

## WHAT EMPIRICAL WORK CAN TELL US ABOUT PRIMARY METAPHORS\*

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### 1. INTRODUCTION

One of the (many) riddles about language and its relation to thought is how is it possible that we can talk about things that we do not perceive directly. How are we able to communicate our thoughts about intangible, abstract notions such as love, friendship, importance, peace, justice or inflation? One of the possible explanations has been provided by what has been termed “Conceptual Metaphor Theory” (henceforth, CMT<sup>1</sup>), championed by George Lakoff and Mark Johnson. In their 1999 book, they propose that our ability to entertain abstract thoughts depends crucially on our ability to project information from concrete domains, from which we do have direct and grounded experiences (basically, sensorimotor information), onto abstract domains. Such abstract domains can in this way be re-structured and understood more easily. Most of the evidence for the existence of this cognitive mechanism comes from linguistic grounds. Thus, and just to name a couple of examples, metaphors have proved extremely useful to explain issues such as the extension of meanings (i.e., polysemy) in our lexicon (Lakoff, 1987). Instead of a haphazard collection of senses, the lexicon can in this way be regarded as a motivated network in which many of the extensions from one sense to another are based on a metaphoric (or metonymic) link. Metaphor and metonymy have also suggested very natural pathways for the diachronic evolution of the meaning of words (Sweetser, 1990) and even of grammatical constructions.

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\* This work has been partially supported by the research projects SEJ2006-04732/PSIC and 05817/PHCS/07 (Fundación Séneca)

<sup>1</sup> We will use this denomination for the theory for lack of an “official” name; some authors working within the theory have been using a slightly different version which also includes “metonymy” (i.e., “The Cognitive Theory of Metaphor and Metonymy” –CTMM; cf. Barcelona, 2002).

However, since in a very explicit way, a metaphor in CMT is not conceived as a linguistic phenomenon, but rather as a *cognitive* mechanism that helps us structure our inventory of concepts, there must necessarily be other ways of proving their existence. Some alternative methods could include for example, psycholinguistic studies or just any of the other methodologies that the broader field of cognitive science normally uses to assess its proposed explanatory notions.

There is more or less general agreement on the fact that nonlinguistic evidence is needed to buttress the notion of metaphor as a fundamental mental capacity by which we conceptualize abstract experiences. This has in fact been argued by many authors, many of them working within CMT, as a necessary step to avoid some of the accusations of “circularity of reasoning”. A common methodology in metaphor theory has been to group together a given number of linguistic expressions, which are found to share certain common characteristics, and then use these expressions to propose a given conceptual metaphor; this conceptual metaphor is in turn used to explain why there is such a numerous group of these linguistic expressions<sup>2</sup>.

Lakoff & Johnson (1999) presented psycholinguistic evidence supporting their theory, but the debate whether psycholinguistic studies support or reject CMT is far from over. Some psychologists have openly contested the theory and seem reluctant to accept some of its tenets (e.g., Glucksberg, Brown & McGlone, 1993; Glucksberg & McGlone, 1999; Keysar & Bly, 1999; McGlone, 1996, 2007; Murphy, 1996, 1997), while, on the other hand, many recent studies provide evidence which seems to be consistent with CMT (e.g., Boroditsky, 2000, 2001; Boroditsky & Ramscar, 2002; Casasanto & Boroditsky, 2008; Françozo, Lima & Gibbs, 2004; Meier & Robinson, 2004; Santiago, Lupiáñez, Pérez & Funes, 2007; Schubert, 2005; Silvera, Josephs & Giesler, 2004; Torralbo, Santiago & Lupiáñez, 2006).

One more or less recent notion in CMT that can be useful for settling these matters is that of *Primary Metaphor*. Since its proposal in Grady (1997), the distinction between Complex and Primary Metaphors has figured prominently in all introductions to CMT. For example, in Lakoff & Johnson (1999), this distinction superseded other previous distinctions between different types of metaphors (e.g., ontological vs imagistic vs structural, etc), that had been present in older versions of the theory (e.g., Lakoff & Johnson, 1980; Lakoff, 1993; Lakoff & Turner 1989).

