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Experimental and Corpus Studies on Embodied Metaphoric Meaning

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Abstract

An important claim in cognitive science is that much of everyday cognition and language has its roots in ongoing bodily experience. One place where embodiment is critical is in the creation and use of metaphoric talk. This article describes some of the studies from experimental psychology and corpus linguistics demonstrating how metaphoric ideas and talk emerge from embodied simulation processes where people imagine themselves engaging in the actions mentioned in the language (e. g., “grasp the concept”). Some of this newer work demonstrates how experimental studies can test ideas from linguistics, but that corpus studies can also be used to examine falsifiable hypotheses first seen in psychology, on the embodied nature of metaphoric meaning.

1 Introduction

Embodied metaphor refers to the idea that many metaphoric concepts are grounded in recurring patterns of bodily experience (Gibbs, 2006; Lakoff & Johnson, 1999). For example, both “I am struggling to get a good start in my career” and “My marriage is on the rock” refers to the concept that LIFE IS A JOURNEY. People’s journey experiences, where they start at some source point, follow a path, and end up at some goal or destination, are used to better structured more abstract concepts like life or career or relationship. Much research in cognitive linguistics shows the importance of embodied source domains in metaphoric ideas and talk.

To a significant extent, the experimental research on embodied metaphor is seen as verification for cognitive linguistic theories of embodied metaphor. But the rise of new work in corpus linguistics now sets the stage for a different kind of interdisciplinary collaboration between linguists and psychologists. This paper presents one example of this interaction between experimental psychology and corpus linguistics on the topic of embodied metaphor. My aim is to demonstrate some of the ways these two fields can be integrated; especially in regard to testing specific potentially falsifiable hypotheses.

2 Experimental Studies on Embodied Metaphor

Many psycholinguistic studies have been conducted over the last 25 years to explore the ways that embodied metaphors may be recruited during people's use and understanding of metaphoric language (Gibbs & Colston, 2012). These varied psychological findings, collected using a variety of experimental methods, indicate that the metaphorical mappings between embodied source domains and abstract target domains partly motivate people's understanding of the specific figurative meanings of many conventional and novel metaphors.

For example, some experiments examined how immediate bodily experience influence metaphor interpretations. In one series of studies on metaphorical talk about time, students waiting in line at a café were given the statement "Next Wednesday's meeting has been moved forward two days" and then asked "What day is the meeting that has been rescheduled?" (Borodistky & Ramscar, 2002). Students who were farther along in the line (i. e., who had thus very recently experienced more forward spatial motion) were more likely to say that the meeting had been moved to Friday, rather than to Monday. Similarly, people riding a train were presented the same ambiguous statement and question about the rescheduled meeting. Passengers who were at the end of their journeys reported that the meeting was moved to Friday significantly more than did people in the middle of their journeys. Although both groups of passengers were experiencing the same physical experience of sitting in a moving train, they thought differently about their journey and consequently responded differently to the rescheduled meeting question. These results suggest how ongoing sensorimotor experience has an influence on people's comprehension of metaphorical statements about time.

One idea that has attracted a good deal of attention in cognitive science is the possibility that much cognition and language is organized around embodied simulation processes (Gibbs, 2006). Several different behavioral studies provide support for the view that embodied simulations play some role in people's immediate processing of verbal metaphors (Gibbs, 2006). People may create partial embodied simulations of speakers' metaphorical messages that involve moment-by-moment "what must it be like" processes that make use of ongoing tactile-kinesthetic experiences (Gibbs, 2006). Understanding abstract, metaphorical events, such as "grasping the concept," for example, is constrained by aspects of people's embodied experience as if they are immersed in the discourse situation, even when these events can only be metaphorically and not

physically realized (i. e., it is not physically possible to grasp an abstract entity such as a “concept”).

For instance, people’s speeded comprehension of metaphorical phrases, like “grasp the concept” are facilitated when they first make, or imagine making, a relevant bodily action, such as a grasping motion (Wilson & Gibbs, 2007). One unique study revealed that people walked further toward a target when thinking about a metaphorical statement “Your relationship was moving along in a good direction” when the context ultimately suggested a positive relationship than when the scenario alluded to a negative, unsuccessful relationship (Gibbs, 2012). This same difference, however, was not obtained when people read the nonmetaphorical statement “Your relationship was very important” in the same two scenarios. People appear to partly understand the metaphorical statement from building an embodied simulation relevant to LOVE RELATIONSHIPS ARE JOURNEYS, such that they bodily imagine taking a longer journey with the successful relationship than with the unsuccessful one.

