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The Myth of Embodied Metaphor

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According to a traditionally influential idea metaphors have mostly ornamental value. Current research, on the other hand, stresses the cognitive purposes metaphors serve. According to the Conceptual Theory of Metaphor (CTM, for short), e.g., expressions are commonly used metaphorically in order to conceptualize abstract and mental phenomena. More specifically, proponents of CTM claim that abstract terms are understood by means of metaphors and that metaphor comprehension, in turn, is embodied. In this paper, I will argue that CTM fails on both counts.

Keywords: Conceptual theory of metaphor, embodied metaphor, abstract terms, simulation.

1. Introduction

According to a traditionally influential idea, metaphors have mostly ornamental value. Yet current research in philosophy, linguistics and psychology points in a different direction and stresses the cognitive functions metaphors might serve. According to a rather popular, contemporary account of metaphor, the so-called Conceptual Theory of Metaphor, expressions are commonly used metaphorically in order to conceptualize abstract and mental phenomena. Metaphor comprehension, in turn, is said to be embodied. In the background is a family of

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theories that are united by the claim that language comprehension in general is embodied.

In this paper, I will first sketch the basic idea of embodied approaches to language comprehension and examine some of the evidence that has been brought forth in favor of the claim that language comprehension in general is embodied. Then the problem of abstract terms will we raised; abstract terms make trouble for embodied approaches as sensorimotor information doesn't seem to be required for understanding these terms. The remainder of the paper will be devoted to the topic of metaphor. From an embodied point of view, metaphors are not only an interesting phenomenon in its own right; they also promise to help explain how we come to understand abstract terms. Consequently, I will address the questions of whether we understand abstract terms by means of metaphors and whether metaphor comprehension itself is embodied. Eventually, I will argue that both questions have to be answered in the negative.

2. *Embodied Approaches to Language Comprehension*

Within the paradigm of Situated Cognition,[1] which spans a rather wide and varied research area, the claim that cognition is embodied has gained some prominence (cf., e.g., Shapiro 2011, 2014). My concern will be with (so-called) embodied approaches to language comprehension. The following quote by Jerome Feldman and Srinivas Narayanan epitomizes the central idea

> that all understanding involves simulation or enacting the appropriate embodied experience. When asked to grasp, we enact it. When hearing or reading about grasping, we simulate grasping (…). (Feldman and Narayanan 2004: 389)

Moreover, the enactment or simulation in question

> is not grounded in previous sensorimotoric experiences of a generic sort, but instead invokes rather specific sensorimotoric experiences. (Scorolli 2014: 127)

This is also put by saying that modality-specific representations, as opposed to amodal, abstract representations, are evoked in language comprehension. These representations are similar to those we form when we directly experience our environment (cf. Barsalou 1999). They are located in regions of the brain devoted to action and perception. "Cognition is inherently perceptual, sharing systems with perception at both the cognitive and neural levels."—Lawrence Barsalou claims (Barsalou 1999: 577); and language comprehension is a case in point. So the idea, basically, is that in order to understand a linguistic expression one has to simulate the corresponding experience. When I hear the word 'grasp'

[1] Here is a popular way of partitioning the field: "According to our usage, then, situated cognition is the genus, and embodied, enactive, embedded, distributed cognition and their ilk are species" (Robbins and Aydede 2009b: 3).

I simulate (reenact) the action of grasping. And since I have grasped before, I will be successful and come to understand the word in question. Simulation, in turn, requires activation in sensory and motor (as well as affective) regions of the brain because in simulating a particular experience we exhibit roughly the same pattern of neural activity that accompanied the initial experience. Language comprehension crucially involves recruitment of the sensory-motor system.

Yet why speak of embodiment here? As Philip Robbins and Murat Aydede point out

> ... not all forms of embodiment involve bodily dependence in the strict and literal sense. Indeed, most current research on embodiment focuses on the idea that cognition depends on the sensorimotor brain, with or without direct bodily involvement. (Robbins and Aydede 2009b: 5)

There are other notions of embodiment; and they all need sorting out. For now, let the Embodiment Claim (EC, for short) be the following claim:

EC_{sim}: Simulation is necessary for language comprehension.

