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bokus@al.uw.edu.pl**CHILDREN'S AND ADOLESCENTS' COMPREHENSION
OF METAPHORS DESCRIBING PEOPLE***Abstract*

The paper discusses how children and adolescents understand metaphors used to characterize people. A metaphor describing a person is taken to mean an expression whose topic is a person and the vehicle is a name from another, easily accessible domain of knowledge. The authors ask how comprehension of such metaphors changes with age. Do children and adolescents imagine the object of a metaphor as still belonging to the vehicle's domain (e.g. as an animal) or do they already activate metaphorical thinking skills? The authors investigate which categories of human traits as subjects of metaphors (or designata of vehicles) are invoked most often, and also which domains more effectively trigger metaphorical descriptions of people's physical traits, activities, intellectual traits, emotions, social functioning. Finally, the authors try to identify those metaphors (in terms of conventionality) in which the most frequent clusters of meanings ("dominants") from a study on adults are activated the earliest. The paper is based on a study of 120 subjects: children of average age 6;7 years and 8;9 years, and adolescents from the first years of middle and high school (30 subjects in each group). Data from an earlier study on 142 adult subjects (Dryll 2017) are also considered. The paper presents the developmental dynamics in the comprehension of 26 metaphors describing people. The results confirm the idea that metaphor requires categorial operations. Final remarks point to the constructivist view and cognitive development.

Keywords: metaphor, conventionality, descriptions of people, cognitive development

Introduction

Competence in producing and understanding metaphors indicates significant achievements in the development of cognitive and communicative

skills. It is related to some extremely important skills: reception, analysis and expression of complex content, both intellectual and emotional. It requires reasoning by analogy and readiness for creative problem-solving. Someone who understands metaphors sees similarities between elements from different areas of knowledge ([5], [38]). They are aware of the potential relation of replacing one expression with another. They understand that words can have more than one meaning. They see differences that enable an expression to be understood literally in one context and figuratively in another.

Metaphors, once considered just a rhetorical figure, have caused generations of researchers problems, consistently defying definition. “A metaphor is an expression in which the name of one object (phenomenon, trait, notion) is replaced with the name of another. ... However, as yet there is no widely accepted definition that would be more precise than the above general expressions. ... And, in a paradox, this difficulty with defining metaphors tells us a great deal about them: it informs us of their complexity, abundance of manifestations, and the impossibility of reducing them to one category of thought” ([37]: 85–86). The same problem was noted by Gemma Corradi Fiumara (1995). Her book *The Metaphoric Process: Connections between Language and Life* offers a conclusion that perhaps goes too far. In Fiumara’s view, one should not strive to produce yet another definition of metaphor (although none that exist are perfect), because it is not really an idea or an object but a complex process.

In the literature we find two main trends in thinking about metaphors. Every contemporary definition produced with the involvement of psychologists shows the influence of at least one of them. The first trend leads from Aristotle, through the rhetorical tradition, the work of semioticians, to the group of comparative theories that dominated in the 1980s and 1990s. Their popularity has waned slightly since then. In this approach, metaphor was only a shortened simile, a way of emphasizing an analogy. The other trend is much more recent, more interdisciplinary, drawing upon the cognitive sciences. It invokes the prototypes of Eleanor Rosch ([35]), includes Lakoff and Johnson’s *Metaphors We Live By* ([25]), and concentrates on categorization, cognitive representation and emergence of features. One can see an attempt at synthesizing the two trends in a few of the latest research areas, such as the hybrid theory of metaphor and studies using advanced technologies (e.g. fMRI).

The direction of present-day research was strongly influenced by Ivor Armstrong Richards and Max Black. Richards, a student of de Saussure, is considered the author of interaction theory, although it was propagated by Black. Richards’ name is associated mainly with his proposed names for the components of metaphor: tenor (today the term “topic” is more often used) and vehicle (ground). Black ([2], [3]) sought metaphors at the sentence level. He argued that understanding them consists in fitting the meanings connoted by a word (or words) used non-literally to the surroundings of that word (words), i.e. the rest of the sentence composed of elements

in their typical meaning. The components of a metaphor are the focus and the frame. In Black's often-cited example, "man is a wolf", "wolf" is used non-literally (focus – in our case vehicle) while "man is" belongs to literal language, which makes it the principal object (frame – in our case topic). The metaphor "man is a wolf" will be comprehensible as long as the recipient and sender share a set of beliefs about wolves and these beliefs form, as Black puts it, "a system of commonplace associations" (p. 228).

Discussing interaction theory, we need to take note of a few things. First, as mentioned earlier, metaphors are composed of a secondary object and a principal object. Second, the objects form a system. Third, the association implications linked to the secondary object (here: a wolf) are applied to the principal object (here: man); fourth, these implications are composed of commonplace ideas about the secondary object (a wolf). Fifth, metaphors highlight, select, and organize the features of the principal object (i.e. draw the listener's attention, here: to certain human traits), thus adapting statements usually used when speaking of the secondary object to the principal object (what we are now, as an exception, saying about people, we usually say about wolves). Sixth, an interaction takes place between the meanings of the principal and secondary objects, in effect changing them (people seem more aggressive, wolves seem gentler to the listener). Finally, these shifts in meaning are not governed by any clear rule.

