

# Cognitive Metaphor and Empirical Methods\*

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## 1 Introduction: Cognitive Linguistics and cognitive sciences

In the intellectual marketplace, different theories of language compete among themselves vying for their niche. One effective way of achieving such a goal is by offering some distinctive feature that makes them stand out from the rest. Such a 'difference' can rest on several grounds: for example, a specific methodology specially suited to the study of a particular linguistic level (e.g. morphology), a new perspective from which to look at linguistic phenomena (e.g. by combining insights from two different disciplines, say, linguistics and sociology), etc. Cognitive linguistics (henceforth, CL) is a theory of language that attempts to describe language in connection to the rest of cognition. This aspiration was explicitly formulated by one of the founders of the movement, George Lakoff. In his "Cognitive Commitment" (Lakoff 1990: 40), he emphasized the need to provide an account of language that was consistent with what other cognitive science disciplines (neuroscience, cognitive psychology, developmental psychology, psycholinguistics, etc) have revealed about cognition and the brain. Put in another way, linguists need to take empirical evidence from other cognitive sciences seriously. This very same point has also been stressed by Gibbs (1996) when commenting on the adjective cognitive in CL:

cognitive linguistics is especially deserving of the term cognitive not solely because of its commitment to incorporating a wide range of data from other cognitive disciplines, but because it (a) actively seeks correspondences between conceptual thought, bodily experience, and linguistic structure, and (b) because it seeks to discover the actual contents of human cognition (1996: 49)

Taking into account this emphasis on the interrelations between language and the rest of cognition, it is not surprising to find that very often the scope of the

explanations offered by CL goes well beyond the realm of language, affecting cognitive processing as well. This “boundary-overflow” can be found in many areas of CL, in some cases, quite intentionally. CL believes that language can provide a “window” on thought, and that by studying language, we can uncover some of the mechanisms at work in high-level cognitive processing. CL is therefore pouring forth a wealth of theories which connect language with the rest of cognition and which provide fresh, ambitious and global views on cognitive processes. However, not all these ideas are having the expected impact in the cognitive sciences, even though they tackle directly many of the “big issues” in these disciplines.<sup>1</sup>

Perhaps one of the reasons for this situation is that the more empirically-minded cognitive science disciplines (e.g., cognitive psychology, neurosciences, etc.) follow as closely as possible the scientific method: that is, theories are not accepted until their hypotheses have been backed up empirically, which in most cases involves the use of scientific experiments. CL claims about the structure of cognition, normally based on introspective, intuitive methods, are therefore received with some misgivings.

One of the theories within CL which has been criticized for its bold claims about human cognition in general (and not merely language), is the Cognitive Theory of Metaphor and Metonymy (henceforth, CTMM). This paper will review some of the proposals of this theory, and will attempt to view the issues from the point of view of empirical studies, that is, from CL’s Cognitive Commitment. The structure of the paper will be as follows; the next section will sketch the major claims of metaphor theory; next, we will review some of its possible criticisms and problems. Then, we will review some of the empirical studies on metaphor that have been carried out. The paper will conclude with a suggestion of the areas that have hitherto not been worked out so far, offering some future suggestions and some conclusions.

## **2 The Cognitive Theory of Metaphor and Metonymy (CTMM)**

One fact that should not be forgotten is that the CTMM is not merely a linguistic theory of how figurative language works, but a theory of language, cognition and reasoning. This can be confusing when taking into account the status of the CTMM as one of the theories that form part of the movement known as “cognitive LINGUISTICS.” So, even though it is routinely considered as one of the theories making up the CL approach, the CTMM is not only a theory of linguistics, but a theory of abstract reasoning and thought. This can be clearly seen when one reads the first sentences

of Lakoff & Johnson (1999: 3):

The *mind* is inherently embodied. *Thought* is mostly unconscious. *Abstract concepts* are largely metaphorical (...) Metaphor is the main mechanism through which we comprehend *abstract concepts* and perform *abstract reasoning*. (emphasis added)

The book goes on to describe some of the characteristics of 'reason' (which, in the next page, is presented as embodied, evolutionary, unconscious, metaphorical, imaginative and emotionally engaged, among other things). This emphasis on cognition is not something new; since 1980, when the first book on conceptual metaphor was published (*Metaphors we live by*, Lakoff & Johnson 1980), conceptual metaphors were presented as devices which structure not only everyday language but also our reasoning and our experience (hence, devices "we live by"). Again, Lakoff (1987) argued that some of the basic mechanisms of human cognition had been uncovered: framing and prototype categorization were some examples of such cognitive mechanisms, and last but not least, standing out as particularly important members of this group of basic cognitive processes, were metaphor and metonymy.

According to Lakoff and his associates, a metaphor involves conceptualizing one domain of experience in terms of another; more technically, a metaphor would be "the cognitive mechanism whereby one experiential domain is partially 'mapped', i.e. projected, onto a different experiential domain, so that the second domain is partially understood in terms of the first one" (Barcelona & Valenzuela, 2005: 209). Thus, the domain of LOVE can be structured by the projection of information from the domain of JOURNEYS, giving rise to expressions such as *This relationship isn't going anywhere*, *We'll just have to go our separate ways*, or *Look how far we've come*. The domain which is so structured is called the 'target domain' and the domain which provides the structure and from which the information is mapped is called the 'source domain'. Examples of conceptual metaphors are numerous; a partial list of metaphors can be found in Lakoff's Master Metaphor List (on-line at <http://cogsci.berkeley.edu/lakoff/list>).