A different set of experiments examined people’s understanding of the embodied metaphor TIME IS MOTION by first asking people to read fictive motion sentences, as in “The tattoo runs along his spine” (Matlock, Ramscar, & Boroditsky, 2005). Participants read each fictive motion statement or a sentence that did not imply fictive motion (e. g., “The tattoo is next to the spine”), and then answered the “move forward” question (e. g., “The meeting originally scheduled for next Wednesday has been moved forward two days.”). People gave significantly more Friday than Monday responses after reading the fictive motion expressions, but not the non-fictive motion statements. These results implies that people inferred TIME IS MOTION conceptual metaphor when reading the fictive motion expressions which primed their interpretation of the ambiguous “move forward” question.

A follow-up group of studies had people engage in abstract motion to see if it influenced their responses to the “move forward” questions (Matlock et al., 2011). Participants first filled in the missing numbers in an array that either went in ascending (e. g., between 5 and 17) or descending (e. g., between 17 and 5) order. When the participants then answered the “move forward” question, they gave far more Friday responses after filling in the numbers for the ascending condition and gave more Monday answers having just filled in the numbers for the descending order condition. People appear to understand the meaning of time metaphors through a mental simulation of the implied motion, findings that are congruent with the claim that conceptual metaphors are active parts of verbal metaphor processing.

These different behavioral studies offer support for cognitive linguistic claims about embodied metaphor, but do so in a more systematic manner that allows for specific hypotheses to be tested, and possible falsified.

3 Psycholinguistics and Corpus Linguistic Studies

The experimental studies reviewed above all employed constructed examples, following most cognitive linguistic work on embodied metaphor. But there is now more emphasis in linguistics on corpus studies examining the use of metaphor in naturalistic discourse. For example, read the words *path* and *road* when they are used in the two different metaphorical contexts below, and consider whether they convey the same meaning (Johansson-Falck & Gibbs, 2012):

1. The Spaniard lost 10–8 6–3 2–6 8–6 to Charlie Pasarell in 1967. And even if Agassi survives his first test, his **path** to a second successive final is strewn with trip wire, with former champions Boris Becker and Michael Stich top seed Pete Sampras and powerful ninth seeded Dutchman Richard Krajicek all in his half of the draw. [emphasis ours]
2. The learner who is well on the **road** to being a competent reader does bring a number of things to the task, a set of skills and attributes many of which are still developing. He or she brings good sight and the beginnings of visual discrimination. [emphasis ours]

The meaning of *path* may be appropriate in (1) because of the uneven nature of Agassi's journey toward winning the tennis match, while *road* seems apt in (2) because the journey becoming a competent reader's is well-established, and one that many people have metaphorically travelled. Previous corpus linguistic studies show that metaphorical uses of *path*, *road*, as well as *way*, are not only structured according to primary/conceptual metaphors such as ACTION IS MOTION, LIFE/A PURPOSEFUL ACTIVITY IS A JOURNEY, and PURPOSES ARE DESTINATIONS, but also appear to be influenced by people's embodied experiences with the specific concepts that these terms refer to in their non-metaphorical uses (Johansson Falck, 2010). Thus, both similarities and differences between real world paths, roads and ways are reflected by how metaphorical paths, roads and ways are described both by the kinds and frequencies of obstacles that people face on these journeys, and the kinds of actions people engage in, on, or near metaphorical paths, roads or ways.

Johansson-Falck and Gibbs (2012) conducted two studies, one a psychological questionnaire and the second a corpus linguistic investigation to see if embodied simulation processes are also prominent in people's use and understanding of expressions like *his path to a second successive final is strewn with trip wire* in reference to Agassi's metaphorical journey to a tennis tournament championship as seen in (1) above. Thus, people's embodied simulation in regard to their imaginative understandings of traveling along different paths and roads provides a major constraint on what gets mapped in various metaphorical instances of *path* and *road*.

A first study investigated people's experiences with paths and roads. Participants were given a booklet that first asked them to create a mental image of "being on a path" and then, on the next page, to form a mental image of "being on a road." Following this, the participants turned the page and saw a series of questions, each of which could be answered by circling either the word *path* or *road*. Analysis of participants' responses revealed the following qualities that people strongly felt they experienced along paths and roads.

Paths

Something you travel on by foot
More up and down
More aimless in their direction
Something you stop on more often
More problematic to travel on

Roads

Straighter
Wider
Paved
Lead to a specific destination
Something you drive on

Overall, the results of this first study employing human participants demonstrated that people's imaginative perceptions of paths and roads focus on the more central rather than peripheral aspects of their bodily actions relevant to these real-world artifacts (e. g. on driving, but not walking, on roads, and on walking, but not driving, on paths etc.). Traveling along paths is clearly different in important ways from that of roads.