Teresa Dobrzyńska ([8], [9]) describes metaphor ("a multi-directionally branched notional structure") as "a vehicle of connotations" and "a capsule of collective and individual experiences" ([8]: 26). This capsule contains both stereotypical content fixed in the social consciousness and more individual beliefs. It is formed in discourse, under the influence of context, among people contributing to a conversation. Every interpretation of a metaphor is intuitive, it is no more than an attempted interpretation of meaning. The result remains open, it will change during the next exchange. This makes metaphors hybrids: their form is linguistic, but they draw upon experiences that remain unnamed. Both the speaker and the listener refer to resources of memory, emotion and motivation, aiming for an expression that differs from those coming from processing conventional utterances. "This is a mechanism and a paradox, because a metaphorical expression serves to express the inexpressible. The barrier of inexpressibility can be overcome thanks to the supra-notional character of metaphor" ([8]: 26).

*Toward research on children's
and adolescents' comprehension of metaphors*

The deliberations on metaphor comprehension also include discussions on the process's developmental dynamics, the aim being to trace the course of progress in mastering the complex competence of understanding non-literal language (cf. [17], [1], [4]). Children start understanding metaphors

around four years of age ([18], [30]). It turns out that already preschoolers are able to find apt metaphorical expressions for pictures they are shown ([24]). The process of metaphor comprehension could be affected by the way metaphors are presented: pictorially versus verbally (a picture-superiority effect has been found in some studies but not in others). Unsurprisingly, therefore, the Right Hemisphere Language Battery (RHLB) test by Karen Bryan ([5]) includes a Picture Metaphor Test (PMT), a Written Metaphor Test (WMT), a Picture Metaphor Explanation Test (PMET) and a Written Metaphor Explanation Test (WMET). The test used on Polish-speaking adolescents and adults is the RHLB-PL test, as adapted by Emilia Łojek ([26]), or a modified version, adapted for younger children, of the Picture Metaphor Test (from the RHLB-PL), as proposed by Natalia Jędrzejowska and Aneta Rita Borkowska ([19]). In research by Katarzyna Konopka and associates ([22]), RHLB-PL tests were used to check the level of metaphor comprehension and production in early school-age children who had experienced speech production motor problems in the early years of their lives due to a developmental abnormality (cleft palate). A study by Jędrzejowska and Borkowska ([19]) using the PMT (in the RHLB-PL modified version) yielded a statistically significant difference between 8- to 11-year-old children with ADHD and those without symptoms of the disorder.

In RHLB-PL tests (either version, picture or written) the researcher uses widely familiar metaphorical expressions (“conventional metaphors”). However, there also exist original, innovative metaphors. As regards conventional metaphors, we can find their figurative meanings recorded in dictionaries (cf. [36]). The meanings of original metaphors are not found in dictionaries. Insofar as we can say children acquire some metaphors – those embedded permanently in the language – as they learn that language, the rules governing the acquisition of skills in producing and interpreting original metaphors remain unclear. In metaphors with set meanings that are present in utterances addressed to children (e.g. wise owl), the dominant of meaning, i.e. the most popular cluster of meanings in the semantic field (here: wisdom) can manifest itself quite early (see [4]). The comprehension of conventional metaphors is above all the effect of acquiring and retaining a cultural message. However, if a child faces the task of capturing the meaning of an expression that is an original metaphor, this is a challenge (see [11]) requiring a problem-solving strategy – a strategy to solve a puzzle (as put by Paul Ricoeur [31], [32]). In this project we looked at the ways in which children and adolescents solved the puzzle. Moreover, we assumed that the meanings of certain expressions should be sought from adults functioning in the same language as that used by the children and adolescents in the study – in a specific time and place. We checked the comprehension of selected metaphors by Polish-speaking adults (see the study described in [13]). We assumed that how children understand metaphors could be different from how older users of language understand them ([6], [21], [24], [16]).

Investigating the dynamics of the development of figurative language comprehension skills, we decided on a special type of metaphor, the kind that appears quite early in development and refers to something children truly consider important and are curious about. Descriptions of other people are definitely such an area. Metaphors describing people are expressions whose topic is people or their traits, activities, relations, and the vehicle is a name taken from another domain of knowledge, e.g. knowledge about animals or everyday objects. This approach is consistent with the definition proposed by Dorota Kubicka ([24]), in which a metaphor consists in presenting a given thing (the topic) in terms characteristic of something completely different (the vehicle) when those things are similar to each other in some respect. In accordance with what Andrzej Falkiewicz ([14]) has said about the function of metaphor, people and human relations would be an appropriate topic. The topic is meant to be harder to name, elusive, but at the same time important to the listener. The topic of other people is interesting to everyone, including small children. According to David Ritchie ([33], [34]), the status of an expression stems from its reference to pragmatic and thus also non-linguistic knowledge shared by interlocutors (common ground). This suggests that people as a topic, i.e. an object described by a metaphor, appear as a very convenient subject on which to study metaphor comprehension. Meanwhile, the vehicles have to be taken from domains linked to knowledge easily accessible even to the youngest subjects. It has to refer to concrete objects or phenomena that the subjects observe, experience and can easily access thanks to cultural transmission. Using metaphorical descriptions of people requires cognitive, social and communicative competence, which is perfected with age. An earlier study on the development of metaphor skills ([10]) involved subjects from three age groups: 5;6–6;0, 8;6–9;0, 9;6–10;0. The results showed that with age, children focus less on appearance and produce psychological portraits more often. This gives grounds to presume that in older groups descriptions of inner traits will be even more elaborate. It turns out, however, that this is not necessarily the case. In her text *Konstrukcje porównawcze jako odzwierciedlenie uczniowskiej wizji świata* [Comparative Constructs as a Reflection of Schoolchildren's Vision of the World], Katarzyna Czarnecka ([7]) writes that the school slang of children aged 12–19 is dominated by descriptions of people's external appearance. The sources of some of the similes quoted in the text are obscure today (“he has a forehead like the ski jump in Sarajevo”), but one can guess the speaker's attitude toward the sights being described: “he dressed up like a herring for Sea Day”, “he has a mug like moldy cheese”.