Thus, metaphors are cognitive phenomena that surface in language, and help to explain many different linguistic mechanisms, such as lexical polysemy (Brugman 1988), constructional polysemy (Goldberg 1995) and historical change (Sweetser 1990). But metaphors are also present in non-linguistic domains, such as gesture (McNeill 1992), and art (Soriano 2005). This is expected, since metaphor is a way of thinking and therefore underlies every type of expression of our thoughts.

What is the function of metaphor? In this view, conceptual metaphors exist to enhance or facilitate the understanding of certain concepts. Thus, when we take

information from one domain and project it to a second domain, the latter receives in this way the structure from the former. This allows us to understand the second domain, the Target, in a way that we otherwise could not. This is what happens in the example above, in which the abstract and fuzzy domain of love is structured by the more concrete and precise domain of accompanied physical movement, with the result that we actually conceive love using the metaphor LOVE IS A JOURNEY. Typical target domains are therefore more abstract and more difficult to conceptualize, and typical source domains are concrete and physical. We are able in this way to exploit our knowledge of such concrete and “graspable” domains and apply it to less concrete, more abstract domains.

### 3 Some (putative) problems with the CTMM

As we have seen in the previous section, the CTMM is a theory of conceptual representation and processing; its claims go far beyond the realm of linguistic theorizing to deal with topics on knowledge representation and the structure of the human mind. And in all probability, one of the causes of the reluctance of certain sectors of cognitive science to take seriously the CTMM accounts is the methodology that is used to make these claims.

The methodology used by the CTMM is essentially linguistic, which is only natural, since the theory has been elaborated by linguists. In the CTMM, metaphors are postulated by putting together a number of linguistic expressions, examining what they have in common (e.g., membership of its lexical items to a given semantic field or domain), and then finding the metaphor that would seem to explicate the use of all these expressions. As a way of example, let us consider how TIME metaphors are hypothesized. To start with, expressions that are used to talk about time are gathered; then, they are classified according to the lexical semantic similarity of their components, and groups are formed. For example, we could form a group of expressions that contain lexemes that belong to the semantic field of money (*Don't waste your time, This can save you hours, I've invested a lot of time in this project, He's just trying to buy more time*, etc). When a number of expressions of this sort are gathered, the motivation for their use in time expressions can be found by assuming the existence of a conceptual metaphor in which time is understood in terms of money, i.e. the TIME IS MONEY metaphor. Though there are probably some variants in the concrete methods that different scholars use (e.g. Barcelona, 2002; Soriano, 2005), this could be a basic rendition of the methodology used in many metaphor studies.

As a first approximation, this methodology is a necessary step in the process.

However, linguistic intuitions are certainly not enough to postulate lawful theories of mental representation. This initial attitude has been nicely summarized by Gibbs (in press):

many psychologists express significant skepticism toward any theory of language use that is not based on objective, scientific experiments. This has most recently been true in regard to how psychologists view the various theories and claims of cognitive linguistics. Many psychologists suggest that linguistic intuitions alone, even those of trained linguists, are insufficient sources of evidence for establishing “what people ordinarily do” when using and understanding language (Glucksberg, 2001; Murphy, 1996; Veraeke & Kennedy, 1996). The best, and in some people’s view, the only, way to study ordinary language use is to objectively study the behavior of naïve human participants in controlled experimental settings.

Again, there have been authors within cognitive linguistics who have expressed their worries on the relative ease with which cognitive linguists use their linguistic results to put forward models of mental representation. Such was the case of the discussion which appeared in the journal *Cognitive Linguistics* on the limits of linguistic analyses, in which different authors discussed the dangers of postulating mental constructs from linguistic evidence alone (Croft 1998, Sandra 1998, Gibbs & Matlock 1999 and Tuggy 1999).

The aforementioned discussion was triggered by the postulation by cognitive linguists of the mental existence of different senses in the analysis of polysemy. In the case of the CTMM, the main reason why critics think that linguistic evidence is not enough to make assertions about the psychological reality of conceptual metaphors could be called “the problem of the circularity of reasoning.” Soriano (2005) states the argument in this way:

Linguistic evidence is not enough to support the existence of conceptual metaphors because it is used both as reason to hypothesize metaphor and as post-hoc evidence of their existence (Soriano 2005: 14).

Of course, this is not the only form of evidence one can find of the existence of conceptual metaphors. Together with the conventionalized expressions that move us to hypothesize the existence of conceptual metaphors in the first place, we frequently find creative, non-conventionalized expressions whose motivation can also be elegantly explained by means of the same conceptual metaphors. This might count as additional evidence for the existence of source-target mappings in our

minds. But the underlying reasoning behind this criticism is that given that linguistic creativity of this sort can also be explained through other means (e.g., Murphy, 1996), it would be desirable to count on other forms of (linguistic and, if possible, non-linguistic) evidence as well.

