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Embodied motivations for metaphorical meanings*

MARLENE JOHANSSON FALCK and RAYMOND W. GIBBS, JR.

Abstract

This paper explores the relationship between people's mental imagery for their experiences of paths and roads and the metaphorical use of path and road in discourse. We report the results of two studies, one a survey examining people's mental imagery about their embodied experiences with paths and roads, with the second providing a corpus analysis of the ways path and road are metaphorically used in discourse. Our hypothesis is that both people's mental imagery for path and road, and speakers' use of these words in metaphorical contexts are strongly guided by their embodied understandings of real-world events related to travel on paths and roads. The results of these studies demonstrate how bodily experiences with artifacts partly constrains not only how specific conceptual metaphors emerge, but how different metaphorical understandings are applied in talk about abstract entities and events.

Keywords: Metaphor; Embodied simulation; Psycholinguistics; Corpus linguistics.

1. Introduction

How do our bodily experiences motivate metaphorical meaning? 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.

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- (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 toward becoming a competent reader is well-established, and metaphorically well-travelled. The question explored in this article is whether people's experiences with different real-world paths and roads are predictable of how speakers use these two terms in talking about metaphorical journeys. We report the results of two studies, one a survey examining people's mental imagery about their embodied experiences with paths and roads and another a corpus analysis of the ways *path* and *road* are metaphorically used in discourse. Our hypothesis is that both people's mental imagery for *path* and *road*, and speakers' use of these words in metaphorical contexts are strongly guided by their embodied understandings of real-world events related to travel on paths and roads.

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, in press a). 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. These findings highlight the possibility that both similarities and differences between people's experiences of paths and roads in everyday life should influence the specific discourse functions of *path* and *road* as metaphor vehicles.

But there is still the need, in our view, to better establish a motivating link between people's real-world experiences of paths and roads and specific patterns of how *path* and *road* are used metaphorically in discourse. We more closely examined this possible connection by first collecting people's intuitions about their embodied experiences of paths and roads, and then using these nonlinguistic data to make predictions about extensive patterns of meta-

phorical *path* and *road* in the *British National Corpus (BNC)*. This strategy of studying people's folk ideas about some bodily or real-world experience and then using that data to predict people's metaphorical language use has been productively exploited in several previous psycholinguistic studies (Gibbs 1992; Gibbs et al. 1994). Yet the present studies extend previous work in psycholinguistics by applying the results from a psychological survey to corpus data, particularly in regard to the way journeys are perceived in path and road events, which provides a better reflection of ordinary metaphorical language use than that typically studied in psycholinguistic experiments.

At the same time, the present studies were motivated by emerging ideas in both cognitive linguistics and psychology that people's use and understanding of both metaphorical and non-metaphorical language is guided by processes of embodied simulation (Bergen 2007; Gibbs 2006a, 2006b; Gibbs & Matlock 2008). Most generally, an embodied simulation is understood as the "reenactment of perceptual, motor, and introspective states acquired during interactions with world, body, and mind" (Barsalou 2008: 618). Much behavioral and neuroscience research demonstrates how conceptual processing involves sensorimotor simulations (Gibbs 2006a). These experimental studies indicate that people's recurring embodied experiences often play a role in how people tacitly make sense of many metaphoric words and expressions.

For example, people's mental imagery for metaphorical phrases, such as *tear apart the argument*, exhibit significant embodied qualities of the actions referred to by these phrases (e.g., people conceive of the "argument" as a physical object that when torn apart no longer persists) (Gibbs et al. 2006). Wilson and Gibbs (2007) showed that people's speeded comprehension of metaphorical phrases like *grasp the concept* are facilitated when they first make, or imagine making, in this case, a grasping movement. Bodily processes appear to enhance the construction of simulation activities to speed up metaphor processing, an idea that is completely contrary to the traditional notion that bodily processes and physical meanings are to be ignored or rejected in understanding verbal metaphors (cf. Gibbs 1994). Furthermore, hearing fictive motion expressions implying metaphorical motion, such as *The road goes through the desert*, influences people's subsequent eye-movement patterns while looking at a scene of the sentence depicted (Richardson & Matlock 2007). This suggests that the simulation used to understand the sentence, in this case involving a particular motion movement of what the roads do, interacts with people's eye movements.