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<sup>2</sup> For a review of this and some other “putative” problems with CMT, see Valenzuela & Soriano (2004).

In what follows (section 2), we will present the main characteristics of Primary Metaphor Theory, which apart for other benefits, “opens possibilities for falsifying the theory” (Costa, 2004:110). After that, in Section 3, we will review some empirical work which partly supports and partly refines the theory. One aim of this paper is to show how empirical work can help not just to support or reject theoretical proposals, but even to refine hypotheses, to make them more specific and focused and to point at newer phenomena that must be theoretically integrated.

## 2. PRIMARY METAPHOR THEORY

Primary metaphors were initially presented by Joseph Grady (Grady, 1997) and later on included in the “official” version of CMT (e.g. Lakoff & Johnson, 1999; Feldman, 2004). Grady’s initial observation was that some conceptual metaphors could be decomposable into simpler ones; after examining carefully a metaphor such as THEORIES ARE BUILDINGS, he came to propose that it was actually formed by two more basic metaphors, PERSISTING IS STANDING ERECT and ORGANIZATION IS PHYSICAL STRUCTURE. This decomposition could in fact be extended to the rest of the metaphorical system, in such a way that some metaphors emerged as “atoms” or “primitives”. These “atomic” metaphors could then be combined to form more complex ones<sup>3</sup>.

Primary metaphors have several characteristics that make them special: they arise from *experiential correlations*, so their learning is *unconscious and automatic*, they are therefore better candidates for *universals* and also highly *embodied*, and the experiences that *both source and target domains* make reference to are *relatively basic*. Let us see each of these characteristics with a little bit more of detail.

Probably the most salient characteristic of these metaphors concerns their origin: they arise from *experiential correlations* in the world. This represents a change in previous versions of the theory, since now, the origin of metaphor is not some type of perceived similarity but the notion of co-occurrence. For example, in many occasions we perceive a scene in which there is an increment in quantity of some substance or material and we are able to perceive that the stuff that is increasing in quantity also increases in height. This is what happens if we pile books on a table: the more books we put, the higher the pile goes; the same correlation would be observed when we fill a bottle with water, or in countless other cases. This perceived correlation between QUANTITY and

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<sup>3</sup> The precise ways in which the “molecular” complex metaphors are formed fall outside the direct scope of Primary Metaphor theory and are better explained by Fauconnier and Turner’s Theory of Conceptual Blending and Integration.

VERTICALITY is what would give rise to the primary metaphor MORE IS UP, which would then explain more abstract uses of “increase in quantity”, such as *the stock prices all over the world have gone down/plummeted in this crisis* or a *high level of cholesterol could lead to heart problems*.

The linguist Christopher Johnson (Johnson, 1999) went even further and suggested that there is a period in the development of the child’s conceptual system in which s/he does not distinguish between both domains: they are said to be *conflated*. In this theory of *conflation*, we encounter complex situations which are experienced globally, as experiential gestalts<sup>4</sup>, but in which different facets can potentially be distinguished. Thus, for a baby being affectionately held, the same situation encompasses the expression of AFFECTION and the WARMTH of being held; these two notions are thus “conflated” in his/her experience. It is only later at a more advanced stage in his/her cognitive development that s/he learns to discriminate more finely and both notions are segregated; however, this connection between both domains persists in some form and is the basis of the mappings that give rise to the primary metaphor AFFECTION IS WARMTH.

Primary Metaphors are highly *embodied*, in at least two different senses. On the one hand, they depend directly on our interaction with the environment and thus our bodily characteristics: we experience notions such as *warmth* or *height* directly with our bodies, via our perceptual/sensorimotor apparatus. Their embodied nature makes them compatible with embodied approaches to language and cognition (e.g., Barsalou, 1999, 2003; Glenberg, 1997; Gibbs, 2003; Zwaan, 2004). The second sense in which they are embodied is a derivation from Conflation theory: in those initial experiences, the two domains that are correlated are activated simultaneously in our brain; they become in this way linked by neural connections by means of the mechanism known as Hebbian learning (which could be paraphrased as “neurons that fire together, wire together”). Thus, in Lakoff & Johnson (1999) we are told that metaphors have a *direct, physical* existence in our brains: they are the neural connections that link distinct brain areas belonging to the correlated domains.