Those who march under the banner all agree that EC is "supported by a growing body of evidence…" (Kaschak et al. 2014: 118)

3. *Evidence*

Evidence is provided by studies that investigate whether during language processing there is activation in regions of the brain devoted to action and perception. There are different types of studies; neuroimaging and behavioral studies, e.g. (for an overview, cf. Kaschak et al. 2014). Here is a short selection of some extensively discussed studies.

First, there are fMRI-studies that show that processing verbs, which denote actions performed by hand (*pick*, *grasp*), foot (*kick*) or mouth (*lick*) elicits activation in the motor (and premotor) cortex (in a somatotopically organized manner). Various studies by Friedmann Pulvermüller, Olaf Hauk, Lisa Aziz-Zadeh and others found a strong congruence between those areas in the brain that are activated during the observation of actions performed by hand, mouth and foot and those areas activated during processing linguistic phrases relating to hand, mouth and foot (Hauk et al. 2004; Pulvermüller 2005, Aziz-Zadeh et al. 2006). The same region is activated when seeing someone grasp a handle and when hearing the sentence "She grasps the handle", for example.

Secondly, there are various behavioral studies. In a so-called action-sentence congruity task, Arthur Glenberg and Michael Kaschak (2002) asked participants to judge whether sentences are sensible or not.[2] The (sensible) sentences in question imply either movement away or move-

[2] As Fred Adams points out, it is not clear what Glenberg and Kaschak mean by "sensible". It cannot mean "meaningful", because in the case of sentences which are not sensible (such as "Hang the coat on the upright cup") "it is because one *knows* what these sentences *mean* that one can *tell* that they are FALSE …" (Adam 2010: 623)

ment towards the body ("He opens the drawer"/"He closes the drawer"). Answering the sensibility question also requires either a movement away from or towards the body. As a result, participants are faster to make sensibility judgments when the direction of the response movement matches the direction of the movement implied by the sentence in question. If the sentence is "He opens the drawer", then participants are faster if the 'sensible' (yes) response requires a movement towards the body. This is taken to show that processing the sentences already activates motor regions in the brain; people simulate the action implied in the sentence. And there is interference if one mentally simulates a drawing move, yet has to make a pushing move in response.

In another study participants perform a picture-sentence congruity task (Stanfield, Zwaan and Yaxley 2002). They read the sentence "The eagle is in the sky" or the sentence "The eagle is in its nest", and then view pictures of objects and have to say whether the object depicted was mentioned in the sentence. The picture is either of an eagle with outstretched wings or an eagle with folded wings. It was found that participants respond faster when the content of the picture matches the image the sentence evokes. If the sentence is "The eagle is in the sky" and the picture depicts an eagle with outstretched wings they respond faster as when the picture depicts an eagle with wings folded. This is taken to show that the participants employ perceptual, modality-specific (as opposed to amodal) representations in processing language. These perceptual representations entertain an "analogue relationship" (Stanfield and Zwaan 2001: 153) to what they represent; they represent details of the object that amodal representations would fail to represent, such as, e.g., folded wings.

These studies lend support to the claim that people occasionally engage in simulation when processing language. But this is not quite the claim at issue. The claim is not just that simulation is a byproduct of or occasionally happens to accompany language processing. Rather—as pointed out before—the claim is supposed to be a stronger claim to the effect that simulation is at least a necessary condition for language comprehension.[3]

Some seem to defend an even stronger claim according to which understanding just IS simulation. Vittorio Gallese and George Lakoff, e.g., claim that understanding is imagination; and they further claim that the latter is (mental) simulation (Gallese and Lakoff 2005). Rolf Zwaan and Michael Kaschak have it that in "a very literal sense, the comprehension of a sentence about removing the pie from the oven relies on much the same machinery that would be involved in actually carrying out the action" (Zwaan and Kaschak 2009: 368). In a similar vein, Raymond Gibbs declares that his "personal view is that online language processing is best characterized as a simulation process …" (Gibbs 2005: 87).

[3] Of course, the notion of simulation also stands in dire need of clarification (cf., e.g., Sanford 2008).

