

SPEECH AND SEMANTIC

Cognitive abilities and creating metaphorical names

Marina O. Avanesyan*, Ekaterina Yu. Khaibrakhmanova

Saint Petersburg State University, Saint Petersburg, Russia

* Corresponding author. E-mail: m.avanesyan@spbu.ru

The cognitive processing of metaphor creation has been insufficiently investigated. Creating metaphors requires the ability to work in a fantastic, impossible context, using symbolic and associative means to express one's thoughts. It has been shown recently that intelligence plays an important role in the creation of metaphors, but it is not the main factor in determining their success. The present research explores the roles of conceptual abilities, categorical abilities, and flexibility (as the factor of creativity) in metaphor creation. Participants ($n = 38$ young adults) were asked to come up with names for three photos, without any special instruction to create metaphors. To classify conceptual abilities we used the test of Conceptual Synthesis (M. A. Kholodnaya, 2012); to measure categorical ability we used the subtest of Similarities (D. Wechsler, 1955); to identify the role of creativity in the metaphor process we used the test of Unusual Uses (J. P. Guilford, 1960). The creation of complex metaphorical names was associated with a tendency to create highly organized mental structures and to retain them within the general semantic context ($r = 0.344$, $p < 0.05$). The tendency to create single-level situational connections was associated with a tendency to give specific names to photos ($r = 0.475$, $p < 0.01$). Photographic images proved out to be fruitful stimuli to investigate the processing of visual information. We developed a preliminary classification of names: 1) concrete; 2) situational; 3) abstract; 4) metaphorical (M1 and M2). We identified two types of metaphorical names — perceptual and complex metaphors — that relate to conceptual abilities in different ways. It is inaccurate to speak about a general concept of metaphorical abilities; we should differentiate the psychological mechanisms that lie at their base.

Keywords: naming, denotation, metaphor creation, conceptual abilities, categorical abilities, flexibility

Introduction

Naming an object is a task that any child or adult performs many times a day; it suggests its assignment to a category. When we “operate with every single concept, the point is that we are operating with the system as a whole” (Vygotsky, 1982, p. 131). In addition to well known logical categories, flexible categories have been described. Flexible categories (*ad hoc* categories, Barsalou, 1983), goal-derived categories (Vallée-Tourangeau, 1998; Ross, 1999; Ratneshwar, 2000) are created by people on the basis of their goals of immediate interest, and may include completely different concepts that have, at first glance, few common attributes or none at all (Ratneshwar, 2000).

In recent decades, studies of concept formation have paid more attention to sensory experience than to formal logic. Many linguistic examples show that concepts that are not based on direct experience are created and interpreted via metaphor, metonymy, and mental imagery. These structures allow us to use sensory experience, yet go beyond the sensual reflection of external reality (Johnson, 1990; Lakoff, 2011). Special attention has been given to metaphors in cognitive studies. Metaphor makes knowledge more “tangible,” as it helps us to understand an abstraction in terms of something more concrete, familiar, and a subject of one’s personal experience. A metaphorical proposition consists of two components: a topic reflecting an object of thought, and a concept (“source”) allowing the author to convey an idea about the topic. The essence of metaphor is “understanding and experiencing one kind of thing in terms of another” (Lakoff & Johnson, 1980, p. 5). Analysis of the metaphors created by a person shows how he integrated new information into his existing system of knowledge, giving it meaningful accents.

The objective of our study was to explore the role of conceptual abilities, categorical abilities, and flexibility (as factor of creativity) in creating metaphorical names for visual objects, using the word “name” as shorthand for denotation. In fact, the creation of metaphors is the original method of categorization of an object. Metaphor is a kind of dynamic “superordinate attribute category” (Glucksberg, 2001) which has not yet been fixed in the language system, but is constructed as an *ad hoc* category.

When creating a metaphor, its author intends to communicate an idea about a topic. To achieve this he must scan his semantic knowledge for suitable vehicles that exemplify his idea. For example, the author wants to say that “music is something that heals.” In this case “something that heals” is a superordinate attribute category. The search process can lead to the concept of “medicine” and a metaphor might be “music is a medicine”. During this process, the author suppresses many kinds of knowledge: aspects of the topic and possible concepts (“source”) that are not relevant to the higher-order category; readily accessible from memory but irrelevant semantic knowledge (e.g., adjectival descriptions of the topic); clichés and dead metaphors. Finally, he assess whether the metaphor conveys the desired meaning and emotional tone (Silvia & Beaty, 2012). In the theory of T. Lubart (2009), emotional resonance is the basis for finding the source of metaphor.

