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ЭМПИРИЧЕСКИЕ ИССЛЕДОВАНИЯ

The Role of Verbal Representation in Assessment of Category Judgments

Alexey A. Kotov
HSE University, Moscow, Russia
ORCID: https://orcid.org/0000-0002-4426-4265, e-mail: akotov@hse.ru

Ivan A. Aslanov
Lomonosov Moscow State University, Moscow, Russia
ORCID: https://orcid.org/0000-0002-2105-8012, e-mail: ivaslanov@gmail.com

Yulia V. Sudorgina
HSE University, Moscow, Russia
ORCID: https://orcid.org/0000-0002-6755-621X, e-mail: yuvsudorgina@gmail.com

The study examines the role of inner speech measured by verbal representation scale in assessment of category judgments and in transfer from the category example to the whole category. We used the conventionality effect of the category label, meaning that people perceive judgments containing commonly used category labels as more convincing even when the category itself is new, and its label is artificial [11]. We proposed that this effect can be enhanced if to use a metaphorical label for the category that emphasizes its feature. We also tested whether the metaphorical label could enhance the transfer of the feature from the category example to the whole category. We hypothesized that the conventionality effect and transfer of the trait will be different in participants depending on their level of verbal representation. In the first part of the study, we adapted the Internal Representation Questionnaire [16] and used verbal representation scale from it to divide participants into groups by their level of inner speech. The results show that participants with higher level of verbal representation were less influenced by the conventionality effect of the label. We also found that participants with lower level of verbal representation were more prone to transfer information of the metaphorical labels. Otherwise, participants with higher level of verbal representation were more inclined to transfer category information of non-metaphorical labels. The findings indicate the relationship between individual differences in verbal representation level and evaluation of category judgments.

Keywords: inner speech, verbal representation, concept, category, conventionality, metaphor, category judgement.

Роль вербальной репрезентации в оценке категориальных суждений

А.А. Котов
Национальный исследовательский университет «Высшая школа экономики»
(ФГАОУ ВО «НИУ ВШЭ»), г. Москва, Российская Федерация
ORCID: https://orcid.org/0000-0002-4426-4265, e-mail: akotov@hse.ru

И.А. Асланов
Московский государственный университет имени М.В. Ломоносова
(ФГБОУ ВО «МГУ имени М.В. Ломоносова»), г. Москва, Российская Федерация
ORCID: https://orcid.org/0000-0002-2105-8012, e-mail: ivaslanov@gmail.com

Ю.В. Судоргина
Национальный исследовательский университет «Высшая школа экономики»
(ФГАОУ ВО «НИУ ВШЭ»), г. Москва, Российская Федерация
ORCID: https://orcid.org/0000-0002-6755-621X, e-mail: yuvsudorgina@gmail.com

В исследовании изучается роль внутренней речи, измеренная по шкале вербальной репрезентации, в оценке категориальных объяснений и переносе информации с нового примера на целую категорию. Мы использовали эффект конвенциональности названия категории, который заключается в том, что объяснения с использованием общеупотребимого названия кажутся более убедительными — даже в том случае, когда категория является новой, а название искусственным [1]. Мы предположили, что данный эффект может быть усилен при использовании для категории метафорического названия, подчеркивающего ее перцептивный признак. Также мы проверили, способно ли метафорическое название категории усилить перенос признака из нового примера категории на целую категорию. Гипотеза заключалась в том, что и эффект конвенциональности, и перенос признака будут по-разному проявляться у испытуемых в зависимости от того, насколько развита их внутренняя вербализация. В первой части исследования мы адаптировали на русском языке опросник внутренних репрезентаций [2], использовав для второй части исследования из него одну шкалу — уровня вербальной репрезентации для разделения испытуемых на группы по степени выраженности внутренней речи. Оказалось, что испытуемые с более выраженной вербальной репрезентацией меньше подвержены эффекту конвенциональности названия категории. Также выяснилось, что при низком уровне вербальной репрезентации перенос категориальной информации был более выражен с использованием метафорических названий категорий. При высоком уровне вербальной репрезентации, наоборот, перенос категориальной информации был более выражен, когда использовались неметафорические названия категорий. В совокупности результаты исследования показывают связь индивидуальных различий в уровне вербальной репрезентации с вынесением и оценкой категориальных суждений.

Ключевые слова: внутренняя речь, вербальная репрезентация, понятие, категория, конвенциональность, метафора, категориальное суждение.

Introduction

Language helps in learning concepts [1; 12] and remembering relevant information when solving problems [2]. It also helps humans represent their own thought processes. When solving a problem, we often rely on speech to tell ourselves what needs to be done. Several theories suggest that in addition to its regulatory function, which supports learning mechanisms, speech provides humans with the form and content of representation. For example, when we encounter something new to us (a new food, a new smell), we can describe the characteristics of this phenomenon in some words.

The format of representation may not necessarily be in the form of inner speech. A. Paivio's prominent theory of double coding [14] assumes the existence of

at least two formats — verbal and analog. According to this theory, the choice of representation format can be conditioned by the requirements of the task, as well as determined by individual differences — by the way of representation that initially dominates in a person.

One of the directions of development of this theory is to measure different types of representations and individual differences in the level of their development [3; 4; 6; 17]. The Internal Representations Questionnaire, published recently (16), is the closest one of representation type measurement to the goals of our study. In contrast to the above-mentioned measurement options, this questionnaire aims to assess speech participation in various situations that do not require communication. In the present study, we used this questionnaire to assess the relationship between the internal speech and the construction of category judgments: the role in explaining and transferring new categorical information of such basic characteristics of a categorical name such as conventionality and the presence of metaphorical descriptions.