Another potential source of concern for cognitive scientists is that some of the claims of the CTMM might be too vague to be tested; for example, the notion of *domain*, while intuitive, is notoriously complicated to define or constrain. This is not always the case, however. For example, concerning the mental processing of metaphors, Lakoff & Johnson (1999) claim that conceptual metaphors are used constantly and automatically, with neither effort nor awareness (Lakoff 1993, Lakoff & Johnson 1999). These hypotheses have been supported empirically by some authors (e.g., Gentner & Imai, 1992, Boroditsky, 2000, 2001, or Casasanto et al, 2004, to name a few), but have also been explicitly challenged some psycholinguists (Glucksberg, 2001; Glucksberg and MacGlone, 1999; Keysar et al, 2000). The latter authors present psycholinguistic evidence that the activation of pre-stored conceptual metaphors does not happen under all conditions; it does occur, but only when speakers are presented with novel linguistic expressions (Keysar et al, 2000) or when they are required to consciously reflect on the meaning of some metaphorical expression (Glucksberg and McGlone, 1999). So, this is an open question; even Gibbs (1994) acknowledges that it does not have to be assumed that people activate source domain knowledge every time they hear or read a metaphorical expression. (Gibbs, 1994: 19). No matter what the answer to this question is, this is not going to be decided on linguistic evidence only.

The previous problems could be loosely (almost “metaphorically”) labelled as *external validity* problems, i.e., problems concerning the capacity of the CTMM analyses to be “exported” from language to other areas of cognition. Additionally, some other authors have pointed out at “internal validity” issues, that is, problems which deal with the linguistic method itself. The problems in this area concern the lack of an explicit, reliable methodology. Most of the analyses carried out within the CTMM depend to a substantial extent on the subjectivity of the analyst. As a matter of fact, methodology issues are simply not discussed in most cases (recent studies have acknowledged this fact, e.g. Kovecses, 2005 or Soriano, 2005); the assumption is that the analyst has followed some of the processes described at the beginning of this section (i.e., gather linguistic expressions, classify them according to some similarity measure and attempt to find mappings from two domains that will explain the greatest number of expressions). This means that most of the times, such analyses are not easily replicable (let alone falsifiable). When the classification of phenomena depends on the intuition of the analyst, there is no clear way in which in-between cases can be ascribed to one or another metaphorical category.

The aforementioned method works with the clearest examples of each metaphorical mapping, but when one approaches large-scale analysis of corpora, the system seems more complicated.<sup>2</sup> Also, we find that there are many metaphors which give rise to a small group of expressions (which adds the complication of having to claim that the mind is organized in a specific way judging from just a few examples).

One of the solutions to these problems can be found in the notion of converging evidence. Evidence coming from different sources, different disciplines using different methodologies all of them pointing in the same direction could be taken to be more convincing. In this alliance of methodologies, empirical methods can play a highly significant role. After all, empirical data holds a privileged status in science; we could say that, with some exceptions, science is empirical. Surely, one isolated experiment is not enough, but linguistic, psycholinguistic and neurolinguistic evidence together could well tilt the balance in a given direction. In the next section we review some of the ways in which empirical evidence can contribute to this debate.

## **4 Empirical studies on metaphor**

There have been many empirical studies on metaphor and figurative language, far too many to even attempt a representative summary of them in this paper. However, most of these studies have not been specifically focused on testing the CTMM. Probably, the most comprehensive survey on psycholinguistic experimentation on metaphor is Gibbs's *The Poetics of Mind* (1994). This fundamental work reviews not only psycholinguistic research on metaphor, but also on the nature of literal vs. figurative language, child metaphorical language acquisition, metaphorical language processing, metonymy and a number of other areas where metaphor comes in to play (like irony or idioms). Two quite recent reviews of empirical studies are Soriano (2005) and Torralbo et al (in press). In this section we will present some examples of works which are directly related to the CTTM, trying to give a sense of how the empirical testing of this theory can be conducted. We will review several methodologies, ranging from behavioral and reaction time studies or gesture studies, to other more sophisticated analyses involving the use of more complex equipments, such as eye-tracking, ERPs or fMRIs.

### **4.1 Behavioural and reaction time studies**

One recent and much cited contribution is Boroditsky's work on the conceptualization of time (Boroditsky, 2000, 2001; Boroditsky and Ramscar, 2002). This scholar

has shown that we do not only talk about time in terms of space, but actually think of time in terms of space.

For example, Boroditsky and Ramscar (2002) tested the existence of the complementary EGO-MOVING and TIME-MOVING metaphors of time (Lakoff & Johnson, 1980). According to these mappings, time is conceptualized as either moving in our direction while we stand still (TIME-MOVING, e.g., Christmas is coming soon) or as being still while we move towards it (EGO-MOVING, e.g., We are approaching that time of the year when shopping becomes the national sport). If our concept of time is constructed with structure from the SPACE domain, then getting people to think about space in a particular way should influence how they think about time. Boroditsky and Ramscar used the sentence *Next Wednesday's meeting has been moved forward two days* to test such hypothesis. The sentence is ambiguous, as it can mean that the meeting would take place on the following Friday or on the previous Monday. They asked informants to say which day of the week the sentence was referring to and the task was performed under a number of circumstances. In the first one, subjects were previously instructed to either imagine forward motion towards an object, or an object approaching them. In the first case the EGO-MOVING metaphor of time was primed and subjects mostly responded that the day referred to in the sentence was Friday. In the second case the kind of motion imagined activated the TIME-MOVING metaphor, which in turned favored the "Monday" answer.