Metaphoricity, along with fluency, originality, and receptivity, refers to the properties of intellectual activity affecting creativity (Kholodnaya, 2002). Creating metaphors requires the ability to work in a fantastic, impossible context, to use symbolic and associative means to express one's thoughts, and to see the complex in the simple and the simple in the complex (Kholodnaya, 2002; Sapogova, 1996). Intelligence plays an important role in the creation of metaphors, but it is not the main factor in determining their success. Intelligence¹ explains 24% of the variance in the experts' assessment of the "creativity" of the created metaphors². And this effect remained even when personality was added to the model (as measured by the "Big Five" questionnaire) (Silvia & Beaty, 2012). Together, personality and fluid intelligence explained 35% of the variance in the quality of creative metaphor. The ability to create metaphorical analogies³ is related to performance on tests of abstract analogies ($r = 0.31$) and verbal analogies ($r = 0.48$)⁴ (Barros & Primi, 2010). Verbal fluency is also associated with the development of creative metaphors (Silvia & Beaty, 2013). Crystallized intelligence had a moderate but insignificant effect on the generation of creative metaphors (*ibid.*).

The mechanisms of searching for concepts with the necessary properties to convey the Ideas of metaphor's author are described in a number of semantic models. The most famous of those models is LSA (latent semantic analysis, Kitsch's Predication Model). According to this model, the concepts are considered as nodes in a 300-dimensional semantic space which are located at different distances from each other, depending on the frequency of co-occurrence of the concepts and their semantic proximity. Following this model, the understanding and creation of metaphor requires the contribution of working memory and vocabulary, as has been experimentally verified (Chiappe & Chiappe, 2007). It has been shown that the ability to produce a good metaphor⁵ is positively related to working memory (Listening Span; Digit Span Reverse, but Not Forward), verbal fluency (reproducing as many rare words for a given category as possible, Retrieval Fluency), testing of vocabulary for naming pictures (Peabody Picture Vocabulary Test).

An interesting approach to explaining the psychological mechanisms of metaphor production was proposed by L.I. Shragina (2000) in "Producing associations by similarity". Respondents were given 10 concrete concepts (pencil, iron, lamp, etc.) with the task to create as many associations by similarity as possible, answering the question: "Who or what is it like?" The responses were divided into four groups: 1) stereotypical associations; 2) original "direct" comparisons; 3) original associations with details; 4) original "indirect" comparisons. Original indirect

¹ A battery of tests was used to measure fluid intelligence: six non-verbal tests, most of which assessed inductive reasoning (Raven's matrices, culturally independent Cattell test, etc.).

² The creativity of each metaphor was estimated by three independent experts (5-point scale), determined by three criteria: semantic distance of concepts (remoteness), novelty, cleverness.

³ An example of such a metaphorical analogy is: "The camel is the _____ of the desert".

⁴ There was also a battery of tests on different kinds of analogies (spatial, abstract, verbal, numerical, mechanical) (Battery of Reasoning Tests [BPR-5]).

⁵ Subjects were presented with a topic (e.g., "Some jobs are _____") as well as a property to be attributed to the topic (e.g., "iconfining and constraining, and make you feel like you are just putting in time") (Pierce & Chiappe, 2009).

comparisons differ from the other kinds of answers by the high level of details; the inclusion of a stimulus as a part into a new wholeness, by comparison of incompatible things; the presence of imaginary characters; vivid imagery; and emotional coloring. In original indirect comparisons, the author creates a mental image that does not convey a separate set of common features, but reflects the movement of thought deeper into the object by detecting and creating new meanings.

The ability to create metaphors is manifested in children between the ages of one and one and a half in symbolic play, in which one object begins to substitute for another (Winner, 1981). For example, an 18-month child calls the toy car that she pushes along her mother's arm a "snake"; a two-year-old child called her teddy bear "zucchini", when grating it against the arm of the chair, which she called "a grater" (Winner & Gardner, 1981). Such metaphors are called enactive because the child develops symbolic functions through action with the object. Another type of early metaphor is the perceptual metaphor that is based primarily on a surface resemblance. We encounter such metaphors when a three-year-old child calls a red and white stop signal "a lollipop". With age, the number of enactive metaphors decreases, while the number of perceptual metaphors increases. This corresponds with the general dynamics of mental development, when operations with material objects are complemented by operations with images. It is interesting that during secondary school, the originality of the metaphors produced and their quantity decrease; however, under conditions in which it is desirable to produce metaphors, children of the "literal period" have no difficulty in creating new metaphors (Winner & Gardner, 1981). In the late teens and adolescence, metaphorical abilities are "restored".