We asked subjects to evaluate simple examples of judgments and explanations about categories: "Why are leaves green?" — "Because they contain chlorophyll." In this example, the greenness of the leaves is explained using the word "chlorophyll." But if the meaning of "chlorophyll" is unknown, will the explanation be taken as convincing? We hypothesized that the level of verbal representation may be related to categorical explanations: the higher the level, the more persuasive the explanation will seem to a person (hypothesis 1).

Research confirms that categorical names or category names make explanations more plausible for respondents [9], especially if the label has conventionalism — the notion that other people also know the name [11]. We also hypothesize that the higher the level of verbal representation a subject has, the more significant will be the conventionality factor (hypothesis 2).

Previously, however, this effect was only studied on labels representing invented abstract categories (e.g., "agularia"). If the category name was metaphorical, would it also affect the persuasiveness of the explanation? A metaphorical name emphasizes a feature in a category that serves as the basis for the metaphor, and can potentially enhance the effect of conventionality by implicitly "explaining" why the category has that name. Research shows that metaphors influence perceptions and judgments about various phenomena [19], but their effect on the evaluation of explanations in relation to conventionality has not yet been studied.

According to D. Gentner's theory [8], metaphor acts as a transitional form between concrete and abstract concepts. Therefore, in some cases, such as more abstract and relative concepts, metaphorical names will not so much serve to generalize as to draw attention to the inci-

dental parts of the category [10].

Since it is known that one important function of categories is to provide inductive transfer of information from a new example of a category to the whole category or its individual examples [5; 7], we hypothesized that metaphorical names can affect both inductive transfer and interact with the level of verbal representation: they will enhance the transfer of categorical information in people with low verbalization and weaken it in people with high levels (hypothesis 3).

We tested how categorical explanations would be evaluated and how information from the new example would be transferred to the target category if the category labels differed in conventionality and "metaphoricality". Our goal was to test the relationship of individual differences in internal verbalization ability to judgment persuasiveness and categorical information transfer. We used the Internal Representations Questionnaire [16] primarily to measure the level of verbal representation. The authors of the original questionnaire assessed convergent validity by correlating the results of the questionnaire with existing internal verbalization assessment instruments, and also assessed the predictive validity of the questionnaire by relating the results of the questionnaire, in particular the level of verbal representation expression, to performance on simple categorical tasks: assessing the relationship between an image and its names. They saw the mechanism of the influence of the level of verbal representation on the performance of such simple tasks in the fact that internal speech may cause additional phonological coding of information, which activates relevant categorical information in the long-term semantic memory. In our study, we wanted to show the dependence on the level of verbal representation of higher-level processes. To do this, we translated the original questionnaire into Russian and evaluated it to highlight the verbal representation scale, and then used the translated version in the experiment.

Study 1. Adaptation of the Internal Representations Questionnaire

Method

The Internal Representations Questionnaire [16] consists of 35 statements measuring four types of representations: Visual Imagery, Internal Verbalization, Orthographic Imagery, and Representational Manipulation. These representations are represented in four scales of the questionnaire. The Visual Imagery scale includes 10 statements in which the preference to use visual images in thinking is described (e.g., *I can close my eyes and easily picture a scene that I have experienced*) The Internal Verbalization scale consists of 11 statements which reflect the process of thinking in the form of inner voice, that is, the

ability to speak the ideas and hear the words "in your head'' (e.g., *I think about problems in my mind in the form of a conversation with myself*). The Representational Manipulation scale has 8 statements which describe the ability to manipulate mental representations in visual-spatial, auditory, and tactile modes (e.g., *I can easily choose to imagine this sentence in my mind pronounced unnaturally slowly)*. The Orthographic Imagery scale consists of 6 statements which reflect the ability to visualize language as it is written (e.g, *I see words in my "mind's eye" when I think)*. Two statements from the Internal Verbalization and the Representational Manipulation scales are reversed.

The original questionnaire was published online and was accessible for use [16]. The statements were translated from English to Russian with the participation of two professional translators (https://osf.io/tsdrp/).

Participants. One hundred and seventy-three students (116 — females, M = 17. 92, SD = 0.767), participated in the study.

Procedure. The study was conducted online via 1KA platform (www.1ka.si). Participants were asked to complete the questionnaire and rate each statement using 5-point Likert scale (1 — completely disagree, 2 — disagree, 3 — do not know, 4 — agree, 5 — completely agree). The statements were presented on a screen in a randomized order. To make sure that participants take the task seriously and do not give answers randomly, we added a control question in the questionnaire. We excluded 15 participants who gave wrong answer to this question. The data from the current study is published in an online repository (https://osf.io/tsdrp/).

Results and Discussion

Exploratory factor analysis (EFA) was used to analyse the factor structure of the questionnaire. Four factors were set to extract from the data. Factors were extracted using principal component analysis (PCA), Varimax rotation was applied to rotate factors. The results of the EFA showed that four factors explain 36.9% of data variance, which is a somewhat weak result. However, the scree plot with Eigenvalues demonstrates a four-factors solution. (Fig. 1).

The results of applying Varimax rotation method, and in particular, factor loadings of the variables are presented in Table 1. We considered and included only those variables which had a factor loading of more than 0.3.

The first factor consists of 12 variables, including 8 statements from the Representational Manipulation scale, and 4 statements from the Visual Imagery scale. The second factor includes 9 variables which represent statements from the Internal Verbalization scale. This factor also includes one variable from the Orthographic Imagery scale.