Interestingly enough, the same results were also obtained when people were physically experiencing motion of these two sorts. For example, the scholar showed the ambiguous sentence to a group of people standing in a lunch-line in a cafeteria. The longer people had been advancing on the line (approaching food), the more they chose Friday as the date referred to in the sentence. This pattern is due to the greater activation of the EGO-MOVING metaphor resulting from their real physical behavior. The following chart summarizes the results (from Boroditsky and Ramscar, 2002: 187). The same pattern of results was obtained with people who were waiting for somebody at the airport, who were about to fly or who had just flown in (less to more ego-moving coherent responses in that order).

Another study, this time involving reaction time, is Valenzuela & Soriano (in press), which used a priming task to test whether speakers activate certain metaphorical mappings during on-line processing, such as ANGER IS A HOT FLUID IN A CONTAINER, ANGER IS AN AGGRESSIVE ANIMAL or ANGER IS AN OPONENT. In this study, subjects were shown a number of stories; the last sentence of these stories could be either a metaphorical expression (i.e., *estar hasta la coronilla*, lit. 'to be up to the crown', related to the ANGER IS A HOT FLUID IN A CONTAINER metaphor), a literal paraphrase of the metaphorical expression (e.g.,



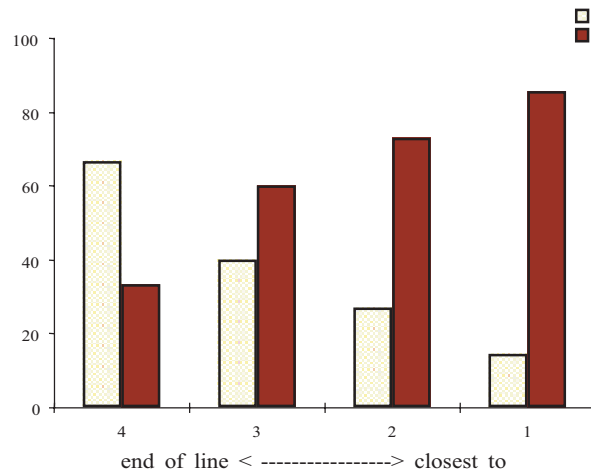


Figure 1: The meeting has been moved forward two days. Experimental results (Boroditsky and Ramscar, 2002)

*estar muy enfadado* 'to be very angry'), or an unrelated control phrase (e.g., *No me des más excusas* 'don't give me any more excuses'). Immediately after reading this, they were presented with a Lexical Decision Task, that is, they had to decide whether a letter string was a word in their language or not. Some of these target words were related to the metaphor and some were not. When the last sentence of the story was a metaphorical expression, people were generally faster responding to the metaphor-related than to the metaphor-unrelated target words. For example, after reading the idiom *estar hasta la coronilla* the mean reaction time to the target word *contenedor* 'container' was 1.05 s, while for *conquistador* 'conqueror' it was 1.255 s. Not only did subjects recognize the metaphor-related target word faster than the non-related after reading the metaphorical expressions, they also recognized metaphor-related targets faster after reading a metaphorical expression than after reading a literal expression or a control phrase. These priming effects support the hypothesis that at least some conceptual metaphors are conceptual structures stored in our minds.

## 4.2 Gesture studies

Another source of evidence for the psychological reality of conceptual metaphors can be the study of gesture and other non-verbal means of expression (e.g. Cienki, 1998). Probably the foremost researcher in this area is David McNeill, who in

his classical work *Hand in Mind* (1992) explored the relationship of gesture and language and argued for a common origin in both of them: an imagistic representation from which both specific linguistic forms and gesture would emerge. This was hypothesized on the basis of at least three sorts of evidence. First, the striking cross-cultural similarity of the gestures that accompany functionally equivalent linguistic expressions - despite those expressions being extremely disparate in form. Second, evidence from language and gesture acquisition. According to McNeill, the fact “that children’s speech and gestures develop together suggests that they are components of a single system from the earliest periods. From age two or so onwards, the two never seem to be separate. This is one argument for considering speech and gesture to be two aspects of a single process” (p. 295). Third, gesture and language necessarily co-occur and seem to complement each other in use. Gesture can add semantic nuances, reduce ambiguity by producing context for linguistic expressions, make explicit the implied, change the pragmatic purpose of the utterance, highlight the main topic, organize discourse, etc (Butterworth and Beattie, 1978; Dancygier & Sweetser, 1996; Duncan, 2001; Kendon, 1995, 2000; Sweetser, 1998; Webb, 1996). In Kendon’s words, “speech and gesture are co-expressive of a single inclusive ideational complex, and it is this that is the meaning of the utterance” (Kendon, 2000: 61).