Experimental findings like these emphasize that people may be creating partial, but not necessarily complete, sensorimotor simulations of speakers' metaphorical messages that involve moment-by-moment "what must it be like" processes, such as grasping, that make use of ongoing tactile-kinesthetic experiences (Gibbs 2006b). These simulation processes operate even when people

encounter language that is abstract, or refers to actions that are physically impossible to perform, such as “grasping a concept” because people can metaphorically conceive of a “concept” as an object that can be grasped. One implication of this work is that people do not just access passively encode conceptual metaphors from long-term memory during online metaphor understanding, but perform online simulations of what these actions may be like to create detailed understandings of speakers’ metaphorical messages (Gibbs 2006b). We maintain that these 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). Thus, people’s embodied simulation in regard to their imaginative understandings of traveling along different paths and roads provides an important constraint on what gets mapped in various metaphorical instances of *path* and *road*.

Another motivation for the work presented here concerns the most appropriate level of generality in explaining patterns of metaphorical language use, in this case the use of *path* and *road* as metaphorical vehicles in discourse. For example, a traditional view of conceptual metaphor theory might presume that people’s use of *path* and *road* in metaphorical ways depends on the recruitment of entrenched conceptual metaphors, such as, again, ACTION IS MOTION, LIFE/A PURPOSEFUL ACTIVITY IS A JOURNEY, and PURPOSES ARE DESTINATIONS. Conceptual, and/or primary metaphors, may offer an important set of general constraints on people’s thinking of and talking about metaphorical journeys, but these conceptual entities do not explain exactly why *path* and *road* are used in specific, and different metaphorical ways in discourse (Johansson Falck 2010).

For example, the idea that LIFE IS A JOURNEY, and its entailment that physical progress along some path/road is progress toward some metaphorical destination, does not explain why *path* seems appropriate in (1), with *road* being most appropriate in (2) above. But viewing conceptual metaphors as embodied simulations, guided by the specific words used by speakers and writers, provides far more details about the motion along the path/road, and the types of obstacles likely encountered along the way, inferences that seem present in people’s different metaphorical uses of *path* and *road*. In this way, our preferred hypothesis on embodied simulations offers a more detailed constraint on metaphorical language use that is still quite general, but operates in a more nuanced manner depending on whether the simulations involve people’s imaginative understandings of real-world paths or roads, and not just journeys more generally.

A complementary theoretical perspective with our own embraces the idea that varied metaphorical patterns of vehicle pairs, such as the German terms *Weg* (i.e., *path*) and *Bahn* (i.e., *course*), and many other uses of metaphor, are best explained in terms of the local interactions between the discourse partici-

pants, and not at the level of pre-existing conceptual analogies or metaphors (Zinken 2007). More specifically, this view maintains,

“the common ground for the negotiation of a figurative interpretation is the stereotypical encyclopaedic knowledge accessed by conventional lexical concepts associated with the vehicle. We should therefore expect that extended meanings are motivated by the particular conventions associated with a lexical item. The assumption that discourse metaphors are form-specific leads to the prediction that different lexical items with similar or overlapping conventional usages, which belong to the same superordinate category function differently as metaphor vehicles.” (Zinken 2007: 451).

Evidence in favor of this alternative perspective comes from a corpus study in German that examined the metaphorical function of different vehicle pairs, including *Weg* (i.e., *path*), and *Bahn* (i.e., *course*). Most generally, people use these two terms differently in metaphorical contexts, with *Weg* primarily referring to the effort used to attain goals, and *Bahn* referring to a pre-determined trajectory followed to reach some metaphorical destination. Zinken suggests from these findings, and from the analysis of other vehicle pairs, that closely similar words often have quite different metaphorical functions, which do not arise from habitual analogies or conceptual metaphors per se, but emerge as specific form-meanings pairings between speakers (i.e., “conceptual pacts”) in different conversational interactions.

We agree that people’s conversational interactions are important in the ways words are used, metaphorically or otherwise, with participants sometimes clearly negotiating the way a word is to be used and understood in specific situations (Clark 1996; Gibbs 1999). But Zinken’s (2007) work did not actually explore people’s real conversational interactions or how various “conceptual pacts” were established for *path* and *course* or any other vehicle pairs studied. Zinken also limited his analysis to only so-called “active metaphors” that required “meta-lexical awareness” as when “the author made use of an interference between lexical concepts” by including a “tuning device” such as “so to speak,” or inverted commas (Zinken 2007: 452). In this way, Zinken did not explore the full range of how any of the vehicle terms he studied were more completely used in discourse. Coherences between patterns at the level of lexical metaphor were not discussed and systematic correspondences at other levels of organization were dismissed as “post-hoc artefact[s] of sorting utterances on the part of researcher[s]” (Zinken 2007: 461) or as an additional layer of analogical schemas that may not be psychologically real.

For these reasons, we suggest that Zinken’s theoretical emphasis on conceptual pacts downplays a key, intermediate level of analysis between abstract conceptual metaphors and local discourse interactions. Our studies explicitly sought evidence for an intermediate level of constraint on metaphor in terms of

people's understandings of real-world artifacts (i.e., paths and roads) as shaped by embodied simulation processes.