The third factor consists of the statements from three scales — the Internal Verbalization scale (4 statements), the Orthographic Imagery scale (1 statement) and the Visual Imagery scale (7 statements). Finally, the last factor includes statements from the Orthographic Imagery scale (3 statements) and the Visual Imagery scale (2 statements).

The results show that 3 out 4 factors are found to be heterogeneous and consisting of variables from different scales. It means that to confirm a four-factor structure of
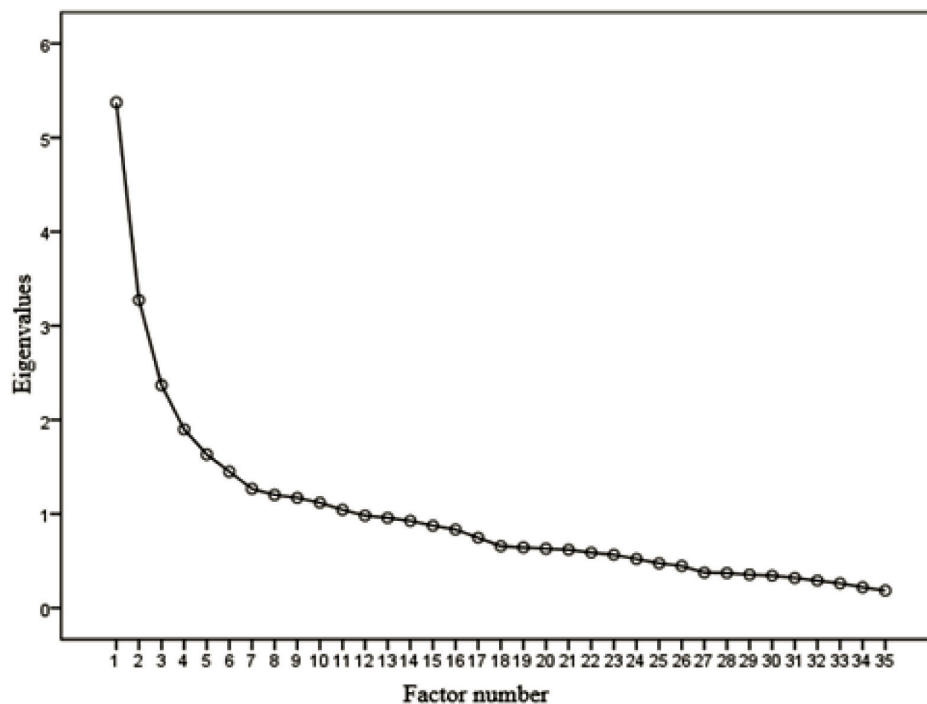

Fig. 1. Scree plot

T a b l e 1

Factor loadings of the variables (statements) after applying the Varimax rotation method

Variable	Factor			
	1	**2**	**3**	**4**
manip1	.764	-	-	-
manip5	.729	-	-	-
manip8	.643	-	-	-
manip6	.586	-	-	-
manip4	.577	-	-	-
vis3	.487	-	.434	-
manip2	.454	-	-	-
vis2	.396	-	.320	-
vis7	.319	-	-	-
vis8	.311	-	-	-
ver1	-	**.650**	-	-
ver6	-	**.647**	-	-
ver8	-	**.617**	-	-
ver4	-	**.588**	-	-
ver7	-	**.583**	.429	-
orth5	-	**.580**	-	-
ver2	-	**.559**	.483	-
ver9	-	**.495**	-	-
ver10	-	**.495**	-	-
ver5	-	**.324**	-	-
ver3	-	-	.563	-
manip3	.364	-	-.553	-
ver11	-	-	.545	-
vis6	-	-	.520	-
vis1	.324	-	.520	-
orth6	-	-	.518	-
vis4	-	-	.433	-
vis5	-	-	.342	-
orth4	-	-	-	-
manip7	-	-	-	-
orth2	-	-	-	.762
orth1	-	-	-	.694
orth3	-	-	-	.684
vis9	-	-	.337	.340
vis10	-	-	-.320	.325

Note: manip — Representational Manipulation scale, vis — Visual Imagery scale, ver — Internal Verbalization scale, orth — Orthographic Imagery scale. Statements that formed the Verbal Representation scale are marked in bold.

the questionnaire, one need to conduct one more adaptation study and reconsider the translation or the wording of the statements.

Almost all statements from the Internal Verbalization scale were included in the factor. One statement from another scale was also found in this factor: *I hear a running summary of everything I am doing in my head.* Based on the idea of this statement, we might say, however, that it corresponds to the description of the Internal Verbalization scale and can be included in this factor.

We took statements from Internal Verbalization which were included in the factor in EFA, named the created scale the Verbal Representation scale and used

it to assess the verbal representation found in the questionnaire adaptation study and compared the evaluation of category explanations in participants with different internal verbalisation levels.

Study 2. Experiment: the Relationship between the Verbal Representation Scale and Perceiving Judgments

Method
Participants. Two hundred and six students aged from 17—24 years participated in the experiment. They

received extra points for a course as a reward for participation.

Materials and procedure. We used text descriptions of four types of categories (https://osf.io/tsdrp/): plants (flowers), inanimate nature (stones), social categories (ethnos) and health condition (disease). Each text contained the information that some person discovered a new phenomenon. In the *conventional label* condition, it was reported that this phenomenon had a certain name (e.g., *Anna learns that the accepted name for plants with those attributes is "agularia"*). In the *without conventional label* condition, it was reported that a person decided to name this phenomenon on his or her own (e.g., *she decides by herself to name plants with such attributes as "agularia"*). Also, each category varied depending on the presence or the absence of the metaphor in its name. For instance, instead of an artificial name "agularia" the name "flamy flower" could be used. As the result, there were four condition variants for every type of category: with or without conventional label and with or without the metaphor. The experiment had a within-subject design, and texts were randomly distributed. Texts were interchanged with the text-fillers with well-known categories which served as a control condition.