McNeill’s proposal of a common origin of language and gesture is relevant to the CTMM because it has been discovered that language and gesture realize the same conceptual metaphors. In many cases our gestures and the accompanying linguistic expressions instantiate the same mapping—although it can also happen that metaphors in both mediums differ or gesture uses metaphor while the accompanying language does not (Cienki, 1998, Sweetser, 1998). Cienki (1998: 203) also notes that gesture can anticipate the same conceptual metaphor that is going to follow in language, an observation that gives support to the claim that metaphor is not a question of language but of thought.

### 4.3 Eye-tracking studies

Eye-tracking studies follow the gaze of subjects when looking at a given stimulus; their eye-movements are recorded and later used to analyze the subject’s on-line cognitive processing. Eye-tracking has proved extremely useful in the investigation of several areas of language processing.

Frisson and Pickering (1999) performed a couple of eye-tracking experiments using metonymic sentences as the stimuli. Eye-tracking was preferred to the more traditional method of measuring reaction times after reading whole sentences because “it provides evidence about processing during the first few hundred millisec-

onds after encountering the stimulus” (p. 1378). Thus, eye-tracking readings are in their opinion more reliable to investigate the real nature of metonymy processing. The authors found that the difficulty in processing sentences with metonymic meanings (Ron heard that the professor addressed the academy) was comparable to those with literal meanings (*We were told that the dean walked into the academy*), but that expressions without a relevant metonymic interpretation (*Ron heard that the professor addressed the bedroom*) caused difficulty for readers. More specifically, the experiments showed that “readers could obtain place-for-event and place-for-institution metonymic interpretations as soon as the critical word was encountered; in contrast, words with no relevant metonymic interpretation caused disruption in the eye-movement record” (p. 1380). This is evidence that literal and metonymic expressions are processed equally easily (simultaneously, according to the authors), and that context plays an important role in metonymy processing (as it does in metaphor processing).

#### 4.4 ERPs and fMRI studies

Event-related Potentials (ERPs) and functional Magnetic Resonance Imaging (fMRI) are two methods that tap directly into the activity of the brain as it is performing some cognitive task. ERPs measure the changes in electric potential among different brain areas (produced by the changes in electric potential produced when two neurons communicate in synaptic firing); fMRIs are able to record the differences in oxygen consumption of the different brain areas during a cognitive task, giving therefore a precise measure of which neural areas are active. Both have been started to be used in connection with metaphor studies.

Pynte, Besson, Robichon & Poli (1996) used ERPs to test whether there was a qualitative difference in brain activity when people comprehend literal vs. metaphoric language; their study did not reveal any such difference, a finding which could be taken to be consistent with the CTMM. To be more specific, their results support a context-dependent account of metaphor comprehension, that is, no differences are found in processing between literal and metaphorical language provided the context is relevant enough. A study of a similar sort was carried out by Coulson, Federmeier, Van Petten & Kutas (2005), who also used ERPs to ascertain differences between literal and figurative language. Their results showed a continuum in difficulty; what these authors propose is that the processing difficulty associated with figurative language is actually related to the complexity of the mapping across domains and of the conceptual integration to be performed (Fauconnier & Turner, 2004).

While fMRIs studies on metaphor and metonymy are scarce, Tim Rohrer has

been using them to determine whether Lakoff's idea about the neural bases of metaphor is correct or not. Rohrer (2004) has measured fMRI responses to sentences containing the word 'hand' in a literal sense (e.g., *I handed him a beer*) or a metaphorical sense (e.g., *I handed him the project*). His results show a great degree of overlap in the brain areas activated when processing both sentences, which this author interprets as proof that the embodiment theory of meaning (i.e., that abstract metaphorical thought has a sensorimotor base) is correct.

#### 4.5 What stills needs to be done

As we have seen, empirical evidence about the existence and behavior of metaphorical mappings can be gathered from a number of sources and using different methodologies: experiments (reaction time, priming, self-paced reading tasks, memory tasks, paraphrasing, surveys, questionnaires, etc.), or using more sophisticated machinery, such as eye-trackers, ERPs or fMRIs. Some of these mechanisms could help in deciding some of the theoretical points which have to be further elaborated by the CTMM. The following is a partial list of these yet unexplained issues:

- What are the restrictions on what gets mapped and what does not in metaphors. We know that not all information pertaining to a source domain can be used in a mapping to a target domain; however, what types of constraints apply in these cases has only been hinted at. Are these constraints related to task, individual, social group, culture?
- What are the circumstances in which metaphorical mappings are used in on-line processing? Does this depend on task, individual, member of a social group? Though the internal structure of many metaphors seems to be quite similar, this cannot be taken to mean that all cases susceptible of a metaphorical analysis are used in on-line processing by all speakers of a language.
- What are the constraints which are imposed by general purpose mechanisms, such as cognitive complexity, etc. and which are the constraints stemming from cultural-linguistic specificity, that is, sanctioned by a given social group? To express it in other words, how universal or how language-culture specific are metaphorical mappings? Do all cultures tend to favor the same source domains? The same target domains? Do they perform the same mappings between equivalent source and target domains? If different cultures sanction different metaphorical mappings to reason about abstract concepts, how does this impinge on the question of Linguistic Relativity (i.e. the Sapir-Whorf Hypothesis)

- How do we choose between alternative metaphors? Are there different types of metaphor in terms of their involvement in on-line processing? (i.e., are there 'dead' metaphors which have been used at some historical point in a given language, but are no longer 'active'?).
- What is the real use of metaphorical mappings, i.e., is their main function the enablement of certain reasoning patterns about abstract concepts, or are they necessary for the communicating of these abstract concepts, or perhaps for some other function? · · What are the brain bases of metaphor, i.e., the true relationship between sensorimotor and higher cortical areas of the brain? Are metaphorical mappings stored in long-term memory or are they computed on-line due to contextual pressure?