2. Study 1: People's imagery for paths and roads

We first explored people's embodied understandings of paths and roads by asking them to imagine themselves "being on a path" or "being on a road" and then giving their ratings to several statements about their mental imagery for these experiences. Our general expectations were that people would give different responses to some of these questions about paths and roads, especially in regard to the types of actions they could make, and what types of properties they typically associated with paths and roads.

2.1. *Methods*

2.1.1. *Participants.* Twenty-four undergraduate students in Psychology at the University of California, Santa Cruz participated for course credit.

2.1.2. *Materials and procedure.* 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*. These questions, shown in Table 1, were designed to elicit people's intuitions about their bodily experiences with paths and roads. The entire task took people only about 5 to 10 minutes to complete.

Table 1. *Proportion of responses to mental image questions in Study 1*

	Path	Road
Which is more likely to have obstacles along the way?	.58	.42
Which is more likely to be straight?	.16	.84
Which is more likely to go up and down?	.71	.29
Which is more likely to be wide?	.04	.96
Which is more likely to be paved?	.04	.96
Which is more likely to go through problematic terrain?	.87	.13
Which is more likely to take you to a specific destination?	.21	.79
Which is more likely to make you move fast?	.13	.87
Which is more likely to move you along in an aimless way?	.79	.21
Which is more likely for you to enjoy traveling?	.83	.17
Which is more likely for you to stop every now and then?	.83	.17
Which is more likely for you to be driving on?	.00	1.00
Which is more likely for you to be biking on?	.54	.46
Which is more likely for you to be moving along on foot?	1.00	.00

2.2. Results and discussion

Table 1 presents the proportion of times participants selected either *path* or *road* as answers to the 14 different questions. Chi-square statistical analyses on these data revealed that people thought of roads as being straighter than paths, $\chi^2(1) = 10.67, p < .001$; paths as being more up and down than roads, $\chi^2(1) = 4.17, p < .05$; roads as being much wider than paths, $\chi^2(1) = 20.17, p < .001$; roads as being more paved than paths, $\chi^2(1) = 20.17, p < .001$; paths as having more problematic terrains than roads, $\chi^2(1) = 15.08, p < .001$; roads as leading to specific destinations more than paths, $\chi^2(1) = 8.17, p < .01$; roads as being able to move fast on more so than paths, $\chi^2(1) = 13.5, p < .001$; paths as being more aimless in their direction than roads, $\chi^2(1) = 8.17, p < .001$; paths being more enjoyable to travel on than roads, $\chi^2(1) = 10.67, p < .001$; paths as something one stops on more often than roads, $\chi^2(1) = 10.67, p < .001$; roads as being something you drive on more than paths, $\chi^2(1) = 24.0, p < .001$; and paths as being something you travel on foot more so than roads, $\chi^2(1) = 24.0, p < .001$. The differences in people's choices of path and road for the obstacles and biking on questions were not statistically significant.

These results offer a compelling picture of the differences in people's embodied understandings of the artifacts paths and roads. Most generally, people think of paths as being more problematic to travel on, more up and down, more aimless in their direction, something that you stop on more often, and something you travel on foot significantly more often than is the case for roads. On the other hand, roads are viewed as straighter, wider, paved, leading to a specific destination, and something you drive along far more than is the case for paths.

One way of characterizing these findings is in terms of what paths and roads afford in terms on their possible, relevant bodily actions (Gibson 1979). Under this view, people do not perceive paths and roads apart from the actions they could possibly perform with each of these artifacts. Our perceptual systems evolved to facilitate the interaction with a real, three-dimensional world, so that perception is not a purely visual experience, taking place in the brain, but an act of the entire organism through guided exploration of the environment. People's knowledge of paths and roads, therefore, is deeply intertwined with the possible embodied possibilities that each of these artifacts affords, called "affordances," and is not simply a static catalogue of perceptual features of paths and roads. Under this view, motion should be highly relevant for participants' experiences of both paths and roads, but driving and heading for a specific destination are more relevant to people's experiences of roads, while walking, being aimless, and traveling on difficult terrains are more relevant to their experiences of paths.

Overall, the results of Study 1 demonstrated that people's understandings of paths and roads focus on what appears to be 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. There is, however, a simple alternative explanation for the findings of Study 1 that is worth some consideration. People's different intuitions about paths and roads may be due to their retrieval of the conventional, semantic meanings for the words *path* and *road* and not from their embodied experiences with paths and roads. Of course, there may be links between people's understanding of word meanings and their experiences of the real-world referents for these words. Speakers may actually build richer understandings for the concepts of path and road given their vast experiences with the words *path* and *road* in different contexts, both metaphorical and otherwise.