Research questions

The research problem is as follows:

1. How does the comprehension of metaphors describing people change with age?

2. In which metaphors (in terms of conventionality) are the dominants of meanings found in studies on adults activated the earliest?

Subjects

The study was part of a bigger project (described, among others, in [12] and [13]).

In the first study (outlined in detail in [13]) 142 adults (psychology students) were asked about vehicles from four domains (animals, plants, everyday objects, and elements of landscape). The results indicated that adults use various categories of description that may be related to the dimensions of human characteristics.

The second study involved subjects from four age groups: younger (average age 6;7) and older (average age 8;9) children from elementary school, younger adolescents (first year of middle school) and older adolescents (first year of high school).

The research tool in the study proper

The tool used in the study proper comprised a list of 26 vehicles of metaphor and instructions telling subjects that all of the stimuli refer to people.¹ The selection of metaphorical stimuli for the study proper was based on three factors:

1. The stimulus belongs to one of the four domains, i.e. it is the name of an animal, a plant, an everyday object or an element of landscape.

2. The stimulus addresses one of four dimensions: good – bad, smart – stupid, pretty – ugly, strong – weak. The selected stimuli were such that one could assume the subjects would respond using expressions compatible with at least one dimension, the dominant dimension for a given metaphor. For example, they would describe the intellectual qualities of the imagined person (smart-stupid) or would focus on appearance (pretty – ugly). A butterfly is beautiful, but we do not really think of it in terms of intellect.

3. The stimuli represent different levels of conventionality: half were more original, half were as unoriginal as possible. Metaphors are seldom wholly original or completely conventional. Rather, they are original in a given context or among a given group of language users.

A complete list of the vehicles used in the study proper, split into domains, dimensions and estimated conventionality, is presented in Table 1.

¹ The children's instructions were the same as in an earlier study, first described in a paper by Ewa M. Dryll ([11]: 207). The instructions for adolescents and adults were presented in another text by Ewa M. Dryll ([13]: 177).

Table 1. Domains and dimensions of vehicles, distinguishing between the more conventional (K) and the less conventional (O)

Dimension	Domain			
	Animals	Plants	Everyday objects	Elements of Landscape
Good	Dolphin (K)	Apple tree (O)	Cup (O)	Sun (K)
Bad	Snake (K)	Nettle (O)	Knife (O)	Swamp (K)
Smart	Owl (K)	-	Lamp (O)	-
Stupid	Hen (K)	-	Boot (K)	-
Strong	Lion (K)	Oak (K)	Hammer (K)	Downpour (K)
Weak	Mouse (K)	Grass (O)	Cotton wool (O)	Fog (O)
Pretty	Butterfly (O)	Rose (K)	-	Rainbow (K)
Ugly	Toad (K)	Potato (O)	-	Murky pond (O)

Analysis of the empirical material

In the first study adults were given a list of 26 metaphorical stimuli and informed that they were possible descriptions of people. Next, they were asked to say what associations they had with each stimulus. The responses formed 26 sets of associations.

In the first stage, an analysis of semantic fields was conducted: for each of the 26 sets, the number of identical expressions (or near-identical ones, differing only in gender, for example) was counted as well as groups of synonyms (based on a Polish dictionary of synonyms and the opinion of competent judges). If an association was obscure, its context was taken into account. Next, identical and synonymous expressions were grouped in clusters. All the responses were included. This yielded clusters of meaning for each of the metaphors. Dominants were determined for the 26 metaphors (i.e. the most frequent associations, the strongest clusters) as well as shades of meaning (rarer but also noteworthy associations).