Obviously, we acquire primary metaphors in an *automatic* and *unconscious* fashion, simply by interacting with the world. Since many of the experiential correlations that provide the basis for primary metaphors are found in common human scenes, and since all humans share similar bodily experiences, these metaphors may well be *universal*. So to speak, universal primary experiences would tend to produce universal primary metaphors. This is different from complex metaphors, where the combination of primary metaphors into some

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<sup>4</sup> What Vilarroya (2002) would call a *slice*, his short-hand term for “slice of life”.

specific configuration holds a higher chance of being affected by culture-specific factors.

There are additional characteristics of primary metaphors; for example, both source and target domains correspond to relatively simple domains. Roughly, source domains are embodied experiences, typically related to perceptual or force-dynamic schematizations of experience, while target domains are normally subjective fields of evaluation, for example, something being difficult or not, important or not, good or not, perceiving an entity as being the controlling or the controlled one in a given situation, etc.

Table 1. Some Primary Metaphors

- Affection Is Warmth	- Linear Scales Are Paths	- Causes Are Physical Forces
- Important Is Big	- Organization Is Physical Structure	- Relationships Are Enclosures
- Happy Is Up	- Help Is Support	- Control Is Up
- Intimacy Is Closeness	- Time Is Motion	- Knowing Is Seeing
- Bad Is Stinky		- Understanding Is Grasping
- Difficulties Are Burdens	- States Are Locations	- Seeing Is Touching
- More Is Up	- Change Is Motion	- Desire is Hunger
- Categories Are - Containers	- Purposes Are Destinations	
- Similarity Is Closeness	- Purposes Are Desired Objects	

Given this state of affairs, it should be clear now why psycholinguistic and neurolinguistic evidence for these metaphors should be easier to locate than for more cultural, complex metaphors. In this paper, we review a number of empirical studies that have been (and are still being) conducted that address the putative existence of these structures in the human mind. Our specific aim is to show how, in true cognitive science spirit, looking at these cognitive-linguistic notions from the point of view of research conducted in neighbouring areas (e.g., social psychology or cognitive psychology), can help us arrive at a more precise and defined view of these structures. Due to space limitations, we will make a selection of relevant work<sup>5</sup>, trying to show the benefits of an interaction between empirical work and theoretical models.

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<sup>5</sup> A more inclusive review (which also presents a detailed psychological model of metaphor processing) can be found in Santiago, Román & Ouellet (in prep).

### 3. SOME EMPIRICAL WORK DEALING WITH PRIMARY METAPHORS

#### 3.1. *Time as space*

The use of the physical domain of space to structure the more abstract domain of time is with all probability the better known and more widely investigated of all metaphors; to use Casasanto's metaphor, TIME has become our particular "Fruit fly":

*"Time has become for the metaphor theorist what the fruit fly is for the geneticist: the model system of choice for linguistic and psychological tests of relationships between metaphorical source and target domains" (Casasanto, in press).*

There is a wealth of studies uncovering the relationships existing between space and time<sup>6</sup>. In general, most of these studies can be taken as sound empirical support for the general idea that the domain of TIME is structured by SPACE (e.g., Boroditsky, 2000, 2001; Boroditsky & Ramscar, 2002; Casasanto & Boroditsky, 2008; Nuñez, Motz & Teuscher, 2005; Santiago, Lupiáñez, Pérez & Funes, 2007; Torralbo, Santiago & Lupiáñez, 2006). The more specific proposals made by CMT regarding the spatial structuring of time, that is, the proposal that there are (at least) two types of spatial metaphors that structure time, namely, the Ego-moving metaphor (e.g. *we are approaching Christmas*) and the Time-moving metaphor (e.g., *Christmas holidays are getting nearer*) have also been specifically supported (e.g., Boroditsky, 2000, 2001; Gentner, Imai & Boroditsky, 2002). Some of these studies have additionally addressed the relationship between embodied experience and the metaphoric system; for example, Boroditsky & Ramscar (2002) showed how some of our real-world experience of spatial situations (e.g., standing in a cafeteria line or riding on a train) had an effect on the type of spatiotemporal metaphors that are activated. In this way, people experiencing motion (e.g., on a train) were more likely to use an Ego-moving metaphor for time, while those that underwent the experience of an object moving towards them (e.g., waiting for a train), were more likely to activate the Time-moving version.