In a series of experimental studies, E.E. Sapogova (1996) concluded that the ability of preschool children to understand and create metaphors is much greater than had previously been believed. She found that tasks that involve the creation or interpretation of metaphor or nonsense activated one of the general mechanisms of the imagination: the construction of a new frame. "The child usually builds a new frame around one isolated attribute, object, or situation, changing it and using it as a generating principle for building a new whole" (p. 44).

To sum up, studies of metaphor creation are searching for the cognitive abilities to influence this process and its age-related patterns. However, psychological mechanisms of producing metaphor need further research. Metaphors are thought to be the products of creativity, although the success of metaphor creation and the results of traditional tests of creativity are linked either moderately or not at all (Avanesyan, 2013). The review of different studies shows the variety of tasks for metaphor creation, but the authors make the extension of the found trends to the creation of metaphors in general.

Method

Most studies of the creation of metaphors are based on verbal material. In our study, the stimulus was presented by photos. Participants were instructed to come up with three names for each photo. There was no special instruction given about the use of metaphor.

Creating metaphors involves finding similarities between semantically distinct concepts. In connection with this statement, we have formulated several hypotheses about which cognitive abilities may affect the ability to create metaphorical names.

Hypothesis 1. The ability to create metaphorical names is correlated with conceptual abilities.

Conceptual ability refers to mental characteristics respecting the process of conceptualization and the generation of new semantic content that does not come from external conditions or previously learned individual knowledge (Kholodnaya, 2012). Creating metaphorical names involves connecting two concepts from distinct domains within a single semantic space. The process of creating a metaphorical name allows the author to identify and convey his ideas about the picture. We hypothesized that a person's ability to move freely over a large semantic distance in the search of names is related to his conceptual abilities.

For diagnosis of conceptual abilities we chose the method of "Conceptual Synthesis" by M.A. Kholodnaya, which is a modified version of the method of Cognitive Synthesis by Abraham, Okoniewski, & Leman (1987 / cited in Kholodnaya, 2012). The participants had to combine into one sentence three stimulus words, taken from different contexts (4 triads). This required creation of a single semantic space in which these concepts were to be consistently linked. The maximum score was received by participants who could construct complex mental structures with transitions from one semantic space to another, but within the general semantic context, which can be compared with the mechanisms underlying the creation of metaphor.

The following criteria were used for assessing each alternative answer to the example of the triad "chain — fire — watch":

0 points - if only two of the three words are linked in the sentence (iModern metal-heads wear chains on their wrists like you would a watch!);

1 point - if a connection is established by a simple listing of items or their formal opposition ("You can melt glass from a watch in the fire, but probably not a chain"; "A watch, chain, and fire are all things people need to deal with their problems");

2 points - all three words are included in a specific situation ("The Red Army commander in the years of the Revolution is standing with his silver watch, in chains, and any minute he may be burnt to death in the fire");

3 points - all three words are put together through some generic categorical basis or the use of complex analogies or the use of one causal relationship or another ("Fire is a chain of oxidation; watches are also a closed chain of successive positions of the watch mechanism; and the chain itself is also composed of several identical links").

Hypothesis 2. The ability to create metaphorical names is associated with categorical abilities.

Initially, it may seem that the creation of metaphors doesn't require aptitude for conceptual generalization and is more likely to be a "fantastic binomial". However, "the source of metaphor is a conscious error in the taxonomy of objects" as "a meta-

phor works as a categorical shift ... [it] rejects the object's membership in the class to which it actually belongs and claims inclusion in a category to which it cannot be attributed on a rational basis. Metaphor is a challenge to nature" (Arutyunova, 1990, pp. 17–18). Thus, for a categorical shift to occur, it is necessary for the hierarchy of generic concepts to have already been formed. "The word is converted into a 'category' only if the person is able to allocate specific and general features, and the word has a definite place in the 'grid' of categories of different level of generality" (Kholodnaya, 2012, p. 230). To measure categorical ability, the subtest "Similarities" of D. Wechsler's test was used. Stimulus material was formed by 13 pairs of words; for each pair, the subject must find similarity between two concepts (Filimonenko & Timofeev, 2004).

