instructions, were copied verbatim from Battig and Montague (1969), but were translated into Russian.

“The purpose of this experiment is to find out what items or objects people commonly give as belonging to various categories or classes. The procedure will be as follows: First, you will be given the name or description of a category. Then you will be given 30 sec. to write down in the notebook as many items included in that category as you can, in whatever order they happen to occur to you. For example, if you were given the category "seafood", you might respond with such items as lobster, shrimp, clam, oyster, herring, and so on. The words are to be written in the notebook, using a different page for every category. When you hear the word "Stop", you are to stop writing and go to the beginning of the next page. You will then be given the name of another category, and again you are to write the names of as many members of that category as you can think of.” The full version of the instruction can be found in the paper by Battig and Montague of 1969.

The category names were read aloud by the experimenter. The participants were tested in small groups to be sure that they could work in a proper way and will not be distracted by each other. The presentation order of the categories was randomized and was different in different groups of participants. The category set for this study consisted of 45 different categories such as various natural kinds ("A Fish", "An Insect", "A Flower"), artificial kinds ("A Type of Vehicle", "An Article of Furniture", "A Musical Instrument"), names ("A Male`s First Name"), activity kinds ("A Profession", "A Sport"), abstract kinds ("A Unit of Time", "A Unit of Distance"), etc.

SPSS and syntax file for Fisher's r-to-z transformation and for comparing Pearson correlations in SPSS (Weaver, Wuensch, 2013) were used for analyses.

Results and Discussion

The same procedure of data analysis as in previous works was used (Battig and Montague, 1969, Storms, 2001). No distinction was made between singular and plural or masculine and feminine versions of exemplars. Legible responses that were nonmembers were not removed from the list. For each exemplar, overall generation frequency was calculated.

Correlation between cities were calculated for further comparison. All words (even these, which were named only one time) were used for this analysis. All Pearson`s correlations were significant, $p<.001$. Correlations are presented in Table 1.

Data can be accepted as geographically stable as correlations between the three regions were very strong.

Table 1: Correlation of generation frequency between three regions for each category. [1]

category	MI	ME	IE
An Alcoholic Beverage	0.97	0.98	0.97
An Amphibian	0.97	0.99	0.96
An Article of Clothing	0.95	0.97	0.94
An Article of Furniture	0.99	0.98	0.99
A Bird	0.97	0.96	0.96
A Carpenter`s Tool	0.96	0.98	0.98
A Color	0.99	1.00	0.99
A Country	0.96	0.97	0.96
A Crime	0.97	0.99	0.97
A Disease	0.94	0.94	0.88
A Domestic Animal	0.98	0.98	0.98
A Domestic Appliance	0.93	0.85	0.80
A Family Member	0.98	0.99	0.99
A Farm Animal	0.99	0.99	0.99
A Fish	0.81	0.94	0.81
A Flower	0.95	0.97	0.96
A Four-footed Animal	0.98	0.98	0.97
A Fruit	0.98	0.98	0.96
A Girl`s first name	0.94	0.88	0.85
An Insect	0.98	0.98	0.96
A Kind of Food	0.85	0.84	0.88
A Kitchen Utensil	0.94	0.97	0.97
A Male`s First Name	0.93	0.92	0.89
A Mammal	0.97	0.97	0.94
A Metal	0.98	0.97	0.97
A Musical Instrument	0.97	0.99	0.97
A Nonalcoholic Beverage	0.96	0.97	0.97
A Part of the Human Body	0.99	0.98	0.98
A Plant	0.89	0.93	0.92
A Precious Stone	0.97	0.98	0.98
A Profession	0.92	0.92	0.91
An Organ of the Human Body	0.99	0.98	0.97
A Reptile	0.98	0.99	0.98
A Science	0.98	0.96	0.95
A Sport	0.97	0.97	0.96
A Toy	0.89	0.94	0.85
A Tree	0.96	0.98	0.97
A Type of Fabric	0.98	0.97	0.97
A Type of Music	0.97	0.97	0.98
A Type of Vehicle	0.95	0.97	0.96
A Unit of Distance	0.99	0.99	0.99
A Unit of Time	0.99	0.99	0.99
A Vegetable	0.98	0.97	0.98
A Weapon	0.97	0.98	0.96
A Wild Animal	0.97	0.99	0.97

[1] MI –Correlations between Moscow and Irkutsk samples.
ME - Correlations between Moscow and Ekaterinburg samples.
IE - Correlations between Irkutsk and Ekaterinburg samples.