An example of one text description of a new category is presented below:

Maria is watching a broadcast about several people suffering from a rare disease which causes the tears to drop often and spontaneously. She doesn't know about the existence of such disease and decided to name it somehow. She decides by herself to name the disease with such attributes as "parsotaphia" / "Piero's syndrome" // She doesn't know about the existence of such disease. She learnes that the accepted name for the disease with those attributes is "parsotaphi" / "Piero's syndrome". Later, Maria and her friend are watching a broadcast about another person suffering from this disease. The person has his tears to drop often and spontaneously. Her friend asks: "Why does it happening to him? "Maria answers: "Because he has parsotaphia / "Piero's syndrome".

After reading the text, participants answered the question "To what extent do you find the given answer to be satisfying?" using 7-point Likert scale. According to the hypothesis, the scores for this question (*persuasiveness of explanation*) should be, on average, higher in conventional label condition, as in the [11]. In addition, metaphor labels can enhance this effect because the metaphor contains the main attribute which constitutes the category. We also compared the scores for answers in familiar categories and in new categories and analysed the interaction of text factor with other factors. According to the data from the original study [11], the score for *persuasiveness of explanation* should be lower in texts with new categories.

Then, participants were presented with the text in which a new example of a category was described, and a new attribute of this example was reported:

New category: *Later, Maria learns that there is another disease which is also characterised by spontaneous and frequent tear dropping. In addition, it is characterized by a constant feeling of grief and melancholy.*

Participants were asked to rate the probability that the phenomenon described in the previous text also had the attribute described in the latter text using 7-point Likert scale (e.g., *To what extend is it probable that the disease, which Maria watched in the broadcast earlier, is also characterized by the constant feeling of grief and melancholy?*).

According to the hypothesis, in the case of metaphor labels, the scores for this question (*the probability to transfer category information*) should be, on average, higher than in the group without metaphor labels because the metaphor implicitly contained the attribute which should be transferred from the new category example.

In the end of the study, participants were asked to complete the Internal Representations Questionnaire. However, we only used statements which formed the Verbal Representation scale in data analysis.

Results and Discussion

Participants were divided into three groups (group factor) based on the level of verbal representation defined by the Verbal Representation scale from the modified version of the Internal Representations Questionnaire [16]. Mean score amongst participants was 3.521, SD = 0.643. The division by groups was organised using quartiles: low level of verbal representation group included participants with the score lower than $Q_{25}= 3.00$, middle level — higher than $Q_{25}= 3.00$ and lower than $Q_{75}= 4.00$, and high level — higher than $Q_{75}= 4.00$.

We used ANOVA to define the influence of metaphor category label, conventionality of category label and individual differences in the level of verbal representation on the persuasiveness of explanation and the probability to transfer category information.

Familiar and new categories comparison. We compared participants' answers in relation with the presence of a new or a familiar (control condition) category and evaluated the interaction of text and group factors. ANOVA revealed a significant influence of the text factor on both questions: participants perceived judgements with familiar categories as more persuasive (M=4.09, SD=2.04), than with new categories (M=3.21, SD=2.05), and were more prone to transfer information in the case of familiar categories (M=4.20, SD=1.92), that in new categories (M=3.61, SD=1.61), F(1.986)=45.630, p<.001 and F(1.986)=21.21, p<.001 respectively (Fig. 2).
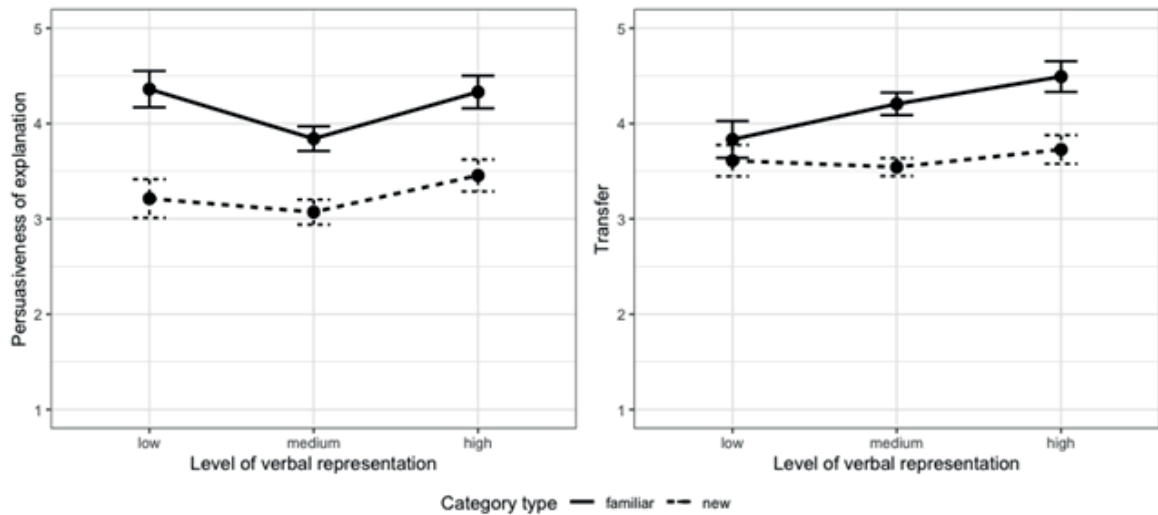
Fig. 2. The comparison of experimental conditions based on the level of verbal representation and category type

Our hypothesis about the group factor was confirmed: this factor was significant for both questions. Speaking about the persuasiveness of explanation, participants with high level of verbal representation demonstrated on average higher scores than participants with medium level of verbal representation. As for the probability to transfer category information, the higher the level of verbal representation, the higher the scores and, therefore, the agreement with the information transfer.