This raises the concern that within-group differences in intellectual abilities might be minimal, because the sample of participants was initially formed of students from leading universities.

Hypothesis 3. The ability to create metaphorical names is related to the level of verbal creativity.

Coming up with names for pictures is a task for divergent thinking: It does not presuppose a right or wrong answer. To identify the role of creativity in metaphor processing, we used the "Unusual Uses" test by J.P. Guilford (Tunick, 1997). The participant was given the following instruction: "The newspaper is used for reading. You can think of other ways to use it. What else can you do with it? How can it be used?" The most interesting for us was the factor of "flexibility", which captures the ability to cross boundaries and to integrate remote concepts. It demands building a new frame and requires the participants to transfer from one familiar system to another, also familiar, but not at all typical of the subject. Flexibility is measured by the number of different categories of usage of the object suggested by the participant. Since the creation of metaphor requires finding similarities between the two concepts of entirely remote semantic fields, it can be assumed that the participants who created the metaphorical names would have better results for "flexibility" in the J. P. Guilford test.

Subjects

The sample consisted of 40 (19 female and 21 male) participants, aged 18 to 27; all were native speakers of Russian. The sample included students and graduates of higher educational institutions of a technical and creative profile, as well as psychology. One of the initial hypotheses was about difference in the ability to create metaphorical names of the representatives of the three groups. However, mathematical analysis of the data did not show any statistically significant differences in the measured indicators. The subjects gave informed consent to participate in the study.

Stimulus material was presented by photographic images. Participants were instructed to come up with three original names for each photo. The photos were taken so that there was one object on a solid background, one object on a more complex background, and one situation of interpersonal interaction. We were guided by the fact that the images were not "noisy", and all the details were easily identifiable. Pictorial stimulus material is not typical for the assessment of metaphorical abilities;

usually respondents are asked to produce a metaphor for different situations. For example in Silvia and Beaty (2012), participants were presented with two different prompts and were asked to describe their past emotional experiences using a metaphor. In the first task, they were asked to “think of the most boring high-school or college class that you’ve ever taken. What was it like to sit through it?” For the next task, participants were asked to “think about the most disgusting thing you ever ate or drank. What was it like to eat or drink it?”

In our case, the instructions didn’t bias the participants in favor of producing metaphors. The pictures were introduced with the phrase: “Now you will need to come up with original names for pictures. How would you name them? Give three names for each picture”. After the main task, participants were asked, “Why did you name the photo that way?” The photos were presented one by one, and there was no time limit for thinking up names. At this stage of research we did not take the level of complexity or specificity of the images into consideration. At the preliminary stage of the study, which involved 13 people (5 females, 8 males) from the ages of 19 to 23, it had been confirmed that the images were given different names, metaphorical names among them.

The empirical classification of names was developed on the basis of theoretical analysis. We assumed that the category to which the participants attributed the object depicted in the photograph might coincide with the object itself (the object is a), might be its generic category (the object is A) or a category associatively connected with it (the object is A’). It was assumed that the association could be of different types: by similarity, by contrast, by contiguity in space or time, or by cause and effect. Metaphorical names were likely to apply to the type of original associations by similarity, including metaphorical “shift”.

Description of stimulus material

Figure 1 shows a soap bubble on a dark blue background.



Figure 1.

©Tomo.Yun, <http://www.yunphoto.net>

Figure 2 shows a glass with a drink on the edge of the roof at sunset. If you look closely, you can see the port in the background.



Figure 2.

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In Figure 3 we see a couple of people sitting among concrete blocks; the city is in the background. These blocks are part of the Holocaust memorial in Berlin. After the presentation of the third photo, the participants were asked whether they knew what it was. There were two people who knew, and the answers of these participants were removed and were not involved in the further processing of data.



Figure 3.

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Preliminary empirical classification of names

When assigning names to the selected type, we took into account not only the name, but also the explanation for it. Four types of names were identified. Two experts analyzed the names, both of them psychologists with experience in qualitative analysis of empirical data; they worked independently of each other.

1. Concrete (descriptive) type. The name produced is the name of the object in the picture. For example, photo 1 got the name “Bubble”.
2. Situational type. The name reflects the feelings and memories of the participant evoked by the photo and conveys his or her emotional state. The names of this type for photos 1 were: “All in one place (the sea is joy, happiness, all in one place)”, “Childhood” (memories of childhood, when “everyone was blowing bubbles”). Some names of this type contained a unique

imprint of personal experience. However, there was no “metaphorical shift” of meaning in these names. Also spatial and temporal associations with the depicted object could be quite clearly observed. Some of the answers that fall into this category could be attributed to the metaphorical type, but the comments by the participants helped to assign the name to the appropriate category. For example, the name “Childhood” was classed as situational, if the participant replied that “as a child I loved to blow bubbles” and as metaphorical, if “... like a memory of childhood, it is fragile and rapidly disappearing”.