These are all pressing questions that need to be answered and we will surely need interdisciplinary cooperation to achieve this goal, which means that cognitive linguists will have to be aware of any developments coming from neighboring cognitive sciences.

## **5 Conclusion**

The overall thrust of this paper has not been to say that linguistics should stop proposing analyses before they have been empirically tested. It would be an oversimplification to advocate "linguistics proposes, psycholinguistics disposes". In no way would we want to suggest that introspection should play no role whatsoever in linguistic theorizing. Nor would we want to suggest that all linguists should become psycholinguists (or the other way round). This paper should rather be understood as a gentle reminder to cognitive linguists that we should do our best not to isolate analyses from empirical approaches. We have to be aware that, at some point in time, empirical validation has to enter the theorizing chain. Instead of a restriction, this could (and certainly, should) be seen as a great opportunity for linguists to expand their tasks. Linguists do not have to be limited to pure theory construction, but can instead look at empirical work, and try to work in tandem with other cognitive scientists. The scientific method is a recursive pattern, in which hypotheses are put forward, tested against empirical work and then refined against the results. The ideal situation would find linguists and psycholinguists engaged in fruitful collaboration: linguists would phrase their theories in such a way that they could be subjected to empirical validation by psycholinguists, and psycholinguists would use full-fledged theories of linguistics in the interpretation of their experimental results.

At the very least, we should remember again the “cognitive commitment”: we should be aware of advances in cognitive sciences. There is a wealth of empirical literature we should do our best to be aware of, and that could very well serve as a great source of inspiration to cognitive linguists. It is only from the interaction between all cognitive sciences that a theory much richer and specific in its details and more sound scientifically will ever be attained (which actually means, getting closer to the scientific method, that is, operationalizing theoretical constructs appropriately, working out hypotheses, testing them and refining them in the light of the results). This means that, with all probability, the attempt to empirically test some aspects of the CTMM in a detailed way will necessarily imply the operationalization of some of its theoretical constructs. While this is not always necessary in purely linguistic, descriptive work, it is nonetheless a must in experimental work. The compromises which will have to be reached in these cases could very well supply new sources of constraints for the theory.

As the saying goes, theory without experimentation is hollow and experiments without theory are blind. Empirical research on cognitive metaphor is necessary if we want to liaise more closely with cognitive science, and if we want some evidence beyond linguistic introspective analysis that those processes described by cognitive linguists do take place in the speakers’ minds and are not just functional explanations for certain systematic phenomena.

## Notes

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- 1. Though it could be argued that in quite recent times this tendency is being slowly reversed, and some CL ideas are indeed finding their way in the CS research agendas; especially in some areas of cognitive psychology (e.g. Richardson et al 2003 on image-schemas) and even neuroscience (e.g. Wallentin et al 2005 on fictive motion).
- 2. Of course, this is a problem common to all applied disciplines. As in their case, the participation of more than one analyst in the classification of the data would greatly improve the internal validity of our studies.

## References

- Barcelona, Antonio. 2000. *Metaphor and metonymy at the crossroads*. Berlin and New York: Mouton de Gruyter.
- Barcelona, Antonio & Valenzuela, Javier. 2005. An overview of cognitive linguistics. In Imelda K. Brady, Marta Navarro Coy & Carlos Perriñán Pascual (eds.) *Nuevas Tendencias en Lingüística Aplicada*, Murcia: Quaderna Editorial, 197-230.
- Boroditsky, Lera. 2000. Metaphoric Structuring: Understanding time through spatial metaphors. *Cognition*, 75(1), 1-28.
- Boroditsky, Lera. 2001. Does language shape thought? English and Mandarin speakers' conceptions of time. *Cognitive Psychology*, 43(1), 1-22.
- Boroditsky, Lera & Ramscar, Michael. 2002. The Roles of Body and Mind in Abstract Thought. *Psychological Science*, 13(2), 185-188.
- Brugman, Claudia. 1988. *The story of over: Polysemy, semantics, and the structure of the lexicon*. New York: Garland Publishing, Inc.
- Butterworth, B. & Beattie, G. 1978. Gesture and silence as indicators of planning in speech. In Campbell, R.N. & P.T. Smith (eds.), *Recent Advances in the Psychology of Language: Formal and Experimental Approaches*. New York: Plenum, 347-360.
- Casasanto, Daniel, Boroditsky, Lera, Phillips, Webb, Greene, Jesse, Goswami, Shima, Bocanegra-Thiel, Simon, Santiago-Diaz, Iliia, Fotokopoloum, Olga, Pita, Ria, and Gil, David. 2004. How Deep Are Effects of Language on Thought? Time Estimation in Speakers of English, Indonesian, Greek and Spanish. Paper presented at the 26th Annual Meeting of the Cognitive Science Society, Chicago, IL, USA, 5 August 2004.
- Cienki, Alan 1998. Metaphoric gestures and some of their relations to verbal metaphoric counterparts. In Jean-Pierre Koenig (ed.), *Discourse and Cognition: Bridging the Gap*. Stanford CA: CSLI Publications, 189-205.
- Coulson, S. & Van Petten, C. 2002. Conceptual Integration and Metaphor: An event-related potential study. *Memory & Cognition* 30: 958-968.
- Coulson, S. 2004. Electrophysiology and pragmatic language comprehension. In I. Noveck and D. Sperber (Eds.), *Experimental Pragmatics*. San Diego: Palgrave Macmillan, pp. 187-206.
- Coulson, S., Federmeier, K.D., Van Petten, C., & Kutas, M. 2005. Right hemisphere sensitivity to word and sentence level context: Evidence from event-related brain potentials. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 31,129-147.