A second study in this series provided a detailed corpus analysis of 240 metaphorical uses of *path* and 47 instances of *road* in the *British National Corpus*. Most generally, the corpus findings matched the intuitions we obtained in our first psychological study. For instance, *path* was frequently used to talk of more difficult, and varied, difficulties in travel in these contexts (23%), but roads were never used in this way. On the other hand, only 12% of the *path* examples, but 60% (based on only 3 of 5 instances) of the *road* instances included explicit mention about where the artifact leads (i. e. *to eternity, to ruin, to stardom*). The same differences are seen in the ways that *path* and *road* are used to describe the target domain of PURPOSEFUL ACTIVITIES/LIVES. Again, there were many more mentions of the difficulties associated with travel along *paths* (38%) than *roads* (13%). These difficulties may be related to obstacles in or on the path/road (e. g., *their path to a winning was obstructed by an excellent performance from India*, or *the constant traps and barriers laid by the forces that would block our path and drag us down*), or they correspond to a difficult area that someone or something is leaving or trying to leave e. g., (*[people] seek a path out of divisive ideological camps*, or *break though the barriers of error to seek the road to truth*).

Paths, but not roads, are connected with choices between alternative courses of action. 21% of the *path* instances with the function of describing PURPOSEFUL ACTIVITIES/LIVES, but none of the *road* cases included words or phrases suggesting that there may be more than one path to achieve a goal (e. g. *only, best, the same, typical, a different path to the same goal*). The term *road*, on the other hand, is more often used in talk about activities that people want to be efficient than paths (e. g., PURPOSEFUL ACTIVITY/LIFE and financial/political developments/processes), and *paths* are more often used to describe actions or developments that may have a more hesitant, aimless, or step by step, quality than *roads* (e. g., COURSES OF ACTION/WAYS OF LIVING, other types of DEVELOPMENT and paths in COMPUTER/MATHEMATICS DEVELOPMENTS/PROCESSES). *Path* is used in talk about processes and *road* in talk about ends of processes and result. Finally, *path* is more closely connected to choices between different courses of action, compared to the much more efficient and single goal-oriented *road*.

The link between people's imaginative understandings of paths and roads and the metaphorical uses of *path* and *road* in discourse has several theoretical implications. First, people mentally simulate different kinds of actions in journeys along paths and roads and apply these experiences to shape their in-the-moment metaphorical understandings of abstract actions through the use of *path* and *road*. Second, the consistent patterns of findings for the psychological survey and the corpus investigation suggest

that metaphorical language including terms that refer to artifacts is to some significant extent predictable. Most importantly, our combination of a psychological investigation of people's experiences of paths and roads with an extensive corpus analysis of metaphorical *path* and *road* shows that neither a conceptual metaphor theory explanation in terms of mappings at the levels of primary or complex metaphor, nor a purely social theory in which the use of *path* and *road* are negotiated between speakers, sufficiently account for the link between metaphorical meaning, mind and world. Instead, people's imaginative perceptions of paths or roads are influenced by their understandings of these artifacts through embodied experience, which can then be simulated in the context of metaphoric thinking and speaking.

4 Conclusion

There is a large body of both experimental and corpus linguistic work on the embodied nature of many metaphoric concepts. The studies described in this article show how experimental and corpus research can nicely feed one another to create hypotheses that can be tested using either experimental or corpus linguistic methods. More specifically, cognitive linguistic studies strongly suggest that people's recurring bodily experiences critically motivate aspects of their metaphoric talk. Psycholinguistic studies confirm that different sensorimotor experiences directly shape people's use and understanding of various metaphorical statements. But the psycholinguistic work is limited in testing people's immediate understanding of individual metaphors and does not explore the role of embodiment in larger discourse contexts. However, recent corpus linguistic research has demonstrated how specific hypotheses can be tested by examining detailed patterns of metaphoric language use within naturalistic speech and text (also see Stefanowitsch, 2011). This work shows that the metaphorical uses of certain words is not simply a social process or accomplished via the direct activation of encoded primary or conceptual metaphors. Instead, similar to the experimental research, corpus linguistic methods are capable of revealing the constraining presences of embodied simulation processes in the ways people think and speak of different abstract, and in this case metaphorical, concepts. In this way, then, corpus linguistic analyses do not simply offer ideas for possible testing using behavioral methods, but can be the site of testing explicit hypotheses themselves.

Embodied experience seems critical to people's use and understanding of metaphoric idea and language, a conclusion that vastly differs from traditional disembodied theo-

ries of metaphorical meaning and language use. Of course, many other factors, ranging from purely linguistic, social and cultural processes also shape the creation and interpretation of metaphoric discourse. But it is unlikely that any of these forces can act alone, apart from the influence of bodily activity. The studies described in this article provide additional evidence that the embodied nature of metaphoric concepts is best characterized in terms of embodied simulation hypotheses in which people imagine themselves engaged in the actual events mentioned in the language, even when these involves actions that are physically impossible to perform in the real world.

5 References

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