Pearson correlations were chosen in order to apply Fisher's r-to-z transformation to compare correlations. Correlations were compared later using Fisher method for independent samples (Steiger, 1980. Meng et al., 1992. Weaver, Wuensch. 2013). Results of that comparison is presented in Table 2. Correlations which were significantly ($p<.05$) and insignificantly different were coded and Chi-square was applied.

There were more correlations between Irkutsk and Ekaterinburg data which did not differ significantly from correlations between Moscow-Ekaterinburg and Moscow-Irkutsk data (Pearson Chi-square=8.022, df=1, $p<.01$ - IE and ME; Pearson Chi-square=11.756, df=1, $p<.001$ - IE and MI).

Thus correlations between the Moscow sample and samples of other cities are not stronger in general than correlation between these cities and it can`t be suggested that Moscow is more similar to other cities culturally than these cities to each other. According to these data, correlations between samples from Irkutsk and Ekaterinburg were no stronger, than correlations between samples from Moscow and Ekaterinburg and Moscow and Irkutsk, thus culture in Moscow is not quite different from cultures of other regions.

In order to test if there are connection between distance and strength of consistency for generation frequency norms correlations between data from cities, which are closer to each other (like Moscow and Ekaterinburg, Ekaterinburg and Irkutsk) were compared to correlations between cities, which are located on a greater distance from each other (like

Moscow and Irkutsk). Frequency of correlations between Moscow and Ekaterinburg data which did not differ significantly from correlations between Moscow and Irkutsk was almost the same as frequency of correlations which were significantly different (Pearson Chi-square=.556, *df*=1, *p*=.456). Correlations, which were significantly different, analyzed separately from insignificant correlations. Frequency of stronger correlations between Moscow and Ekaterinburg in comparison to correlations between Moscow and Irkutsk data did not differ from frequency of weaker correlations (Pearson Chi-square=1.80, *df*=1, *p*=.180). There were no stronger correlations between Ekaterinburg and Irkutsk data in comparison to correlations between Moscow and Irkutsk data (Pearson Chi-square=11.756, *df*=1, *p*<.001). Frequency of greater correlation between Irkutsk and Ekaterinburg data in comparison to correlations of Moscow and Irkutsk data were equal to frequency of lower correlations (Pearson Chi-square=.818, *df*=1, *p*<.366) Thus, the strength of correlations is not related to distance. There were no significantly stronger correlation levels for cities which are closer to each other.

Table 2: Comparison of correlation coefficients between three regions for each category.[2]