- Croft, William. 1998. Linguistic evidence and mental representations. *Cognitive Linguistics* 9, 151-174.
- Dancygier, Barbara & Sweetser, Eve. 1996. Conditionals, discourse and alternative spaces. In Goldberg, Adele (ed.), *Conceptual Structure, Discourse and Language*. Stanford: CSLI Publications, 83-98.
- Duncan, Susan 2001. Perspectives on the co-expressivity of speech and co-speech gestures in three languages. In *Proceedings of the 27th Annual Meeting of the Berkeley Linguistics Society, 27*. Berkeley: The Berkeley Linguistics Society.
- Fauconnier, Gilles, and Turner, Mark. 2004. *The way we think*. New York: Basic Books.
- Frisson, S. & Pickering, M. J. (1999). The processing of Metonymy: Evidence from eye movements. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 25, 1366-1383.
- Gentner, Dedre and Imai, Mutsumi. 1992. Is the Future Always Ahead? Evidence for System-mappings in Understanding Space-time Metaphors. *Proceedings of the Fourteenth Annual Conference of the Cognitive Science Society*, 510-515.
- Gibbs, Ray W., Jr. 1992. Categorization and metaphor understanding. *Psychological Review*, 99, 572-577.
- Gibbs, Ray W., & Matlock, Teenie. 1999. Psycholinguistics and mental representations. *Cognitive Linguistics* 10-3, 263-269.
- Gibbs, Ray W. In press. Why Cognitive Linguists Should Care More About Empirical Methods. To appear in: Monica Gonzalez-Marquez, Irene Mittelberg, Seana Coulson, and Michael J. Spivey (eds.) *Methods in Cognitive Linguistics*. Ithaca: John Benjamins.
- Gibbs, Ray. 1996. What's cognitive about cognitive linguistics? In Casad, Eugene (ed.), *Cognitive Linguistics in the Redwoods*. Berlin and New York: Mouton de Gruyter, 27-54.
- Gibbs, Raymond W., Jr. 1990. Psycholinguistic studies on the conceptual basis of idiomaticity. *Cognitive Linguistics*, 1-4: 417-462.
- Gibbs, Raymond W., Jr. 1994. *The Poetics of Mind. Figurative Thought, Language and Understanding*. New York: Cambridge University Press.
- Gibbs, Raymond W., Jr. 2000. Making good psychology out of blending theory. *Cognitive Linguistics*, 11: 3-4, pp 347-358.
- Glucksberg, Sam. 2001. *Understanding Figurative Language: from Metaphors to Idioms*. New York: Oxford University Press.
- Glucksberg, Sam and McGlone, Matthew S. 1999. When love is not a journey: what metaphors mean. *Journal of Pragmatics*, vol 31, 1541- 1558.