In the second study we analyzed children's utterances gathered during individual Piagetian interviews and utterances gathered from adolescents during a group study. The following criteria were taken into account:

a) Index of reference

The purpose of the index of reference was to estimate whether a subject imagined the object as still belonging to the vehicle's domain (e.g. as an animal), i.e. taking the question literally and not as a metaphor, or as a person (testifying to skills in activating metaphorical thinking). Each response (to each stimulus) can be given at least 1 point if the response is judged to refer unequivocally to the context of the vehicle; 2 points are given for a "neutral" description, and 3 points for a description unequivocally referring to a person.

b) Category of features describing the object. Each distinct unit in utterances was classified as information on:

– outward appearance, physical traits of the imagined object (e.g. grey-eyed, having leaves)

- activities of the object (e.g. learns, hunts)
- intellectual traits of the object (e.g. clever, not very smart)
- emotional and social traits (happy, friendly)

c) Activation of dominants from adults' utterances in the utterances of children and adolescents. The activation of a dominant in a given group means that the subjects can understand a given metaphor in the same way as adults.

Results

At which stage of development are children able to link metaphors to descriptions of people?

Whether subjects refer to the vehicle or the topic of a metaphor when responding to a metaphorical stimulus is shown by the *index of reference*. This index enables us to estimate if a subject imagines the object as still belonging to the vehicle's domain (e.g. as an animal), i.e. taking the question literally and not as a metaphor, or as a person, which testifies to the activation of metaphorical thinking.

The biggest difference in the average index of reference is seen between younger and older children (age 1. age 2.).

Table 2. *Index of reference sums and inter-group sum differences in the age groups (ANOVA, df=3;123)*

Age	Younger children	Older children	Middle school students	High school students	F	p
<i>Index of reference sum</i>	47.2333	64.8788	67.1667	69.3000	17.382	.000

Each age group has its distinctive features. The youngest children (average age 6;7) often associated the stimulus mainly with the vehicle. Experimenting with translating its features into human qualities, they sometimes produced unreal or grotesque images (a man with thorny skin, toads going to school). Children in this group judged an object in terms of being well-behaved (good) or naughty (bad). The gravest misdeeds were hitting other children and disobeying the teacher. Some built original conclusions based on innovative analogies, others used proven strategies. They said the object is a person "playing" at being the vehicle (which is easy for stimuli from the domain of animals or plants, but harder for everyday objects and elements of landscape). They devoted a lot of attention to the object's emotional and social functioning. If they could not name the quality, they gave an example of typical behavior.

Middle school students more often characterized people, but their descriptions were superficial and unambiguous (the structure did not indicate any ambivalence). If they were critical, they expressed it. They used emotionally charged expressions like "disgusting", "stinks", "dumb" (as part of the *stupid* cluster). They did not give examples of behaviors. Compared to middle school students, high school students' responses indicated greater tolerance for ambi-

guity. The descriptions often contained ambivalence. There were also some examples of a rather abstract sense of humor or intentional references to culture (Owl associated with Athena, Hammer with Thor, Murky Pond with Cthulhu).

Which categories of features of the metaphor object (a person or the designation of a vehicle) are referenced by members of the four age groups?

Subjects from different age groups give different responses to questions about metaphors, as shown in Table 3. The number of descriptions of physical traits and activities of the object decreased significantly with age. On the other hand, the number of expressions related to emotional and social functioning grew. Older subjects paid more attention to cognitive functioning.

Table 3. Index of reference averages and inter-group sum differences in referring to categories of features of the object of a metaphor in the age groups (ANOVA, $df=3;123$)

<i>Categories of features of the objects of metaphors</i>	<i>Younger children</i>	<i>Older children</i>	<i>Middle school students</i>	<i>High school students</i>	<i>F</i>	<i>p</i>
<i>physical traits</i>	28.6000	18.1765	13.5667	13.7667	6.884	.000
<i>activities</i>	32.2667	19.6471	2.6333	2.4333	36.413	.000
<i>cognitive traits</i>	.8667	2.4412	4.1000	4.2000	16.153	.000
<i>emotional and social traits</i>	9.7333	19.5882	17.4667	26.1000	9.179	.000
<i>description units²</i>	87.8000	70.1765	37.9667	48.6667	22.420	.000

The comparison of how children and adolescents understand metaphors referring to human qualities can be supplemented by looking at the most frequently used expressions. For example, the word “nice” is used early (by the youngest children) and widely. The term “a grind”, meanwhile, only seems important to middle school students.

Which of the four domains: animals, plants, everyday objects, and elements of landscape, more frequently trigger metaphorical descriptions of people’s physical traits, activities, intellectual traits and emotional and social traits?

Since the study involved eight stimuli from the animal domain, six from the plant domain, six from the everyday object domain and six from

² The number of description units results from the responses being split into functional units providing information about the object (cf. [10], [12]). This indicator shows whether subjects speak succinctly or extensively, and if they digress or not. It turns out that the number of description units that a subject needs to adequately (in the subject’s view) describe an object decreases with age.

This change could be the effect of different forms of data gathering (oral vs. written), but because there is also a difference between the groups of younger and older children, it is justified to say that not only the mode of response is significant. Both middle and high school students gave shorter responses than the children, but it was middle school students who gave the fewest answers.

the element of landscape domain, weighted averages were used in the analyses below. Table 4 shows inter-group differences in the categories of features used in response to metaphorical stimuli. The results suggest that the domain to which a vehicle belongs is linked to the category of features that a metaphor describes. Vehicles from the animal domain were most often linked to descriptions of emotional and social functioning, followed by activities and physical traits. There were significantly fewer references to cognitive functioning (even though Owl was in this domain). A stimulus from the plant domain inclined subjects to speak of physical traits above all. Second were emotional and social characteristics, followed by activities and, finally, intellect (the lowest average in the set). From all the domains, everyday objects were the easiest to associate with intellect. Elements of landscape were associated with emotions, followed by physical qualities.