3. Abstract type. Such names are mostly abstract concepts that reflect the individual characteristics of the object, which have been generalized and reflected in a category of a higher level. Such names for the picture of the bubble were “Roundness”, “Perfect Shape”, “Sphere”, “Microcosm” (because “it is a greatly enlarged object on a blurred background”). The names show that the soap bubble turned out to be an example of a more “universal” phenomenon.
4. Metaphorical type. The names of this type involved a “semantic shift”, i.e., deviation from the conventional categorial system, to which an object pictured in the photo belonged. Metaphorical responses were divided into two groups: M1 and M2.

Group M1 included metaphors formed on the basis of sensory similarities between the object depicted and something else, and based on the properties of the different modalities (often visual and tactile). Examples of M1 metaphorical names for photo 1 are: “Planet”, “The World in a Drop”, “Eye”, “Egg”, “Lake in the Ball”, “Crystal Ball”, “Sky”, “Cocoon.” Such metaphors are usually called perceptual metaphors¹.

Group M2 was formed by complex metaphors; the highlighted characteristics were not transferred to another specific object, as in the case of M1, but were generalized with a semantic shift typical of metaphors. The soap bubble ceased to be a soap bubble and turn into “Inner World”, “Tempest in a Teapot”, “Space of Spring”, “The Most Important Thing”, “Prism of the Truth”, “Last Bastion”, “Myopia”.

When considering the metaphorical names, it is legitimate to ask whether it is possible that one component of the metaphor is an image, and the other is the word.

One of the types of visual metaphors described in the literature is an integrated metaphor (Forceville, 1994), where an object is represented in such a way that it resembles another object, but does not lose its identity. In such integrated pictorial metaphors, the principle of the identity of the components of the metaphor “A is B” is implemented “literally”: Each of the two objects retained its semantic integrity, to which an addressee could refer at any moment. The source is not presented in the

¹ The example of perceptual metaphor for the second photo is “City in the Glass”, which is based on a visual illusion; for the third photo perceptual metaphors are often based on such properties as color (dark and light blocks, like “Piano Keys”), location (blocks facing each other, like a “Labyrinth”).

picture; it is hinted at, as if it symbolically exists in the picture. The names that reflect this “duality” of the image have been attributed to the M1 type. The addressee conceived the object or situation in the photo in light of these names. The names became the bridge between the two grounds of the photos — the “literal” and the “figurative”.

In addition to the M1 responses, which underlined the perceived similarity of the objects, we encountered another, more abstract type of figurative answer. By definition, in a metaphor the more complex and difficult thing is understood and experienced in terms of more concrete and sensual thing (Lakoff & Johnson, 1980). However, the images on the stimulus photos are more concrete and descriptive than the names given to them. We can assume that the names of the second type (M2) are “backward” metaphors, i.e., the images themselves are vehicles for the transmission of complex abstract ideas (as conveyed in the name) (Fig. 4). For example, “To imagine what the ‘space of Spring’ is like, look at the photo of the soap bubble”¹.

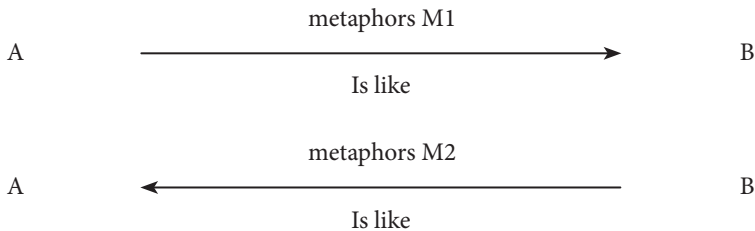


Figure 4. The direction of the metaphorical process

A high level of generalization is typical both for M2 names and for abstract names, so it is important to maintain a clear line of demarcation between them. The essential feature of a metaphor is that its concepts refer to different subject domains, causing “cognitive collision” and, as a consequence, the emotional effect of a metaphor. In the abstract type, on the contrary, there is a generalization of the object’s properties in the system of genus-species relations in which it is initially included.