category	MI-ME Z, *p*	IE-ME Z, *p*	IE-MI Z, *p*
An Alcoholic Beverage	-1.181 .237	-1.253 .210	-.210 .834
An Amphibian	-3.565 <.001	-3.670 <.001	-.355 .722
An Article of Clothing	-2.570 <.010	-2.731 <.01	-.346 .729
An Article of Furniture	2.820 <.01	2.257 <.05	-.346 .729
A Bird	.819 .413	.000 1.000	-.774 .439
A Carpenter`s Tool	-3.053 <.01	.000 1.000	2.723 <.01
A Color	-20.159 <.001	-13.585 <.001	-1.089 .276
A Country	-1.317 .188	-1.220 .223	.000 1.000
A Crime	-5.844 <.001	-4.560 <.001	.399 .690
A Disease	-.191 .849	-3.736 <.001	-3.591 <.001
A Domestic Animal	.575 .565	.000 1.000	-.530 .596
A Domestic Appliance	3.076 <.01	-1.055 .291	-3.787 <.001
A Family Member	-1.443 .149	.000 1.000	1.359 .174
A Farm Animal	-.263 .793	.000 1.000	.245 .807
A Fish	-5.462 <.001	-5.224 <.001	-.049 .961
A Flower	-1.611 .107	-1.008 .314	.496 .620
A Four-footed Animal	.000 1.000	-1.428 .153	-1.416 .157
A Fruit	-.605 .545	-1.792 .073	-1.212 .225
A Girl`s first name	3.843 <.001	-1.328 .184	-4.836 .001
An Insect	-.630 .529	-2.298 <.05	-1.700 .089
A Kind of Food	.205 .838	1.676 .094	1.489 .136
A Kitchen Utensil	-2.906 <.01	.000 1.000	2.719 <.01
A Male`s First Name	.906 .365	-1.802 .072	-2.633 <.01
A Mammal	-.383 .702	-2.569 <.05	-2.252 <.05
A Metal	2.153 <.05	.000 1.000	-1.894 .058
A Musical Instrument	-4.242 <.001	-3.745 <.001	.218 .827
A Nonalcoholic Beverage	-1.216 .224	.000 1.000	1.109 .267
A Part of the Human Body	3.266 <.01	.000 1.000	-2.979 <.01
A Plant	-2.597 <.01	-.717 .473	1.673 .094
A Precious Stone	-.823 .410	.000 1.000	.744 .457
A Profession	-.389 .697	-.689 .491	-.338 .735
An Organ of the Human Body	2.629 <.01	-1.368 .171	-3.663 <.001
A Reptile	-1.355 .175	-1.604 .109	-.378 .705
A Science	4.542 <.001	-1.000 .317	-5.086 <.001
A Sport	-.315 .753	-1.286 .198	-1.000 .317
A Toy	-3.696 <.001	-5.106 <.001	-1.792 .073
A Tree	-2.252 <.05	-1.243 .214	.795 .426
A Type of Fabric	1.823 .068	.000 1.000	-1.628 .104
A Type of	-.338	1.831	2.111

[2] MI-ME - comparison of correlation coefficients between Moscow and Irkutsk sample with correlation coefficients between Moscow and Ekaterinburg sample.
IE-ME - comparison of correlation coefficients between Irkutsk and Ekaterinburg sample with correlation coefficients between Moscow and Ekaterinburg sample.
IE-MI - comparison of correlation coefficients between Irkutsk and Ekaterinburg sample with correlation coefficients between Moscow and Irkutsk sample.

Music	.736	.067	<.05
A Type of	-1.666	-1.055	.517
Vehicle	.096	.292	.605
A Unit of	.540	.000	-.611
Distance	.589	1.000	.542
A Unit of Time	-.964	.000	.895
	.335	1.000	.371
A Vegetable	1.308	1.048	-.132
	.191	.295	.895
A Weapon	-2.498	-3.174	-.875
	<.05	<.01	.382
A Wild Animal	-5.518	-4.648	.534
	<.001	<.001	.593

As correlations between the three regions are strong, geographical stability of generation frequency norms for Russian language can be suggested. Nevertheless, this work was aimed to prove geographical stability and further analyses can be continued in order to study regional specificity of concepts with more sensitive statistic methods.

There were no evidence for connection between strength of correlations and geographical distance. Correlations between Moscow sample with samples from the other two cities were not greater than between these cities. Correlation between Ekaterinburg and Irkutsk data were no stronger than between data from these two cities and Moscow. This fact suggests stability of generation frequency norms in Russian database and domination of the same culture around the whole area of the country. Similar pattern was observed for English language when comparison of category norms collected in different regions of the same country conducted (Battig and Montague, 1969). English and Chinese category norms of different age groups within a culture were also similar (Howard, 1980, Yoon et al., 2004, Gutchess et al., 2006). As norms of generation frequency are geographically stable, the same generation frequency norms can be used for Russian language around the whole country.

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