And with respect to terms expressing emotional states, Glenberg and colleagues, e.g. hold that "understanding of language about emotional states requires that those emotional states be simulated, or partially induced, using the same neural and bodily mechanisms as are recruited during emotional experience." (Glenberg et al. 2005: 120) (The list is not meant to be exhaustive.) But then, given that something like semantic memory (and presumably other faculties as well) is also necessary for language comprehension, one might think that simulation can at best be a necessary condition for understanding—unless it could be shown that semantic memory is located in sensory-motor regions of the brain (on the neural correlates of semantic memory cf., e.g., Binder and Desai 2011).[4]

Moreover, even the weaker claim that simulation is (only) necessary for language comprehension is not uncontroversial. Not only have the results by Hauk, Pulvermüller and others come under attack recently. For example, in a meta-analysis of 29 studies Christie Watson and colleagues conclude that they "did not find evidence for consistent involvement of premotor or motor cortices in the representation of action concepts. At the very least, this finding argues against the hypothesis that premotor or motor cortex activations are inherent to the process of understanding action concepts." (Watson et al. 2013: 1202). What is also missing in order to put the claim that simulation is necessary for comprehension on a firm empirical footing is not so much empirical evidence that there are cases in which there is comprehension as well as simulation but rather evidence that if there is no simulation (sensory-motor activation) then there is no comprehension. Yet that claim is not corroborated by empirical investigation. Rather, there is evidence to the contrary. In discussing various studies with apraxic patients, Bradford Mahon and Alfonso Caramazza reach the conclusion that "cognitive neuropsychological studies of patients with sensory and/or motor impairments demonstrate that such impairments do not necessarily give rise to conceptual deficits." (Mahon and Caramazza 2008: 59). Patients suffering from apraxia are impaired at using objects, but can commonly name the objects (such as a hammer) and say what they are used for. Mahon and Caramazza relate the case of a patient who has been carefully studied and who was "not able to produce any correct pantomime of object use", was "severely impaired at using actual objects correctly" but was "flawless at naming object associated pantomimes…" (Mahonand Caramazza 2005: 483). Production (or simulation) and recognition may not be as closely connected as embodied theories predict.

4. *Abstract terms*

Moreover, so far we have mostly been talking about verbs denoting actions that we can perform. But one might wonder whether we do not also understand verbs denoting experiences or actions that we cannot

[4] Thanks to Markus Kneer for helpful discussion here.

simulate or perform; don't we understand the sentence "The dog's tail began to wag", for example (cf. Hickok 2014)? And, don't we also understand words that do not denote actions or sensory experiences at all? This brings us to the problem of abstract terms, which, in turn, will bring us to the topic of metaphor.

Abstract terms make trouble for embodied approaches to language comprehension because motor or sensory information doesn't seem to be all that relevant to understanding these terms. Yet Laurence Barsalou claims that appearance is deceptive here. He has it that even abstract concepts such as TRUTH "can be represented perceptually" (Barsalou 1999: 600; Barsalou 2009). Jesse Prinz also thinks that all that is needed are modal, perceptual representations. He invites us to

> (c)onsider justice. One way to understand this lofty idea is by grounding it in very concrete scenarios. There are different kinds of injustice, and each can be captured by simulating an event. First, there is inequality. This can be simulated by imagining a situation in which I get two cookies and you get three. Second, there is inequity. For example, you might give me one cookie in exchange for two. Third, there is violation of rights. Suppose I try to eat my cookie and you prevent me from doing so. (Prinz 2012: 129)

Let us gloss over the fact that the situations described are cases of injustice, not justice. Prinz continues:

> We learn the concept by means of very simple cases and then need to figure out whether more complicated cases are sufficiently similar to these (…) Still, the simple scenarios can give us a very concrete idea of what justice is, and that is sufficient for grounding our understanding of this seemingly abstract concept. (Prinz 2012: 129)

Note that Prinz uses "simulation" with a slightly different meaning. "Simulation" here rather means something like "mental imagery", the conscious evoking of a particular scenario. And he also seems to defend a stronger view according to which simulation is not only necessary and also sufficient for language comprehension.

Yet simulating a particular scenario by means of (conscious) mental imagery cannot be a necessary condition for understanding linguistic phrases. Otherwise we would all be very busy vicariously experiencing prior events of injustice while reading the newspaper (there is obviously a cognitive-load-problem lurking in the background). Also, according to Prinz, "[w]e learn the concept by means of very simple cases and then need to figure out whether more complicated cases are sufficiently similar to these" (Prinz 2012: 129). But grasping what various concrete cases have in common is exactly the purpose abstract ideas are supposed to serve; it is their job description. Consequently, abstract ideas come in through the back door. Finally, if all it takes to understand or grasp the concept of justice is to simulate various specific scenarios, then, given that people, arguably, tend to simulate different scenarios, no shared meaning will emerge.