There were no interactions between category type (new or familiar category) and group factor in both questions (Tab. 2). This way, the influence of the rest of the factors — the presence of the metaphor and conventionality in the category label and the level of verbal representation — will be considered based on the texts with new categories where the scores are lower than in familiar categories condition.

Persuasiveness of explanation. ANOVA did not reveal the interaction of all three factors, i.e., metaphor, conventionality and group, F(1.484)=0.529, p=0.589. There were also no significant interactions between metaphor and conventionality, as well as

between metaphor and group (Tab. 3). We found a significant interaction between conventionality and group, F(1.484)=3.920, p=0.020. As for the analysis of separate factors, only conventionality factor was found to be significant: participants found judgments with conventional label to be more persuasive (M=4.17, SD=1.97), than with non-conventional label (M=2.25, SD=1.66). This result replicates the result from the previous study [1].

The analysis of the interaction between conventionality and the level of verbal representation showed that participants with high level of verbal representation were less dependent from the conventionality of the label when evaluating the persuasiveness of explanation (Fig. 3). Participants with low and medium level of verbal representation gave higher scores for the persuasiveness of explanation when the label was conventional, and lower scores when it was unconventional. It means that the effect of conventionality [11] was more relevant for participants with low and medium level of verbal representation. This result disproves our hypothesis that the

Table 2

ANOVA results of persuasiveness of explanation and probability to transfer category information in new and familiar categories

Factor	SS	df	MS	F	p	η^2_p
persuasiveness of explanation						
category type	189.52	1	189.52	45.630	<.001	0.044
group	39.07	2	19.53	4.703	0.009	0.009
category type * group	5.41	2	2.71	0.652	0.521	0.001
Residual	4095.23	986	4.15			
probability to transfer category information						
category type	66.1	1	66.11	21.21	<.001	0.021
group	19.1	2	9.57	3.07	0.047	0.006
category type * group	10.0	2	5.02	1.61	0.200	0.003
Residual	3073.4	986	3.12			

T a b l e   3

ANOVA results of persuasiveness of explanation in new categories

| Factor	SS	df	MS	F	p	η^2_p
metaphor	0.736	1	0.736	0.224	0.636	0.463
conventionality	371.255	1	371.255	113.089	<.001	0.189
group	13.059	2	6.530	1.989	0.138	0.008
metaphor * conventionality	1.023	1	1.023	0.312	0.577	0.644
metaphor * group	3.228	2	1.614	0.492	0.612	0.002
conventionality * group	25.735	2	12.867	3.920	0.020	0.016
metaphor * conventionality * group	3.476	2	1.738	0.529	0.589	0.002
Residual	1588.897	484	3.283			
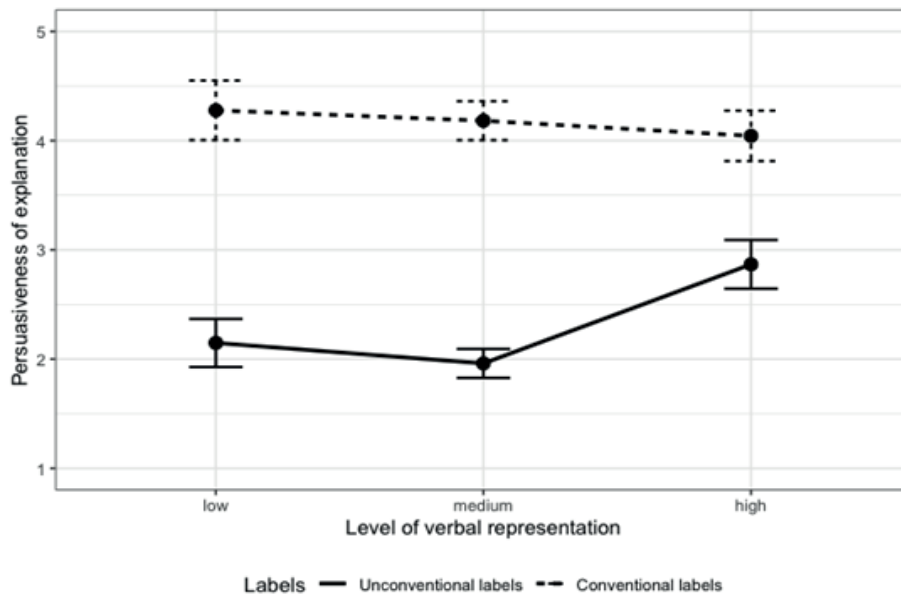
Fig. 3. Persuasiveness of explanation depending on the level of verbal representation and category type

effect of conventionality should manifest more in participants with high level of verbal representation.

Probability to transfer category information. ANOVA found a significant interaction of three factor (metaphor, conventionality, group) and their influence on the agreement to transfer an attribute from the new category example to the previous one, F(2.484)=4.368, p=.013 (Tab. 4).

Participants with low level of verbal representation were more prone to transfer the information in the case of metaphor labels, than without metaphor. Participants with high level of verbal representation, otherwise, were more prone to transfer the information in the case of labels without metaphor, than with metaphor. This interaction was found only in the conventional label condition (Fig. 4).

This interaction confirms our hypothesis that metaphor labels should enhance the agreement to transfer the information about category if a person has a low level of verbal representation, whereas labels without the metaphor enhance this agreement when a person has a high level of verbal representation.