Table 4. Sums of expressions from different object feature categories (all age groups) versus vehicle domains $N = 124$

Domains	Description units	Index of reference sum	Categories of features			
			activities	physical	cognitive	emotional and social
animals	62.1048	58.9597	17.2500	17.7097	3.9435	19.0161
plants	56.6129	56.4839	12.0323	19.6129	.7419	15.5806
everyday objects	52.9355	57.3226	12.2581	13.9355	4.7742	14.8065
landscape	53.4194	55.8699	10.3871	16.9032	.7742	17.3226

Table 4a. Use of a category of features versus vehicle domain (t for dependent samples, $df=123$)

Domain pairs	Categories of features					
	description units	index of reference	activities	physical	cognitive	emotional and social
animals-plants	t = 4.177; p < .001	t = 2.907; p = .004	t = 3.772 p < .001	t = -1.527 p = .129	t = 9.119 p < .001	t = 3.896 p < .001
animals - everyday objects	t = 6.309 p < .001	t = 1.804; p = .074	t = 3.818 p < .001	t = 3.335 p = .001	t = -1.793 p = .075	t = 4.271 p < .001
animals - landscape	t = 5.594 p < .001	t = 3.398 p = .001	t = 4.817 p < .001	t = 0.627 p = .532	t = 9.390 p < .001	t = 1.780 p = .078
plants - everyday objects	t = 3.157 p = .002	t = -0.908 p = 0.365	t = -0.245 p = .806	t = 5.018 p = .000	t = -8.191 p < .001	t = 0.840 p = .402
plants - landscape	t = 2.400 p = .018	t = 0.910 p = .364	t = 1.714 p = .089	t = 2.348 p = .020	t = -0.128 p = .899	t = -1.802 p = .074
everyday objects - landscape	t = -0.408 p = .684	t = 1.701; p = .092	t = 1.747 p = .083	t = -2.850 p = .005	t = 9.205 p < .001	t = -2.666 p = .009

In which metaphors (in terms of conventionality) are the dominants of meanings from studies on adults activated the earliest?

It was expected that dominants in conventional meanings would manifest themselves the earliest, and that strong dominants would be activated in the younger age groups and weaker ones – in the older groups. Table 5 presents information on the activation of dominants together with the level of metaphor conventionality. Level 1 corresponds to the least conventional metaphors, level 7 – to the most conventional ones, while the + symbol indicates that the presence of the principal dominant and the next most numerous one in a given metaphor was statistically significant.

Table 5. The number (percentage) of adult subjects who used a given dominant and the activation of that dominant in children's and adolescents' responses – average and differences in the groups (ANOVA $df = 3;123$)

Study on adults		Activation of dominants (average)					
Metaphor and its conventionality [n]	Strength of dominant	Younger children	Older children	Middle school students	High school students	F	p
Apple Tree [1]	helpful (9%)	.0000	.0882	.0333	.1667	1.611	.190
	cheerful (6.5%)	.0000	.0000	.0000	.0000	-	-
Lamp [1]+	bright (10.3%)	.0000	.0000	.0000	.0333	1.046	.375
	cheerful (9.2%)	.0000	.1176	.0333	.1667	1.448	.232
	enlightened (7.5%)	.0000	.1176	.1667	.4000	5.393	.002
	(added: shines)	.8000	.4412	.1000	.2333	5.142	.002
Cup [1]+	fat (11%)	.0333	.0588	.1667	.1000	1.053	.372
	warm (9%)	.0000	.0000	.0000	.1667	4.098	.008
Grass [1]+	cheerful (13%)	.0000	.0588	.0000	.1333	1.963	.123
	calm (7%)	.0333	.0588	.0000	.2667	4.884	.003
Swamp [2]+	unpleasant (14%)	.0667	.2647	.0667	.0000	2.113	.102
	dirty (11.8%)	.5000	.5294	.3000	.5333	.517	.671
	with problems (8.5%)	.0000	.0000	.0333	.0000	1.046	.375
	bad (7.8%)	.0000	.0000	.0000	.0000	-	-
	insincere (7.6%)	.0000	.0000	.0000	.0333	1.046	.375
	stinky (5%)	.0333	.0000	.3667	.2000	8.336	.000
Cotton Wool [2]	delicate (15.5%)	.1333	.1471	.0333	.2000	1.296	.279
	submissive (11%)	.0333	.0000	.0333	.0333	.378	.769
	weak (7.5%)	.0000	.0882	.2000	.0667	2.647	.052
	nondescript (7.5%)	.0000	.0000	.2000	.0333	2.849	.040
	sweet (7.4%)	.3333	.1471	.3000	.3333	1.117	.345
	nice (6.2%)	.1000	.1765	.0667	.2333	.982	.404
	fat (6.1%)	.0000	.0882	.0000	.2000	2.398	.071
Potato [2]	fat (17%)	.0667	.1765	.0667	.4000	3.435	.019
	arrogant (10.8%)	.0333	.1176	.0333	.1333	.817	.487
	stupid (10.2%)	.0000	.0882	.0000	.0667	1.190	.317
	common (9%)	.0000	.0000	.0333	.1333	2.270	.084
	boring (7.3%)	.0000	.0000	.0333	.0667	1.328	.268