Therefore, I conclude, admittedly without having fully argued the point, that accounts that try to ground abstract ideas "in concrete sce-

narios" fail to explain how comprehension of abstract terms such as "truth" or "justice" can be embodied.[5] Fortunately, there is a very popular account in contemporary cognitive linguistics that is happy to volunteer an alternative explanation.

5. *The Conceptual Theory of Metaphor*

Abstract concepts are metaphorical, the Conceptual Theory of Metaphor, CTM for short, claims. According to George Lakoff, one of the founding fathers of CTM, "everyday abstract concepts like time, states, change, causation, and purpose turn out to be metaphorical". (Lakoff 1993: 203) Mark Johnson, his brother-in-arms, has it that "[*a*]*ll* theories are based on metaphors because all our abstract concepts are metaphorically defined" (Johnson 2008: 51). But they not only claim that abstract concepts are metaphorical(ly defined). They also claim that metaphor comprehension is embodied!

The idea that abstract terms are metaphorical has intuitive appeal. In using metaphors, we try to understand one kind of phenomenon in terms of another, and we thereby often borrow from the concrete realm of sensory experience in order to conceptualize abstract and mental phenomena (Lakoff and Johnson 1980). We feel blue, complain about her being cold or thin-skinned, we let people "chew over new suggestions and digest new information" (Deutscher 2005: 122), and we say that someone's theory needs more support, is about to collapse, etc. We talk about abstract, 'elusive' things such as emotions, information or theories in terms of more concrete phenomena and mundane activities such as temperature, digestion or buildings.

But CTM is not really a theory about linguistic usage as metaphor is "not a figure of speech but a mode of thought…" (Lakoff 1993: 210). These modes of thought are called conceptual metaphors (hence the name of the theory). They are "mappings across conceptual domains" (Lakoff 1993: 203); more specifically, they are mappings from a source domain which is commonly less abstract onto a target domain which is commonly more abstract. Here is a somewhat overworked example that nonetheless nicely illustrates the point. Let us try to map the domain of journeys onto the domain of love. This is what we get.

[5] For a more comprehensive overview over the debate about abstract terms, cf. also, e.g., Dove 2011, 2014; Borghi and Binkofski 2014, or Barsalou and Wiemer-Hasting 2005.

LOVE IS A JOURNEY

Source: journey	Target: love
the travelers	➔ the lovers
the vehicle	➔ the love relationship itself
the journey	➔ events in the relationship
the distance covered	➔ the progress made
the obstacles encountered	➔the difficulties experienced
decisions about the way to go	➔ choices about what to do
the destination of the journey	➔ the goal(s) of the relationship

(Kövecses 2010: 9)

Mappings such as these help us interpret metaphorical utterances. In saying something like "We are at a crossroads", "This isn't going anywhere", or "Look how far we've come" your partner is exploiting the love-is-a-journey mapping. And abstract concepts are metaphorical in that their understanding is also based on conceptual metaphors such as the above one.[6] Yet understanding is achieved not just by mapping elements from one domain onto elements of the other domain. We also 'map' knowledge. We know certain things about journeys, for example, and we use that knowledge in order to understand what love is. We try to understand love in terms of and by what we know about journeys (cf. Lakoff 1993: 206–207). More specifically, we come to employ patterns of inference that we commonly use to reason about journeys in order to reason about love. We know that when one encounters obstacles while travelling or is in danger of getting lost it might be advisable to engage a tour guide. Analogously, one may come to realize that when one encounters difficulties in a love relationship, it might be helpful to engage a psychotherapist as a kind of tour guide, etc. What is mapped are structural relationships. Conceptual metaphors, therefore, come out as analogies,[7] as structure-preserving mappings, an idea that is most clearly expressed in structure-mapping theory as initially developed by Dedre Gentner (1980: 1983).[8]

> The basic intuition is that an analogy is a mapping of knowledge from one domain (the base) into another (the target), which conveys that a system of relations that holds among the base objects also hold among the target

[6] Of course, there are other ways to conceptualize the domain LOVE. Love may be a game, or a plant that needs nurturing, and so on and so forth. Yet Lakoff and Johnson insist that all love-related metaphors are "significantly constitutive of our concept of love" (Lakoff and Johnson 1999: 71–72).