T a b l e   4

ANOVA results of the probability to transfer category information

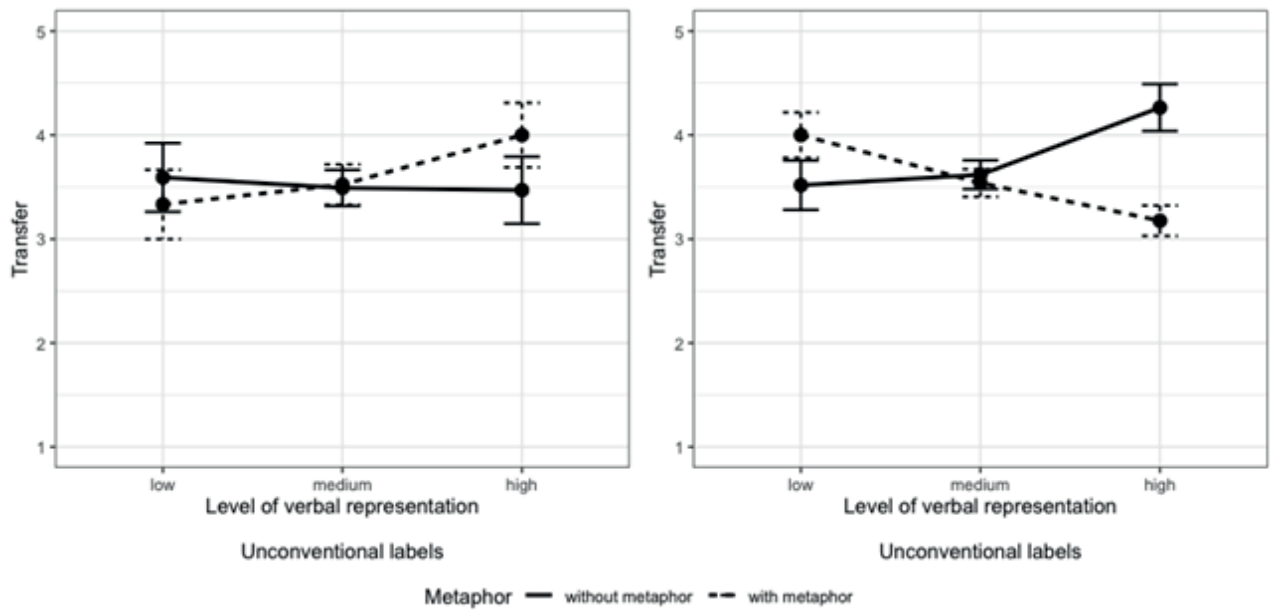| Factor	SS	df	MS	F	p	η^2_p
metaphor	0.448	1	0.448	0.173	0.677	0.358
conventionality	1.514	1	1.514	0.586	0.445	0.001
group	3.001	2	1.500	0.580	0.560	0.002
metaphor * conventionality	2.965	1	2.965	1.147	0.285	0.002
metaphor * group	2.507	2	1.254	0.485	0.616	0.002
conventionality * group	1.538	2	0.769	0.297	0.743	0.001
metaphor * conventionality * group	22.584	2	11.292	4.368	0.013	0.018
Residual	1251.257	484	2.585			

Fig. 4. The comparison of the probability to transfer category information in dependence from the level of verbal representation and category type

General Discussion

Language allows us to work with the information internally: retrieving information from the long-term memory and translating it to the level of awareness [17; 18; 19]. The influence of speech on cognitive processes increases with age [1]. Our study shows that the influence of the inner speech also extends to the understanding of categorical explanations. We found that high levels of verbal representation were associated with the evaluation of the persuasiveness of categorical explanations and transfer of categorical information. This ability was related to the presence of the 'metaphorical names' factor. At a low level of verbal representation, the transfer of categorical information was more significant with the use of metaphorical names. In contrast, when the level of verbal representation was high, the transfer of categorical information was more significant when conventional categorical names were used. Further research is needed in order to account for these differences.

In our study, we did not compare the assessment of categorical judgments with individual differences in other types of representation. Adapting the questionnaire did not allow the use of other scales, but the verbal representation scale has shown that it can be used for a wide range of cognitive processes, from simple ones that require image identification [16] to more complex ones that include the understanding of explanations. The next stage in the application of the measure of the inner speech and verbal representation can be to examine the relationship to the level of awareness in the operation of categorical information. It is known that adults and children over the age of 9 are more successful in learning cat-

egorization rules if the attributes included in these rules have good lexical labels [2]. This effect is not observed in children under 9 years of age, even though formation of these types of rules is already available. At the same time, children of this age can hardly verbalize and, consequently, realize the found categorization rule [18]: a fact that was noted by L.S. Vygotsky [1]. It can be assumed that children who have a higher level of development of verbal representation will have more opportunities to comprehend the found categorization rules. However, testing this hypothesis would require adapting the material of this questionnaire.

Conclusions

In our study, we extracted the verbal representation scale from the internal representation questionnaire [16]. The adaptation of the questionnaire to Russian-speaking respondents showed the greatest compliance of the verbal representation scale with its version in the original version. This scale was used to divide the subjects into groups with low, medium, and high levels of this ability with subsequent analysis of its connection to the evaluation of categorical explanations and the transfer of categorical information. We showed the connection between the level of verbal representation and these cognitive processes and the interaction with the relevant factors — the use of different types of categorical names (conventional and metaphorical) and their conventionality. These results significantly expand ideas about the influence of the inner speech on cognitive processes.