<i>Butterfly</i> [3]+	beautiful (18%)	.0667	.2647	.5333	.5000	4.617	.004
	delicate (16%)	.1000	.2647	.2000	.4000	2.086	.106
	airy (14.5%)	.0000	.1176	.1667	.2667	3.264	.024
	cheerful (9%)	.0000	.1471	.1000	.0333	1.673	.176
	gadabout (7.3%)	.0000	.0588	.0000	.3000	6.048	.001
	(added: flying)	.6000	.1176	.0000	.0000	12.965	.000
<i>Hen</i> [3]	stupid (20.5%)	.0000	.0000	.1000	.1000	2.294	.081
	loud (12%)	.0000	.2647	.2667	.1667	2.800	.043
	homebody (11.5%)	.0000	.0000	.0333	.1667	4.491	.005
<i>Murky Swamp</i> [3]	dirty (27%)	.6333	.3529	.5333	.1667	3.452	.019
<i>Nettle</i> [3]	unpleasant (21%)	.4667	.5882	.3667	.3000	.963	.413
	mean (16%)	.0667	.3235	.1000	.1333	2.215	.090
	hurtful (12%)	.8000	.6471	.3000	.1667	4.121	.008
	bad (7.2%)	.1000	.1765	.1000	.3333	2.073	.107
<i>Downpour</i> [4]	sad (22.3%)	.0000	.3824	.2333	.5000	4.580	.005
	impulsive (14.9%)	.0000	.2059	.3000	.1333	3.345	.022
	unpleasant (7%)	.1333	.3824	.2333	.1000	1.575	.199
	strong (6.2%)	.0333	.0588	.0000	.0667	.701	.553
<i>Dolphin</i> [4]	gadabout (22.5%)	.0000	.0000	.0000	.0000	-	-
	nice (17%)	.0000	.1765	.3667	.3000	3.572	.016
	intelligent (8%)	.0000	.0000	.0333	.1333	3.294	.023
<i>Lion</i> [4]+	brave (24%)	.0000	.1176	.3000	.5000	10.036	.000
	imperious (21.8%)	.1000	.1471	.3333	.4667	2.851	.040
	strong (16%)	.0333	.0882	.0333	.2333	3.202	.026
	dangerous (5.5%)	.2667	.2353	.3000	.1333	.628	.599
<i>Mouse</i> [5]	quiet (26%)	.2000	.1765	.7000	.6000	10.749	.000
	common (9.8%)	.0000	.0000	.0667	.2000	3.065	.031
	small (6.5%)	.1333	.1765	.3667	.2333	1.806	.150
	shy (6.2%)	.1000	.1765	.2333	.1667	.561	.642
	fearful (6.3%)	.1667	.2941	.2333	.2333	.346	.792
	calm (5%)	.1333	.0000	.0667	.0333	1.935	.127
	agile (4.9%)	.0333	.2647	.0333	.0000	6.891	.000
<i>Fog</i> [5]	mysterious (28%)	.0333	.1471	.0667	.4333	5.822	.001
	sad (8%)	.1000	.2647	.0333	.0000	4.405	.006
	nondescript (7.5%)	.0000	.0000	.1000	.1000	2.294	.081
<i>Knife</i> [5]	sharp (29%)	.5333	.4412	.8333	.6333	3.036	.032
	aggressive (9%)	.0667	.2353	.1000	.0333	2.251	.086
	unpleasant (6.9%)	.0667	.2353	.1333	.1333	1.259	.292
<i>Hammer</i> [6]	stupid (30%)	.0000	.0294	.2333	.1667	3.625	.015
	strong (14%)	.0000	.3235	.2000	.3333	.571	.635
	staunch (8%)	.0000	.0294	.0333	.2000	2.781	.044
	big (7.5%)	.0000	.0000	.0000	.1333	4.665	.004
<i>Snake</i> [6]	devious (32%)	.0000	.0294	.1333	.2667	5.175	.002
	insincere (10.5%)	.0000	.0000	.0333	.2333	5.523	.001
	intelligent (8%)	.0000	.0294	.1000	.2667	5.458	.001
	treacherous (5.5%)	.0000	.0000	.0000	.1667	6.065	.001