[7] The idea that metaphor is based on analogy goes back at least to Aristotle.

[8] As Dedre Gentner and Brian Bowdle point out, not all metaphors are analogies; some "defy description in terms of alignment", especially certain poetic metaphors such as the following one (if it is a metaphor) from a poem by E. E. Cummings "The voice of your eyes is deeper than all the roses" (cf. Gentner and Bowdle 2008: 110) Also, they defend the 'Career of metaphor hypothesis', according to which "a metaphor undergoes a process of gradual abstraction and conventionalization as it evolves from its first novel use to becoming a conventional 'stock' metaphor." (Gentner and Bowdle 2008: 116).

> objects. (Gentner and Clement 1988: 312–313; cf. also Gentner and Bowdle 2008)

Structure is mapped from one domain onto another. And, again, our understanding of abstract terms is said to be based on metaphorical, analogical mappings. Metaphor comprehension, in turn, is said to be embodied. Unfortunately, as soon as we talk about metaphor, conceptions of embodiment proliferate.

6. *Embodied Metaphor*

First, Lakoff and colleagues claim that all complex conceptual metaphors can be decomposed into what they call primary metaphors.[9] Primary metaphors are experientially grounded. An example of a primary metaphor is AFFECTION IS WARMTH.

> For example, for an infant, the subjective experience of affection is typically correlated with the sensory experience of warmth, the warmth of being held. During the period of conflation, associations are automatically built up between two domains. Later, during a period of differentiation, children are able to separate out the domains, but the cross-domain associations persist. (Lakoff and Johnson 1999: 46)

When we were held affectionately as children, we experienced affection and warmth occurring together. We learnt to associate affection with warmth.[10] That helps us to produce and comprehend temperature metaphors ("He greeted me warmly"). According to Lakoff (2012), the association claim is evidenced by various experimental findings. It could be shown, e.g., that subjects holding a cup of hot coffee are prone to evaluate an imaginary individual as warm and friendly—significantly more so than subjects holding a cup of iced coffee (Williams/Bargh 2008). Subjects automatically associate physical warmth with friendliness. This is so, according to Lakoff, "(b)ecause primary metaphors are persistent (long-lasting or permanent) physical circuits in the brain." (Lakoff 2012: 782)

Others claim that metaphor comprehension is embodied in that people understand metaphors via mental imagery. Raymond Gibbs and colleagues, for example, claim that people understand metaphors containing an action verb by imagining themselves engaging in that very action (Gibbs 2006). They conduct psycholinguistic studies in order to corroborate their claim. Mostly, they let participants read metaphorical sentences, the sentence "Let us stomp out racism", e.g., and then

[9] The LOVE IS A JOURNEY metaphor is also built up of various primary metaphors (cf. Lakoff 2008: 26–27). Still, one might wonder whether all complex metaphors are decomposable into primary metaphors and what exactly the principles of (de)composition amount to.

[10] According to Lakoff, thought in general is embodied: "Thought is embodied, that is, the structures used to put together our conceptual system grow out of bodily experience and make sense in terms of it; moreover, the core of our conceptual system is directly grounded in perception, body movement, and experience of a physical and social character" (Lakoff 1987: xiv).

ask them what is "particularly noticeable" (Gibbs and Mattlock 2008: 166) in the image they form. And according to Gibbs, the participants conceive of racism as if it was a physical object–thereby employing the metaphor IDEAS ARE OBJECTS–and then they imagine their bodies in action, imagine themselves stomping (Gibbs and Matlock 2008).

This brings to the fore two new embodiment claims, one according to which

EC: Association is necessary for metaphor comprehension,

and one according to which

EC: Mental imagery is necessary for metaphor comprehension.

But now recall the initial embodiment claim. Applied to the case of metaphor, it comes to this:

EC: Simulation is necessary for metaphor comprehension.