The classification of the names is more empirical, and demands a rigorous theoretical classification; however, it is possible to identify such dimensions of names as abstract–concrete, semantically close–semantically distant.

With respect to the further development of stimulus images, it should be noted that different types of images evoke different types of responses. For example, the picture of a glass rarely received abstract or complex metaphorical names in our study, whereas the picture with people sitting on a background of blocks received almost no concrete names.

¹ Examples of complex metaphors for the second photo are “Loneliness” and “End of Life”; complex metaphors for the third picture are “Islands” (because “the concrete blocks are like islands, people are on the islands, everyone has his own island, together they create a city”) and “Lost” (“away from the bustle of people, among the same type of objects”).

Table 2. Types of names for the three photographs, N = 38

photo	Type of name				
	Concrete	Situational	Abstract	Metaphorical (M1)	Metaphorical (M2)
photo 1	10.5%	9.6%	24.6%	36.0%	17.5%
photo 2	21.1%	43.9%	4.4%	1.8%	28.9%
photo 3	3.5%	33.3%	17.5%	13.2%	32.5%

Results

There were 347 names given to photographs and there were results from three tests: “Conceptual Synthesis” by M.A. Kholodnaya, “Similarities” by D. Wechsler, and “Unusual Uses” by J. P. Guilford (as modified by E. Tunik).

Table 3. Pearson chi-square correlations

	Fluency	Flexibility	Similarity	Triads	Concrete names	Situational names	Abstract names	Metaphorical names M1	Metaphorical names M2
Fluency	1								
Flexibility	.750**	1							
Similarity	.145	.255	1						
Triads	.193	.010	.032	1					
Concrete names	-.156	-.033	-.171	-.475**	1				
Situational names	-.155	.066	-.122	-.185	-.192	1			
Abstract names	.012	-.210	-.018	.251	-.253	.076	1		
M1	-.017	.111	.239	-.070	.182	-.341*	-.253	1	
M2	.221	.021	.074	.344*	-.440**	-.508**	-.304	-.281	1

** Correlation is significant at the 0.01 level (2-sides).

* Correlation is significant at the 0.05 level (2-sides.).

A positive correlation was detected between the indicators of “conceptual synthesis” and the number of responses of metaphorical type M2 ($r = 0.344$, $p < 0.05$). This means that a higher level of conceptual abilities is associated with a tendency to give complex metaphorical names. By combining words into sentences in a “Conceptual Synthesis”, the participant creates a semantic context in which all three distantly related words can be consistently linked in one sentence. The more

complex and indirect the links are, the higher the participant's score. The metaphor also consists of concepts from remote semantic fields. Apparently, in both cases — conceptual abilities and metaphoric abilities — it is important to move long semantic distances while keeping within certain semantic structures. In creating an M2 metaphor, one departs from the concrete characteristics of an object and, on one's own initiative, develops more complex and generalized conclusions. Both tasks require the ability to retain two semantic spaces simultaneously.

One of the most important results was that there was no correlation between conceptual abilities and the creation of perceptual metaphors (M1). Perhaps this is because the creation of perceptual metaphors is based on seeing a direct, surface similarity, whereas in the case of complex metaphors, the respondents create the similarity. Consider two names proposed by different authors for the third photo: "The Staircase" (M1) and "The Beginning" (M2), both based on the same characteristic, the staggered arrangement of the concrete blocks. However, when the photo is named "The Staircase", the author transfers the selected property of the blocks to another object (a staircase), pointing out that the steps are similar to the arrangement of these blocks. In the case of the name "The Beginning", the author explains that the people are sitting on the lowest block, which makes it similar to a beginning and further growth. In the second case, several characteristics of the blocks are generalized and turned into a complex concept, generated by the author with the significant introduction of new semantic content.

So when discussing metaphorical abilities, it is essential to differentiate between different kinds of metaphors, and the psychological mechanisms that produce them.

In addition to the positive correlation between the results of the "Conceptual Synthesis" test and M2 metaphors, a negative correlation was found between these test results and the concrete type of names for photos ($r = -0.475$, $p < 0.01$). Giving concrete names is the most basic way to name the visual image ("entry-level" naming, Kosslyn & Chabris, 1990): The participant translates the observed visual information into verbal language by categorizing the depicted object ("It is a 'Soap Bubble'" for the first photo; "It is 'Glass on the Windowsill'" for the second photo). We can assume that there is a common tendency to construct one-level and situational links between concepts in two different tasks.