Empirical work in this area has gone beyond the initial proposals of CMT. Initially, in both the "Ego-moving metaphor" and the "Time-moving metaphor" versions, time was conceived as a horizontal line in a front-back axis to the speaker, in such a way that the Future was conceived in front and the past was

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<sup>6</sup> In fact, the relationships between space and time have been known for a long time; see for example Piaget & Inhelder (1969)

conceived behind the speaker. Núñez & Sweetser (2006) gesture studies were able to show that, in some cultures, this organization could be reversed: for the Aymara, the future is at the back and the past is in front of the person. As it turns out, the time-line can have other axes in fact; for example, Boroditsky (2001) was able to show that Mandarin speakers could also conceptualize the time line vertically, so that the past is located “up” and the future is “down” (so that the “down” month would approximately mean the “next” month). Additionally, in this study she showed that English speakers could be trained to organize time also vertically, suggesting more concrete ways in which cognitive structuring can take place.

Finally, empirical research has also uncovered another way of spatializing time, which, interestingly enough, has no linguistic reflex (at least no language that uses it has been reported yet). In these cases, time is conceived as a horizontal line which progresses, not on a sagittal view (i.e., front-back), but on a transversal one (i.e., left-right). Priming experiments by Torralbo, Santiago & Lupiáñez (2006) and Santiago, Lupiáñez, Perez & Funes (2007) and gesture studies by Casasanto and Lozano (2008) have shown how in Western societies, this horizontal line is followed left-to-right, so that the past is located to our left, and the future is located to our right. This seems to be related to the direction of writing-reading, and there is evidence that the opposite orientation is found in cultures that have the opposite way of writing (e.g., Tversky, Kugelmass & Winter, 1991). Thus, for Hebrews and Arabs, the past is located on the right and the future on the left (the same explanation could be applied to Boroditsky’s results with Mandarin speakers).

### 3.2. Other spatial metaphors

**HAPPY IS UP/GOOD IS UP.** Time is not the only domain which has been shown to be spatially organized. For example, Casasanto & Lozano (2008) used a variant of the Stroop effect paradigm which involved gesturing to show that vertical organization underlies the use of abstract domains such as HAPPINESS. In their study, participants had to use both hands to move marbles from one tray to another one located either above (red) or below (blue). The direction of the movement was made to depend on the colour of a word appearing in a screen. So, for example, if the word appearing in the screen was blue, they had to move a ball to the blue tray below, and if it was red, they had to move it up to the red tray<sup>7</sup>. Crucially, the meaning of the word (though irrelevant for the task, which involved only the colour of the letters) was related to “happy”

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<sup>7</sup> Actually, the location of the blue and red trays was counterbalanced across subjects.

or to “sad”. Participants were much quicker (and accurate) moving the balls when the resulting gesture was metaphor-congruent (that is, when a “happy” word corresponded to an “up” gesture) than in metaphor-incongruent cases. The same results were obtained when the words were replaced by happy or sad faces (this time, the red or blue colour guiding the motion was present in the image-background in which the faces appeared). Some of the stimulus they used also corresponded to other words hypothetically organized by vertical metaphors (e.g., *wealthy, poor, virtuous, evil, hero, villain*, etc.).

Meier & Robinson (2004) also tested the relationship between what they termed “affect” (a term they used to include notions such as “happy/sad” and also “good/bad”) and “vertical position”. In their experiment, subjects were quicker to respond to “affective” words (e.g. *hero* or *good*) appearing at the top of the screen than in metaphor-incongruent positions (i.e., at the bottom).