<i>Rose [6]</i>	beautiful (33%)	.1000	.4118	.7333	.7333	11.613	.000
	delicate (13.5%)	.1333	.1471	.1333	.3000	1.019	.387
	hurtful (8%)	.2333	.3235	.4667	.2667	1.058	.370
<i>Toad [6]</i>	ugly (35%)	.1333	.2941	.7000	.8333	15.966	.000
	disgusting (14.8%)	.0000	.0882	.1667	.3000	4.446	.005
<i>Oak [6]</i>	strong (35%)	.0000	.2647	.1333	.7333	13.123	.000
	big (15%)	.0667	.3824	.4667	.6000	3.971	.010
	old (8.5%)	.0000	.0000	.1000	.1333	2.842	.041
	trustworthy (3.5%)	.0000	.0000	.0000	.0333	1.046	.375
<i>Rainbow [7]</i>	cheerful (36%)	.1333	.3824	.4000	.7667	5.830	.001
	sweet (13%)	.0000	.0000	.0000	.0000	-	-
	beautiful (6%)	.2333	.0588	.3333	.0333	3.307	.023
<i>Owl [7]</i>	wise (44%)	.1333	.7059	.7667	1.0667	11.462	.000
	evening person (9%)	.9000	.4118	.0667	.1333	8.298	.000
<i>Sun [7]</i>	cheerful (46%)	.2333	.6471	.4667	.6667	2.908	.037
	warm (11%)	.0333	.0588	.2667	.4333	4.661	.004
	nice (7.5%)	.1667	.4412	.2000	.2333	1.836	.144
<i>Boot [7]</i>	stupid (51%)	.0667	.1471	.7333	.7333	13.562	.000

An analysis of inter-group differences shows that in conventional metaphors, i.e. those in which the principal dominant contains over 35% of all responses – Rainbow, Owl, Sun, Boot, the dominants are active in all the age groups: Rainbow – “cheerful”, Sun – “cheerful”, “warm”, Boot – “stupid”, Owl – “wise”. Even if not all of the youngest subjects spoke about people, the dominants – if only in trace amounts – appeared early. The increase in their frequency of use was statistically significant. Only changes in using the expression “nice” were not significant, because it was used by everyone.

In the study on adults, Apple Tree, Cup, Lamp and Grass turned out to be the least conventional. Their strongest dominants only accounted for a dozen or so percent of responses. There were more associations with the vehicles here than in the case of unoriginal stimuli.

Apple Tree: the dominant “helpful” (9% for adults) was activated in group two but occurred infrequently. The change was not statistically significant. The dominant “cheerful” (6.5% in adults) was not activated at all. This means that of the 26 metaphors, this one was interpreted the least consistently.

Lamp: trace amounts of the dominant “bright” (10.3% of adult responses) did not appear until the high school group. “Cheerful” (9.2% for adults) – activated in group two, result insignificant. “Enlightened” (7.5% for adults) was activated in group two, grew steadily and the changes were statistically significant. The average use of an expression that was not a dominant in the adult group: “shines” – the number of uses dropped with age, the changes were statistically significant.

Cup: the dominant “fat” (11% for adults) was already seen in group one, the change was not statistically significant. The dominant “warm” (9% for adults) was not activated until high school, and the numbers were not high.

Grass: the dominant “cheerful” (13% for adults) appeared in the responses of group two and high school students. The changes were not statistically significant. The dominant “calm” (7% for adults) was already active in group one (but faded in middle school). High school students spoke most often of calm in relation to Grass. The change was statistically significant.

Based on this comparison, we can say that for the most unconventional of the 26 metaphors, dominants were activated later or not at all. Adults sometimes used the same dominants to speak of different metaphors. Of course this does not mean that the metaphors mean the same thing – the way clusters are arranged in a given semantic field is unique. But a question arises: Which dominants do adults use most often? The dominant “cheerful” appeared six times (Sun, Rainbow, Butterfly, Lamp, Grass, Apple Tree), activation in the youngest group only took place for Rainbow (7.) and Sun (7.), in older children there was weak activation for Grass (1+.), Lamp (1+.) and Butterfly (3+.) and strong activation only for Rainbow (7.) and Sun (7.). In the most unconventional Apple Tree (1.), the dominant was inactive. There were four instances of “stupid”, “strong”, “fat”, “unpleasant”, three of “beautiful”, “nice”, “delicate”, two of “warm”, “calm”, “intelligent”, “sweet”, “gadabout”, “non-descript”, “common”, “dirty”, “bad”, “hurtful”, “insincere”, “sad”, “big”. The other expressions appeared once each, although some are close in meaning to more frequent examples, e.g. “devious” and “treacherous” are somewhat connected to “insincere”, just like “staunch” to “strong”, and “smart” to “intelligent”. The stimuli addressed the dimensions of good-bad, strong-weak, smart-stupid, pretty-ugly, so the appearance of such dominants is not surprising. What is interesting is their arrangement and repeatability. Looking at these dominants, one gets the impression that they form descriptions referring to human qualities with some degree of complexity. They can be analyzed in many ways. For example, different kinds of weakness or weak intensity of a given trait are bundled in single clusters (“weak”, “airy”, “submissive”, “quiet”, “shy”, “fearful”, “boring”, “small”), while a person’s appearance is described using more commonplace categories (“fat” four times, “beautiful” three times, “dirty” three times, “big” twice, “small” and “ugly” once each). It would be worth including this aspect in a future project.