References | *Литература*

1. Vygotskij L.S. Myshlenie i rech' [Thinking and speech]. Moscow: Publ. Labirint, 2012. 352 p. (In Russ.).

2. Kotov A.A., Zherdeva M.P. Vliyanie legkosti naimenovaniya prostranstvennykh priznakov na nauchenie novym pravilam kategorizatsii [Effect of Spatial Locations Nameability on Category Learning]. *Psikhologiya. Zhurnal Vysshei shkoly ekonomiki*, 2020. Vol. 17, no. 1, pp. 145—155. (In Russ.). DOI:10.17323/1813-8918-2020-1-145-155

3. Brinthaupt T.M., Hein M.B., Kramer T.E. The self-talk scale: development, factor analysis, and validation. *J. Pers. Assess*, 2009. Vol. 91, no. 1, pp. 82—92. DOI:10.1080/00223890802484498

4. Calvete E. et al. Self-talk and affective problems in college students: valence of thinking and cognitive content specificity. *Span. J. Psychol*, 2005. Vol. 8, no. 1, pp. 56—67. DOI:10.1017/s1138741600004960

5. Chen S.Y., Ross B.H., Murphy G.L. Decision making under uncertain categorization. Front. Psychol, 2014. Vol. 5, pp. 991. DOI:10.3389/fpsyg.2014.00991

6. Duncan R.M., Cheyne J.A. Incidence and functions of self-reported private speech in young adults: A self-verbalization questionnaire. *Can. J. Behav. Sci*, 1999. Vol. 31, no. 2, pp. 133—136. DOI:10.1037/h0087081

7. Edwards B.J. et al. Explanation recruits comparison in a category-learning task. *Cognition*, 2019. Vol. 185, pp. 21—38. DOI:10.1016/j.cognition.2018.12.011

8. Gentner D., Asmuth J. Metaphoric extension, relational categories, and abstraction. *Language, Cognition and Neuroscience*, 2017. pp. 1—10. DOI:10.1080/23273798.2017.1410560

9. Giffin C., Wilkenfeld D., Lombrozo T. The explanatory effect of a label: Explanations with named categories are more satisfying. *Cognition*, 2017. Vol. 168, pp. 357—369. DOI:10.1016/j.cognition.2017.07.011

10. Goldstone R.L., Barsalou L.W. Reuniting perception and conception. *Cognition*, 1998. Vol. 65, no. 2-3, pp. 231—262. DOI:10.1016/s0010-0277(97)00047-4

11. Hemmatian B., Sloman S.A. Community appeal: Explanation without information. *J. Exp. Psychol. Gen*, 2018. Vol. 147, no. 11, pp. 1677—1712. DOI:10.1037/xge0000478

12. Kotov A.A., Kotova T.N. The Role of Different Types of Labels in Learning Statistically Dense and Statistically Sparse Categories. *The Russian Journal of Cognitive Science*. cogjournal.org, 2018. Vol. 5, no. 3, pp. 56—67. DOI:10.2139/ssrn.2580829.

13. Lupyan G., Rakison D.H. Language is not just for talking: Redundant labels facilitate learning of novel categories. *Psychological. journals*, 2007. DOI:10.1111/j.1467-9280.2007.02028.x

14. Paivio A. Mental imagery in associative learning and memory. *Psychol. Rev*, 1969. Vol. 76, no. 3, pp. 241—263. DOI:10.1037/h0027272

15. Regier T., Kay P. Language, thought, and color: Whorf was half right. *Trends Cogn. Sci*, 2009. Vol. 13, no. 10, pp. 439—446. DOI:10.1016/j.tics.2009.07.001

16. Roebuck H., Lupyan G. The Internal Representations Questionnaire: Measuring modes of thinking, 2019. DOI:10.31234/osf.io/euhcn

17. Siegrist M. Inner speech as a cognitive process mediating self-consciousness and inhibiting self-deception. *Psychol. Rep*, 1995. Vol. 76, no. 1, pp. 259—265. DOI:10.2466/pr0.1995.76.1.259

18. Sloutsky V.M. From Perceptual Categories to Concepts: What Develops? *Cogn. Sci*, 2010. Vol. 34, no. 7, pp. 1244—1286. DOI:10.1111/j.1551-6709.2010.01129.x

1. *Выготский Л.С.* Мышление и речь. М.: Лабиринт, 2012. 352 с.

2. *Котов А.А., Жердева М.П.* Влияние легкости наименования пространственных признаков на научение новым правилам категоризации // Психология. Журнал Высшей школы экономики. 2020. Том 17. № 1. С. 145—155. DOI:10.17323/1813-8918-2020-1-145-155

3. *Brinthaupt T.M., Hein M.B., Kramer T.E.* The self-talk scale: development, factor analysis, and validation // J. Pers. Assess. 2009. Vol. 91. № 1. P. 82—92. DOI:10.1080/00223890802484498

4. *Calvete E. et al.* Self-talk and affective problems in college students: valence of thinking and cognitive content specificity // Span. J. Psychol. 2005. Vol. 8. № 1. P. 56—67. DOI:10.1017/s1138741600004960

5. *Chen S.Y., Ross B.H., Murphy G.L.* Decision making under uncertain categorization // Front. Psychol. 2014. Vol. 5. P. 991. DOI:10.3389/fpsyg.2014.00991

6. *Duncan R.M., Cheyne J.A.* Incidence and functions of self-reported private speech in young adults: A self-verbalization questionnaire // Can. J. Behav. Sci. 1999. Vol. 31. № 2. P. 133—136. DOI:10.1037/h0087081