**CONTROL/POWER IS UP.** Schubert (2005) and Valenzuela & Soriano (in press) have conducted studies dealing with the CONTROL IS UP metaphor. For example, Valenzuela & Soriano (in press) presented subjects with vertically arranged pairs of words. The task of the subjects was to decide whether both items were semantically related or not. The presentation of the stimuli could be either metaphor-congruent (e.g., *captain* above *soldier*) or the other way round. Subjects were quicker to respond in metaphor-congruent positions than in metaphor-incongruent cases.

A specially interesting case is Schubert (2005); in one of his experiments, he was able to dissociate the dimensions of “power” and “judgment” (normally, “power” is associated with “good”). For example, besides stimuli in which powerful and positive are associated (e.g., *leader*), he also included cases in which there was an association between powerful and negative (e.g. *dictator*). Interestingly, people responded to these words differently when the task required them to judge them either as positive or as powerful. Thus, *dictator* was processed quicker if it appeared at the top of the screen when the task involved judging stimuli as powerful or not, and was processed quicker if it appeared at the bottom of the screen when the task involved judging stimuli as positive or not, showing in this way how flexibility of mapping plays a prominent role in the processing of abstract words, a mechanism that has not been outlined by CMT.

**SIMILARITY IS CLOSENESS.** Casasanto (in press) tested the relationship between similarity and closeness, which is said to motivate the sense extensions of words such as *close* or *far* that can be used with the meanings “similar” and “different”, respectively (e.g., *that is not the correct answer, but it is close enough*, or *their opinions on this issue couldn't be farther apart*). In his initial experiment, Casasanto presented pairs of abstract words (e.g., *grief* and *justice*)



and asked his subjects to rate how similar/different they were. Both words appeared horizontally aligned, side by side, but in three different positions; close to each other, separated from each other, or far from each other. His results showed that people would judge the same word-pair as more similar when they had seen it close to each other, and as more different when it had been presented in the more distant condition. However, these results were reversed in a second experiment in which the stimuli involved pictures of unfamiliar faces. This time, when the pairs of faces were presented far from each other, they were judged as more similar than when they were presented close to each other. He included a final experiment in which concrete words were presented and subjects were asked to evaluate their similarity either in appearance or in function/use. The results showed that subjects who were asked to judge the similarity of the words using a conceptual judgement criterion (i.e., function or use) tended to evaluate closer words as more similar and far-apart word pairs as less similar, while subjects which had to decide on perceptual similarity performed in the inverse direction (i.e., close as less similar and far as more similar). Casasanto's study shows how, though linguistically, no difference is found between both types of similarity (we would use the same metaphor in the same way in both cases), there seems to be a difference in the mapping of similarity to distance depending on which dimension is to be evaluated. This can be taken as a very clear case in which empirical testing can not only enrich and refine the predictions by CMT but go beyond them, uncovering mechanisms which cannot be accessed using a purely linguistic methodology.

### *3.3. Other concrete-to-abstract metaphors*

**IMPORTANT IS BIG.** There is another group of metaphors which relate the physical domain of SIZE with different abstract domains. This is what can be seen in the IMPORTANT IS BIG metaphor investigated by Schubert (in press) and Valenzuela & Soriano (2008). Valenzuela & Soriano (2008) reported on a series of experiments in which subjects had to decide which of two factors they judged as more important in their lives. These "life factors" were abstract concepts and the answer to the task was a matter of personal choice (i.e., there was no "correct" answer). Thus, they would see "friendship" and "money" side by side, and they would have to choose one of these factors as more important for their lives. Size was manipulated by varying the font in which the words were presented; one of them was bigger (20 pt. font) and the other one smaller (12 pt. font). Their results showed that people were faster in their choice of the more important factor when the size was metaphor-coherent (i.e., big in size) than in the inverse case. Additionally, in another block, subjects were

asked to choose the *less* important factor for them. This time, if the IMPORTANT IS BIG metaphor was present, they should be quicker when choosing the *smaller* stimulus: roughly, an attempt to categorize a stimulus appearing in big font as “less important” should produce a inconsistency due to the automatic activation of “more important” associated to big stimuli, and accordingly subjects should take a longer time. Indeed such was the result, which can be taken as an indication that the metaphor IMPORTANT IS BIG is automatically activated in on-line tasks. In another experiment, Valenzuela and Soriano (2008) used the experimental paradigm known as Implicit Association Test (IAT) in which subjects have to create a novel-compound category made up of compatible or incompatible notions. In the case of the IMPORTANT IS BIG metaphor, subjects were much quicker and accurate when they had to group together “important” words along with “big” words (and “small” and “unimportant” words) than in the non-congruent cases (i.e., associating “important” and “small” words and “unimportant” and “big” words). Similar results, though still preliminary, have been reported by these authors applying this experimental paradigm to the AFFECTION IS WARMTH metaphor.