One might think that mental imagery and simulation are simply two sides of the same coin. But although there is, presumably, a close connection here, mental imagery is the conscious evoking of a mental image, while simulation–in the sense at issue here–is (presumably sub-conscious) activation in sensory-motor regions of the brain. Consequently, evidence for a necessary role of simulation in metaphor comprehension ought to come from neuroimaging studies. Yet in a carefully designed fMRI-study by Shirley-Ann Rüschemeyer and colleagues, it could be shown that the comprehension of metaphorical uses of action verbs ("grasp the idea") doesn't yield the same motor activation pattern as the comprehension of literal uses of action verbs ("grasp the cup") (Rueschemeyer et al. 2007). Lisa Aziz-Zadeh and colleagues reached a similar conclusion (Aziz-Zadeh et al. 2006). Others disagree (cf, e.g., Boulenger, Hauk and Pulvermüller 2009). And still others claim that activation in primary motor regions is necessary only for the interpretation of unfamiliar metaphors (Desai et al. 2011). In sum, empirical evidence for an indispensable role of simulation in metaphor comprehension is inconclusive (for a more comprehensive yet still critical assessment, cf., e.g., Casasanti and Gijssels 2015).

But even aside from questions about its empirical support, the claim that metaphor comprehension is embodied either in the association, the mental imagery or the simulation sense, faces a couple of more 'theoretical' problems.

Take association first. It does not seem implausible to assume that association underlies our understanding of temperature metaphors ("She greeted my warmly"). It might also help explain how we understand synaesthetic metaphors such as "The stone statue had a cold smell" (Werning et al. 2006: 2365).[11] Yet note that these metaphors are

[11] They define the relevant terms as follows: "A metaphor is synaesthetic if and only if its source domain is perceptual. It is only weakly synaesthetic if its target is not also perceptual and strongly synaesthetic if its target domain, too, is perceptual." (Werning et al. 2006: 2365–2366).

not based on structure-preserving mappings, for there is no structure to be preserved or mapped; they therefore fail to fulfill Lakoff's own characterization. Comprehending metaphors that are based on mappings, on the other hand, requires more than just association. In understanding the LOVE IS A JOURENEY metaphor, e.g., you are not just associating two domains. Rather, you are using knowledge of one domain to better understand the other. Mere association won't do. As a consequence, one might try to distinguish two types of metaphors; those, which are based on association and those which are predominately based on domain knowledge.

Similarly in the case of mental imagery. Imagery might provide a good place to start when it comes to interpreting novel or poetic metaphors. When reading the following two lines

> Two roads diverged in the wood, and I
> I took the one less traveled by.

of the famous poem "The Road not Taken" by Robert Frost, you might immediately form an image of someone travelling on his own, being alone in the woods and so on. The mental image, by providing you with detailed pictorial and also even affective information about how it feels to be alone in the woods, might help you to grasp the metaphor. Reuven Tsur, one of the founding fathers of cognitive poetics, stresses the role of concrete visual images in the interpretation of metaphor in particular and of poetry in general (Tsur 1999). But what about other metaphors; e.g., the metaphor 'Man is a wolf'? What am I supposed to imagine here? I might imagine a wolf in man's clothing. But in the mind of others the metaphor might conjure up other images, men packhunting, for example. Again, domain (encyclopedic) knowledge does most of the work. As Max Black pointed out, the MAN IS A WOLF metaphor "will not convey its intended meaning to a reader sufficiently ignorant about wolves." (Black 1955: 287) Only if you are sufficiently knowledgeable will the wolf-metaphor organize your view of man, as Black puts it (ibid, 288). Again, one might try to distinguish different types of metaphor according to the cognitive processes most likely involved in their interpretation.

Finally, consider simulation again. In order to understand metaphoric expressions such as 'He grasped the idea' or 'man is a wolf', one has to figure out what grasping a cup and grasping an idea, or what man and wolf, have in common. But one also has to understand that an idea is grasped differently than a cup and that man is not a wolf! Otherwise one will not recognize them as metaphors. MAN IS A WOLF is a metaphor exactly because man is NO wolf! And "He grasped the idea" is a metaphorical expression because we grasp an idea in a manner that is somehow similar but also somehow different from the manner in which we grasp a cup! Simulating the action of grasping, thereby activating the same neurons as when one actually grasps a cup, is not what it takes to understand the metaphor. Metaphors draw on simi-

larities–but equally on differences! Understanding metaphors requires that one looks at things differently than one did before! Metaphor, at least novel metaphor, is "a method of *expanding* understanding" (Shapiro 2011: 86). Simulation, if at all, provides us with a theory of literal interpretation. But interpreting metaphors requires that we leave the literal meaning behind.