There were no statistically significant correlations between indicators of creativity (flexibility) and production of metaphorical names. However, we do not reject the hypothesis that the capacity for metaphoricity and creativity are linked. Perhaps the problem should be examined further by other methods, which are more sensitive to individual differences. One possible explanation is that creating a metaphor requires not only an ability to create a new frame for the object, but also to create a link (on the basis of similarity) between this object and an object from a remote semantic domain.

There were no statistically significant correlations between the level of generalization and the type of metaphor. After analyzing the stimulus material and answers to the Wechsler test's "Similarities" subtest, we concluded that the test did not show objective differences in the ability to generalize on the part of the participants. Therefore, we do not reject the hypothesis of a relationship of categorical capabilities with the ability to create metaphors.

Conclusion

This paper has proposed an approach to the study of metaphor creation, wherein the stimulus material was presented by visual images and the instructions did not create a mindset prompting participants to come up with metaphorical names. Photographic images proved to be fruitful stimulus materials to investigate the processing of visual information. A preliminary classification of names was developed: 1) concrete; 2) situational; 3) abstract; 4) metaphorical.

Common strategies of information processing were identified as they were manifested in different tasks:

The tendency to create single-level situational connections was manifested in a tendency to give for photos specific names.

The tendency to create highly organized mental structures while retaining the general semantic context, contributed to the creation of complex metaphorical names.

The creation of metaphors did not require the ability to change the context of one object (cognitive flexibility *sensu* Guilford); it required the ability to establish new connections between two distantly related objects, the readiness to transform the object, and to make a categorical shift in its meaning.

Any metaphor uses emotional and sensory-motor experience. However, respondents created perceptual metaphors directly based upon a material object — a photographic image. Specific details of the image were important in this case and the perception of similarity became the basis of a metaphor. In more complex metaphors (conceptual ones) the author of the metaphor does not point to certain perceptual characteristics of the object, but uses the junction of the perceptual image and the name for creating a new concept which embodies his idea.

By defining different types of metaphors and their different relations to conceptual abilities, we can, on one hand, confirm a differentiation between perceptual metaphors and complex metaphors and, on the other hand, state that it is necessary to differentiate between the psychological mechanisms of creating these types of metaphors.

Limitations

In our study we do not claim to have created a new method. What was important for us was to present a situation in which a person could create a metaphorical name on his own initiative. The next task was to develop a typology of the names. That is why it was important for us to identify the fact that the same types of names were found for all of the stimulus photographs. Further study will be enriched by the development of the stimulus material.

There were no significant correlations between metaphor creation and such cognitive characteristics as flexibility and fluency of thinking, but a definite answer requires more careful selection of diagnostic method. For future studies, we plan not only to define the type of name, but also the quality of the name. As we research the complex mechanism of metaphor creation, more complex statistical approaches will be required.

Acknowledgements

This study was funded by Russian Humanitarian Scientific Fund, grant no 15-36-01357 (2015 - 2017).