7. *Edwards B.J., Williams J.J., Gentner D., Lombrozo T.* Explanation recruits comparison in a category-learning task // Cognition. 2019. Vol. 185. P. 21—38. DOI:10.1016/j.cognition.2018.12.011

8. *Gentner D., Asmuth J.* Metaphoric extension, relational categories, and abstraction // Language, Cognition and Neuroscience. 2017. Vol. 34. № 10. P. 1—10. DOI:10.1080/23273798.2017.1410560

9. *Giffin C., Wilkenfeld D., Lombrozo T.* The explanatory effect of a label: Explanations with named categories are more satisfying // Cognition. 2017. Vol. 168. P. 357—369. DOI:10.1016/j.cognition.2017.07.011

10. *Goldstone R.L., Barsalou L.W.* Reuniting perception and conception // Cognition. 1998. Vol. 65. № 2—3. P. 231—262. DOI:10.1016/s0010-0277(97)00047-4

11. *Hemmatian B., Sloman S.A.* Community appeal: Explanation without information // J. Exp. Psychol. Gen. 2018. Vol. 147. № 11. P. 1677—1712. DOI:10.1037/xge0000478

12. *Kotov A.A., Kotova T.N.* The Role of Different Types of Labels in Learning Statistically Dense and Statistically Sparse Categories // The Russian Journal of Cognitive Science. 2018. Vol. 5. № 3. P. 56—67. DOI:10.2139/ssrn.2580829

13. *Lupyan G., Rakison D.H.* Language is not just for talking: Redundant labels facilitate learning of novel categories // Psychological Science. 2007. Vol. 18. № 12. P. 177—183. DOI:10.1111/j.1467-9280.2007.02028.x

14. *Paivio A.* Mental imagery in associative learning and memory // Psychol. Rev. 1969. Vol. 76. № 3. P. 241—263. DOI:10.1037/h0027272

15. *Regier T., Kay P.* Language, thought, and color: Whorf was half right // Trends Cogn. Sci. 2009. Vol. 13. № 10. P. 439—446. DOI:10.1016/j.tics.2009.07.001

16. *Roebuck H., Lupyan G.* The Internal Representations Questionnaire: Measuring modes of thinking. // Behavior Research Methods. 2020. Vol. 52. № 5. P. 2053—2070. DOI:10.3758/s13428-020-01354-y

17. *Siegrist M.* Inner speech as a cognitive process mediating self-consciousness and inhibiting self-deception // Psychol. Rep. 1995. Vol. 76. № 1. P. 259—265. DOI:10.2466/pr0.1995.76.1.259

18. *Sloutsky V.M.* From Perceptual Categories to Concepts: What Develops? // Cogn. Sci. 2010. Vol. 34. № 7. P. 1244—1286. DOI:10.1111/j.1551-6709.2010.01129.x

19. Thibodeau P.H., Hendricks R.K., Boroditsky L. How Linguistic Metaphor Scaffolds Reasoning. *Trends Cogn. Sci.*, 2017. Vol. 21, no. 11, pp. 852—863. DOI:10.1016/j.tics.2017.07.001

20. Winawer J. et al. Russian blues reveal effects of language on color discrimination. *Proc. Natl. Acad. Sci. U. S. A.* National Acad Sciences, 2007. Vol. 104, no. 19, pp. 7780—7785. DOI:10.1016/j.tics.2009.07.001

19. *Thibodeau P.H., Hendricks R.K., Boroditsky L.* How Linguistic Metaphor Scaffolds Reasoning // Trends Cogn. Sci. 2017. Vol. 21. № 11. P. 852—863. DOI:10.1016/j.tics.2017.07.001

20. *Winawer J. et al.* Russian blues reveal effects of language on color discrimination // Proc. Natl. Acad. Sci. 2007. Vol. 104. № 19. P. 7780—7785. DOI:10.1016/j.tics.2009.07.001

Information about the authors

Alexey A. Kotov, PhD in Psychology, Senior Researcher, Laboratory for the Neurobiological Foundations of Cognitive Development, HSE University, Moscow, Russia, ORCID: https://orcid.org/0000-0002-4426-4265, e-mail: akotov@hse.ru

Ivan A. Aslanov, Lomonosov Moscow State University, Moscow, Russia, ORCID: https://orcid.org/0000-0002-2105-8012, e-mail: ivaslanov@gmail.com

Yulia V. Sudorgina, Intern researcher, Laboratory for the Neurobiological Foundations of Cognitive Development, HSE University, Moscow, Russia, ORCID: https://orcid.org/0000-0002-6755-621X, e-mail: yuvsudorgina@gmail.com

Информация об авторах

Котов Алексей Александрович, кандидат психологических наук, старший научный сотрудник Научно-учебной лаборатории нейробиологических основ когнитивного развития, Национальный исследовательский университет «Высшая школа экономики» (ФГАОУ ВО «НИУ ВШЭ»), г. Москва, Российская Федерация, ORCID: https://orcid.org/0000-0002-4426-4265, e-mail: akotov@hse.ru

Асланов Иван Александрович, соискатель, Московский государственный университет имени М.В. Ломоносова (ФГБОУ ВО «МГУ имени М.В. Ломоносова»), г. Москва, Российская Федерация, ORCID: https://orcid.org/0000-0002-2105-8012, e-mail: ivaslanov@gmail.com

Судоргина Юлия Владимировна, стажер-исследователь Научно-учебной лаборатории нейробиологических основ когнитивного развития, Национальный исследовательский университет «Высшая школа экономики» (ФГАОУ ВО «НИУ ВШЭ»), г. Москва, Российская Федерация, ORCID: https://orcid.org/0000-0002-6755-621X, e-mail: yuvsudorgina@gmail.com