Schubert *et alli* (in press) has also investigated the relation between size and power (POWERFUL IS BIG), again showing the existence of flexibility in metaphorical mappings. In his experiments, subjects had to assign a social group to the category “powerful” or “powerless”. The words corresponding to the categories were presented either in big or small font. Their results showed that people’s responses were both quicker and more accurate when the stimulus font size matched the metaphor than in the inverse cases. However, when subjects were explained the possible effect of size and encouraged to try to avoid its influence, their error rate decreased; in a further experiment, not only were subjects informed of these possible effects, but they were also presented a high number of incongruent mappings (e.g., powerful group with small font), thus increasing their practice with these cases. In this last study, subjects reaction times also improved, showing again that the default application of metaphoric mappings can be subject to conscious control by part of conceptualizers, given a task that so requires it.

#### 4. CONCLUSIONS

The goal of CMT is one of the most relevant for cognitive science: it is concerned with how we structure thought. As such, any advancement in the theory is vitally relevant for anyone interested in the study of cognition. Primary Metaphor Theory has contributed to place CMT nearer to other current approaches to the study of embodied cognition, such as Embodiment theory

(e.g., Glenberg, 1997), Simulation Theories (e.g., Zwaan, 2004) or Perceptual Symbol Theory (e.g., Barsalou 1999), to the extent that some of the results of these compatible theories could be taken as providing partial support for some of the views of CMT. At the very least, the basic idea that there are complex and abstract domains which are structured by the projection of information from more concrete domains (e.g., good and up/white/big<sup>8</sup>) does seem to receive support from many different studies from different areas.

This is not to say that the CMT or even Primary Metaphor Theory are without problems. For example, the origin and development course of primary metaphors (i.e., the Conflation hypothesis) has been insufficiently spelled out<sup>9</sup>; the interplay between universality and culture-specificity (e.g., Kovecses, 2007) is in clear need of further clarification; even the psycholinguistic status of metaphors is not completely clear yet. Lakoff's view of metaphors as stable, neurophysiologically implemented structures in the mind/brain has not received clear support from neuroscience, and proponents of cognition as a dynamical system<sup>10</sup> would suggest alternative explanations for many of the phenomena observed. Finally, how do we choose between different versions of a metaphor (that is, the issue of flexibility) is again a point that will have to be clarified in the future.

At the very least, the interplay between linguistically-based theoretical proposals on the one hand, and empirical work coming from other cognitive sciences, such as cognitive psychology, social psychology or neuroscience, on the other, seems to be working in this case. Thus, we have seen how empirical studies can suggest refinements in the theory (as was the case of the different time-lines existing in the *TIME IS SPACE* metaphor), point at non-linguistic realizations of metaphor (cf. left-right metaphors for time), or suggest restrictions or additions to proposed metaphors (cf. Casasanto's work on similarity as closeness). And if we take a look at the way in which other scientific disciplines work, it seems that, to use another spatial metaphor, this is the way to go.

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<sup>8</sup> For more information on these specific metaphors, see Meier & Robinson (2004), Meier, Robinson, Clore (2004) and Meier, Robinson & Caven (in press), respectively.

<sup>9</sup> For a view explicitly challenging the Conflation hypothesis, see Seitz (2005).

<sup>10</sup> For a review of these approaches, see Calvo-Garzón, Laakso & Gomila (2008); from the more "cognitive-linguistic" camp, Gibbs seems to be seduced by this dynamic-emergent approach (e.g., Gibbs & Cameron, 2008; Gibbs, 2008).

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