References

- Avanesyan, M. O. (2013). Psihologicheskie mehanizmyi ponimaniya i sozdaniya metaforyi [Psychological mechanisms of understanding and creating metaphors]. PhD dissertation. Saint Petersburg: Saint Petersburg State University.
- Arutyunova, N. D. (1990). Metafora i diskurs [Metaphor and discourse]. In N. D. Arutyunova & M. A. Zhurinskaya (Eds.), *Teoriya metaforyi* [The theory if metaphor]. (pp. 5–32). Moscow: Progress.
- Barros, D., Primi, R., & Koich, F. (2010). Metaphor creation: A measure of creativity or intelligence? *European Journal of Education and Psychology*, 3(1), 103–115.
- Barsalou, L. W. (1983). Ad hoc categories. *Memory & Cognition*, 11, 211–227. doi: 10.3758/BF03196968
- Beaty, R. E., & Silvia, P. J. (2013). Metaphorically speaking: Cognitive abilities and the production of figurative language. *Memory and Cognition*, 41(2), 255–267. doi: 10.3758/s13421-012-0258-5
- Chiappe, D. L., & Chiappe, P. (2007). The role of working memory in metaphor production and comprehension. *Journal of Memory and Language*, 56, 172–188. doi: 10.1016/j.jml.2006.11.006
- Gardner, H., Winner, E., Bechofer, R., & Wolf, D. (1978). The development of figurative language. In K. Nelson (Ed.), *Children's language*. New York: Gardner Press.
- Fauconnier, G., & Turner, M. (2002). *The way we think: Conceptual blending and the mind's hidden complexities*. New York: Basic Books.
- Filimonenko, Yu. I., & Timofeev, V. I. (2004). *Metodicheskoe rukovodstvo po testu D. Vekslera (vzroslyiy variant)* [Wechsler Intelligence Test: Diagnostics of the intellectual development level (adult version): A guide]. Saint Petersburg: Imaton.
- Forceville, C. (1994). Pictorial metaphor in advertisements. *Metaphor and Symbolic Activity*, 9(3), 211–232. doi: 10.1207/s15327868ms0901_1
- Guilford, J. P. (1960). *Alternate uses, Form A*. Beverly Hills, CA: Sheridan Supply.
- Johnson M. (1990). *The body in the mind: The bodily basis of meaning, imagination, and reason*. Chicago: University of Chicago Press.
- Kholodnaya, M. A. (2002). *Psihologiya intellekta: Paradoksyi issledovaniya*. 2-e izd., pererab. i dop. SPb.: Piter. (Kholodnaya, M. A. Psychology of intelligence: Paradoxes of Research. 2 nd ed., Revised. and ext. Sankt-Peterburg: Piter.)
- Kholodnaya, M.A. (2012). *Psihologiya ponyatiynogo myishleniya: Ot kontseptualnyih struktur k ponyatiynim sposobnostyam* [Psychology of conceptual thinking. From conceptual structures to conceptual abilities]. Moscow: Institute of Psychology of the Russian Academy of Sciences.
- Kosslyn, S. M., & Chabris, C. F. (1990). Naming pictures. *Journal of Visual Languages and Computing*, 1(1), 77–95. doi: 10.1016/S1045-926X(05)80035-7
- Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago and London: University of Chicago Press.
- Lakoff, G. (2011). *Women, fire and dangerous things: What categories of language tell us about thinking*. Moscow: Gnozis.

- Lubart, T., Mushir, K., Torjman, S., & Zenasni, F. (2009). *Creativity psychology*. Moscow: Cogito-Centre.
- Pierce, R. S., & Chiappe, D. L. (2009). The roles of aptness, conventionality, and working memory in the production of metaphors and similes. *Metaphor and Symbol, 24*, 1–19. doi: 10.1080/10926480802568422
- Ratneshwar, S. (2001). Goal-derived categories: The role of personal and situational goals in category representations. *Journal of Consumer Psychology, 10*(3), 147–157. doi: 10.1207/s15327663jcp1003_3
- Ross, B. H., & Murphy, G. L. (1998). Food for thought: Cross-classification and category organization in a complex real-world domain. *Cognitive Psychology, 38*, 495–553. doi: 10.1006/cogp.1998.0712
- Silvia, P. J., & Beaty, R. E. (2012). Making creative metaphors: The importance of fluid intelligence for creative thought. *Intelligence, 40*(4), 343–351. doi: 10.1016/j.intell.2012.02.005
- Sapogova, E. E. (1996). Vniz po krolichey nore: metamorfoza i nonsens v detskom voobrazhenii [Down the rabbit hole: Metaphor and nonsense in child's imagination]. *Voprosyi psihologii [Issues in Psychology], 2*, 36–44.
- Shragina, L. I. (2000). Originalnyie assotsiatsii po shodstvu kak komponent kreativnosti [The original association by similarity as a component of creativity]. *Psichologicheskii zhurnal [Psychological Journal], 4*, 73–78.
- Tunick, E. E. (1998). *Diagnostika kreativnosti. Test E. Torrensa. Metodicheskoe rukovodstvo* [Psychodiagnosics of creative thinking. Creative tests]. St. Petersburg: Imaton.
- Vallée-Tourangeau, F., Anthony S. H., & Austin, N. G. (1998). Strategies for generating multiple instances of common and ad hoc categories. *Memory, 6*, 555–592. doi: 10.1080/741943085
- Vygotskiy L. S. (1982). Problemy obschey psikhologii [Issues in general psychology]. In L.S. Vygotsky *Sobranie sochineniy: v 6 tomakh* [Collected works in 6 volumes]. Vol. 2. Moscow: Pedagogika.
- Wechsler, D. (1955). *Wechsler Adult Intelligence Scale Manual*. New York: Psychological Corporation.
- Winner, E., & Gardner, H. (1981). *The development of metaphoric operations*. Final report [microform]. ERIC Clearinghouse.

Original manuscript received August 27, 2015

Revised manuscript accepted February 14, 2016

First published online June 30, 2016