Now recall that CTM not only claims that metaphor comprehension is embodied but also that conceptual metaphors help us understand, are even "significantly constitutive" of, abstract concepts. Yet that claim, as has often been pointed out, is also fraught with problems. Let me mention just one (for some more, cf., e.g., Kompa forthcoming). CTM makes wrong predictions about the way in which abstract concepts are best learned. "What is love?" the little boy asks. "A journey", his mother replies. Yet the boy is not meant to believe that love *is* a journey. Rather, he is supposed to believe (and has to learn) other things about love; that if two people are in love they like each other a lot, and want to spend time together, and so on. The 'defining' properties need to be learned independently of the mapping, it seems. And only distinct domains can be mapped onto each other.[12] As Barsalou puts it: "Although metaphor most certainly plays a major role in elaborating and construing abstract concepts, it is not sufficient for representing them…" (Barsalou 1999: 600; cf. also, e.g., Murphy 1996)

7. *Summary*

To sum up, abstract terms are not metaphorical, nor is metaphor comprehension embodied. Or at least, neither association nor mental imagery nor simulation seem to play an indispensible role in metaphor comprehension. Still, embodied approaches are right in claiming **a** role for simulation, mental imagery or association in language comprehension in general and metaphor comprehension in particular. It seems highly plausible that on hearing a particular utterance a listener will occasionally simulate a previous experience or actively imagine a scenario that somehow fits the utterance. This might provide her with more detailed, pictorial information about a possible way the world might be if the utterance is correct. Similarly, in the case of a metaphorical utterance. A listener will occasionally conjure up certain images that might help her explore the metaphorical mapping further, especially in the case of novel metaphors.[13] In other cases, association might provide a

[12] Domain knowledge usually precedes metaphorical mapping. As Ellen Winner and Howard Gardner, e.g., point out, a child's ability to interpret metaphor is constrained only by what they know about the domains in question: "That is, there are not inherent limits on the kinds of similarities children can perceive. All that is necessary is sufficient knowledge of the domains involved" (Winner and Gardner 1993: 427).

[13] Evidence concerning the neural correlates underlying the processing of novel metaphors is somewhat inconclusive, especially with respect to the role of the right

route to comprehension. But there is no reason to think that every time a linguistic item, let alone a metaphor, is being processed simulation, association, or imagery has to take place. Still, as suggested above, one might try to distinguish different types of metaphors according to the cognitive processes most likely involved in their comprehension, even if this will hardly yield a clear-cut distinction. So, in sum, I side with those who claim that in language comprehension in general, and metaphor comprehension in particular sensory-motor (as well as affective) information is appealed to in a context-sensitive, task-dependent manner (cf., e.g., Desai et al 2011,[14] Desai et al. 2013;[15] or van Dam et al. 2014?[16]).

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hemisphere (yet cf., e.g., Mashal et al. 2007).

[14] Desai et al. (in an fMRI-study) investigated participants' responses to literal action sentences, metaphoric sentences, and abstract sentences of varying familiarity. They "hypothesized that relatively unfamiliar (literal and metaphoric) action language engages the sensory-motor systems because comprehension of such expressions involves relatively detailed simulations of literal actions." (Desai et al. 2011: 2377). Their results confirmed the hypothesis.

[15] According to Rutvik Desai and colleagues, one "question is whether the involvement of sensory-motor information is obligatory (because it is an essential part of semantic representation) or context-dependent (varying with factors such as task-demands or expectations due to the nature of the stimuli)." (Desai et al 2013: 1–2) As they point out, their results suggest that the involvement of the sensory-motor system decreases as abstraction increases, "highlighting the context-sensitive nature of semantic processing" (Desai et al 2013: 1).

[16] Wessel van Dam and colleagues investigated at what level of language processing sensorimotor activity comes into play. They reach the conclusion that "… recent studies have shown that sensorimotor information is recruited in a flexible manner during language comprehension…" (van Dam et al. 2014: 407).

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