Final remarks

Dividing concepts linked to the relationship between language and cognition into “non-constructivist” (cognition reflects reality) and “constructivist” (cognition reconstructs reality), Andrew Ortony ([29]) used this criterion to characterize the most widespread views on the essence of metaphor. According to the distinction proposed by Ortony ([29]), Aristotle’s views should be seen as non-constructivist. In his widely cited introduction to the second edition of *Metaphor and Thought* (1993), Ortony outlines the fundamental difference between the earlier (chiefly positivist) and contemporary approach to the “queen of figures”. In his view, 20th-century Western philosophy rec-

ognized the primacy of literal language. It underlined the justifiability of distinguishing between meanings taken literally and figuratively. Reality was supposed to be described using unambiguous statements, often verifiable as true or false. This stemmed from the assumption that a thinking person's task was to provide as faithful a description as possible of the objectively existing world ("mind as the mirror of nature"). Risking some generalization, we could say that to non-constructivists metaphor is an unimportant linguistic embellishment that parasitizes the normal (i.e. literal) meaning of words; it breaks the rules. It belongs to rhetoric, it is a "cheap trick", therefore the language of science should be free of it. On the other hand, the development of cognitive sciences has led to the consolidation of the opposite paradigm: Knowledge about the world is the result of active construction of reality, and language, perception and information are inextricably linked. Many factors decide about which content the mind processes at a given moment. They include memory, emotional state, level of concentration on the task in hand. In this approach, knowledge is a construct created by the individual, the effect of a person's cognitive effort. To constructivists, speaking is always an action requiring creativity. Metaphors and other figures of speech may sometimes require a little more creative thinking, but the difference is quantitative, not qualitative. Meaning has to be constructed by the audience anyway, so dividing expressions into those that should always be taken literally or non-literally is not all that important. Ortony ([29]) points out, however, that the proposed division of theories into constructivist and non-constructivist is not categorical (this is an "axis" rather than "two boxes").

In an earlier text, with the riveting title *Why Metaphors Are Necessary and Not Just Nice*, Ortony ([27]) discusses the defining features of metaphor. He mentions: compactness (a metaphor offers a package of common qualities of two objects), inexpressibility (it helps transmit a complex description for which other means are inadequate), and vividness (metaphors draw their communicative strength from emotional charge and closeness to experience). He also outlines the "reconstruction" view based on the assumption that language processing is analytical while metaphor is a synthesis. This is why people use metaphors when they want to point to more than one quality. If they wanted to speak of just one, a literal description would be enough. Almost 30 years later Olaf Jäkel ([20]) also listed some features of cognitive theory of metaphor and called them "postulates". Among other things, they include universality (metaphors are universal), categoriality (metaphors "work" within and between categories), modeling (they model cognitive experience), diachrony (they change over time), unidirectionality (they do not work "both ways"), benefit (economy of words), creativity (metaphors cannot be paraphrased without loss of information), focus (they draw attention to specific aspects of objects or phenomena).

The research model described in the present text confirms most of the characteristics of cognitive theory of metaphor according to Jäkel ([20]). In

the light of the data gathered, his postulates regarding metaphors seem justified. Activation of a dominant actually does require access to Black's ([2]) "system of commonplace associations." This explains why children repeat with conviction that Mouse eats cheese and Lion is king. Ortony's ([28]) remarks on an imbalance in the salience of shared attributes (the Down-pour-Person is involved mainly in crying) have also proved correct.

Metaphor involves presenting a given thing (topic) in categories applicable to a completely different thing (vehicle) when these two things are similar in some way ([24]). As Black ([2]) wrote, in a metaphor the association implications linked to the secondary object (the vehicle) are transferred onto the principal object (the topic). These implications are composed of commonplace ideas about the secondary object (the vehicle), while the metaphor highlights, selects and organizes the features of the principal object (i.e. draws attention to certain features of the topic), thus adapting to the principal object (the topic) statements that are normally used to speak about the secondary object (what we are saying, as an exception, about the topic, we usually say about the vehicle). There is interaction between the meanings of the principal and secondary objects. Both meanings change as a result (e.g. in the metaphor "man is a wolf" people seem more aggressive to the listener while wolves seem gentler). In our research ([12]) some typically animal traits (white fleece, claws) turned into typically human qualities (respectively: light skin or being pale, long painted nails). Features of animal appearance could also turn into human preferences ("is covered in wool/down/hair" into "likes wearing woolen sweaters", "has hooves" into "likes eating gnocchi" [in Polish *kopyto* means hoof, *kopytka* – little hooves – means gnocchi], "has striped skin for concealment in the jungle" into "likes striped clothes best").

Following our analysis of the responses gathered in the present project, the constructivist view on metaphors seems even more convincing. The material clearly shows that subjects transfer more than one feature of the vehicle to the topic of a metaphor, which confirms the idea that metaphor is a process of categorial operations. In the most conventional metaphors, dominants come first. However, even if children are familiar with the convention and produce an appropriate association, they continue to expand their description. They often see that first meaning as just a starting point for further reasoning, they look for more similarities between the vehicles and the topic. We can see in many utterances that they are not satisfied with finding just one, but create a "network" of shared features which they then transfer to the topic of the metaphor. Undoubtedly, to understand a metaphor means to construct its meaning. This is a more complex process than would appear in the light of comparative theories. The conclusion from these studies is clear: The development of metaphor comprehension skills is not just about the acquisition of conventional similes, proven rhetorical devices. It is a complex process that unquestionably reflects an individual's cognitive development.

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