- Glucksberg, S., and Keysar, B. 1993. How metaphors work. In A. Ortony (Ed.), *Metaphor and thought* (2nd ed, pp. 401-424). Cambridge, England: Cambridge University Press.
- Glucksberg, S., Keysar, B., and McGlone, M. S. 1992. Metaphor understanding and accessing conceptual schema: Reply to Gibbs(1992). *Psychological Review*, 99, 578-581.
- Goldberg, Adele. 1995. *Constructions. A Construction Grammar approach to argument structure*. Chicago: University of Chicago Press.
- Gonzalez-Marquez, Mónica, Mittelberg, Irene, Coulson, Seana and Spivey, Michael J. (eds.). In press. *Methods in Cognitive Linguistics*. Ithaca: John Benjamins.
- Kendon, Adam 1995. Gestures as illocutionary and discourse structure markers in Southern Italian conversation. *Journal of Pragmatics*, 23-3: 247-279.
- Keysar, Boaz, Martin Bly, Bridget. 1999. Swimming against the current: Do idioms reflect conceptual structure? *Journal of Pragmatics* 31 (12): 1559-1578.
- Keysar, Boaz, Shen, Yeshayahu I., Glucksberg, Samuel and Horton, William S. 2000. 'Conventional Language: How Metaphorical Is It?' *Journal of Memory and Language* 43: 576-93.
- Kovecses, Zoltan. 1990. *Emotion Concepts*. Springer-Verlag. Kovecses, Zoltan. 2005. *Metaphor in Culture: Universality and Variation*. New York: Oxford University Press.
- Lakoff, George. 1987. *Women, fire, and dangerous things*. Chicago: Chicago University Press. Lakoff, George. 1990. The Invariance Hypothesis: Is Abstract Reason Based on Image- Schemas?, *Cognitive Linguistics*, 1(1), pp. 39-74.
- Lakoff, George. 1993. The contemporary theory of metaphor. In Andrew Ortony (Ed.), *Metaphor and thought* vol. 3 (pp. 201-233). New York: Cambridge University Press.
- Lakoff, George and Johnson, Mark. 1980. *Metaphors We Live By*. Chicago: University of Chicago Press.
- Lakoff, George & Johnson, Mark. 1999. *Philosophy in the Flesh: The Embodied Mind and its Challenge to Western Thought*. New York: Basic Books.
- Lakoff, George and Turner, Mark. 1989. *More Than Cool Reason: A Field Guide to Poetic Metaphor* Chicago: University of Chicago Press.
- McNeill, David. 1992. *Hand and Mind: What Gestures Reveal About Thought*. Chicago: University of Chicago Press.
- Murphy, Gregory L. 1996. On Metaphoric Representation, *Cognition* 60 (1996): 173-204.

- Peeters, Bert. 1998. Cognitive Musings: Review of Geiger, R. A & B. Rudzka-Ostyn (eds.), *Conceptualization and Mental Processing in Language* (Berlin: Mouton de Gruyter, 1993), *Word*, 49(2), pp. 225-237.
- Peeters, Bert. 2001. Does Cognitive Linguistics Live up to its Name? In Dirven, René, Bruce Hawkins and Esra Sandikcioglu (eds.), *Language and Ideology: Volume 1: theoretical cognitive approaches*. 2001. vi, 301 pp.83-106.
- Pynte, J., Besson, M., Robichon, F., & Poli, J. 1996. The Time-Course of Metaphor Comprehension: An Event-Related Potential Study. *Brain & Language*, 55, 293-316.
- Richardson, Daniel, Dale, Richard, & Spivey, Michael. To appear. Eye movements in language and cognition: A brief introduction. In Gonzalez-Marquez, Coulson, Mittelberg, & Spivey (Eds.) *Methods in Cognitive Linguistics*. John Benjamins.
- Richardson, Daniel, Spivey, Michael, McRae, Ken, & Barsalou, Lawrence. 2003. Spatial representations activated during real-time comprehension of verbs. *Cognitive Science*, 27, 767-780.
- Sandra, Dominiek and Rice, Sally. 1995. Network analyses of prepositional meaning: Mirroring whose mind, the linguist's or the language user's? *Cognitive Linguistics* 6, 89-130.
- Sandra, Dominiek 1998. What Linguists Can and Can't Tell You about the Human Mind: A Reply to Croft. *Cognitive Linguistics*, 9, 4, 361-478.
- Soriano, Cristina & Valenzuela, Javier. 2004. A Picture-Word Priming Task as a test for the existence of metaphorical representation. Fifth AELCO/SCOLA Conference, University of Zaragoza, Spain.
- Soriano, Cristina 2005. The Conceptualization of Anger in English and Spanish: a cognitive approach. Doctoral Thesis, University of Murcia.
- Sweetser, Eve. 1990. *From Etymology to Pragmatics: The Mind-as-Body Metaphor in Semantic Structure and Semantic Change*. Cambridge: Cambridge University Press.
- Sweetser, Eve. 1998. Regular metaphoricity in gesture: Bodily-based models of speech interaction. In *Actes du VXIe Congrès International des Linguistes (CIL16) (CD-ROM)*. New York : Elsevier.
- Torralbo, Ana, Santiago, Julio and Lupiañez, Juan (in press). Flexible conceptual projection of time onto spatial frames of reference. *Cognitive Science*.
- Tuggy, David. 1999. Linguistic evidence for polysemy in the mind: a response to Dominiek Sandra and William Croft. *Cognitive Linguistics* 10-4, 343-368.

- Turner, Mark 1991. *Reading Minds: The Study of English in the Age of Cognitive Science*. Princeton: Princeton University Press.
- Ungerer, Friedrich & Schmid, Hans-Jörg. 1996. *An introduction to cognitive linguistics*. London: Longman.
- Valenzuela, Javier & Soriano, Cristina. In press. Reading anger stories: A lexical decision task as a test for the existence of metaphorical representation. To appear in Ibarretxe-Antuñano, Iraide, Carlos Inchaurralde & Jesús Sánchez (eds.), *Language, Mind and the Lexicon*. Frankfurt: PeterLang.
- Wallentin, Mikkel, Lund, Torben Ellegaard, Östergaard, Svend, Östergaard, Leif and Roepstorff, Andreas. 2005. Motion verb sentences activate left posterior middle temporal cortex despite static context. *NeuroReport* 16(5):649-652.
- Webb, Rebecca 1996. *Linguistic features of metaphoric gestures*. Unpublished doctoral dissertation, University of Rochester.