Cognitive linguistic research on metaphor has not generally focused sufficiently on the role of linguistic meaning in the creation and continued use of metaphorical concepts, because of its strong emphasis on the experiential grounding of linguistic structure and behavior (Gibbs & Tendahl in press). To some extent, Zinken's (2007) project correctly attempts to highlight the significance of linguistic interaction in how people come to metaphorical understandings of different words. Despite our concerns about the limitations of his study, we fully agree that language use is a critical constraint on the way people conceive of different real-world entities (cf. Clausner and Croft 1997), including the artifacts of paths and roads.

We evaluated the specific idea that people's intuitions about their experience with paths and roads comes exclusively from their understandings of the conventional meanings of the words *path* and *road*. Determining the contents of any word meaning in people's mental lexicon is quite challenging. Nonetheless, we can look at the ways communities of people define *path* and *road* by examining different dictionary entries for these words to see if they contain evidence of the very specific intuitions about path and road observed in Study 1.

We did this by examining the listed senses of *path* and *road* in five dictionaries of American English [e.g., *The American College Dictionary (ACD)*, *The American Heritage Dictionary of the English Language (AHDEL)*, *NTC's Thesaurus of Everyday American English: The Most Practical Resource for American English (TEAE)*, *Webster's New Encyclopedic Dictionary New rev. ed. 1996 (WNED)*, and *Merriam-Webster online dictionary (MW)*]. All the dictionaries first list specific definitions that apply to actual paths and roads (e.g., a *path* is "a way beaten or trodden by feet of men or beasts" and a *road* is "a clearly marked, often paved, way from one place to another," or "a place less enclosed than a harbor where ships may ride at anchor"). But the dictionaries differ in terms of which sense they list first, and the generality of each definition. For instance, some dictionaries first listed meanings of *road* that referred to a constructed way for the passage of vehicles, while others first list those

that refer to a roadstead. There was also variation with respect to which definitions were listed. Some dictionaries, but not all, listed definitions that are general enough to be applicable to both concrete and metaphorical uses of a word (e.g., “a route, course, or track in which something moves”), definitions that apply to a roadstead, a railroad/railway, a garden path, or a track, or to metaphorical senses (e.g., “a course of action, conduct or procedure”). Finally, the dictionaries differed with respect to the circularity of their definitions. For instance, one of the dictionaries (*AHDEL*) first defined *path* as a “[a] trodden track or way” and *road* as a “an open way, generally public, for the passage of vehicles, persons, and animals”, but then stated that *path* is “[a]ny road, way or track” and *road* is “[a] course or path.”

Despite these differences, we examined each of the five dictionaries’ entries for *path* and *road* and noted instances where a particular sense was identical to any of the students’ strong intuitions about their embodied images of paths and roads obtained in Study 1. Table 2 presents a tally of the cases of overlap between dictionary definitions and participants’ responses to the different questions posed in Study 1. For example, Study 1 showed that people viewed roads as being significantly more likely to be straight than were paths (Question 2). Yet none of the dictionaries gave any indication that a *road* was defined as being straight. Similarly, participants in Study 1 viewed paths as being more likely to go up and down than roads, but none of the dictionaries made any mention of this as being a sense of the word *path*. On the other hand, all five dictionaries noted that paths are usually traveled along by foot (Question 4), while four dictionaries stated that people usually drive on roads (Question 12).

Table 2. *Comparison between dictionary definitions and participants’ responses to the questions posed in Study 1*

		Dictionaries				
		ACD	AHDEL	TEAE	WNED	MW
Question 2 (straight)	road					
Question 3 (up/down)	path					
Question 4 (wide)	road	X			X?	X?
Question 5 (paved)	road	X	X?	X		
Question 6 (probl.terrain)	path					
Question 7 (destination)	road			X		X
Question 8 (move fast)	road					
Question 9 (aimless way)	path					X
Question 10 (enjoy)	path					
Question 11 (stop)	path					
Question 12 (driving)	road	X	X		X	X
Question 14 (on foot)	path	X	X	X	X	X

There were some cases in which the listed definitions for *path* or *road* could lead one to infer some characteristic that was congruent to participants' responses in Study 1. For instance, according to (*MW* and *WNED*), *road*, but not *path*, is "an open way for vehicles, persons and animals" while paths are "trodden" (*MW*) or "formed by repeated footsteps" (*WNED*). The fact that roads are connected with vehicles and paths formed by footsteps seems to suggest that roads are wider. None of these two dictionaries, however, explicitly say which artifact is wider. Nonetheless, we included the ambiguous cases of inferred understanding in our analysis, but marked these separately as X? to indicate the uncertainty over whether a dictionary really contained that sense and was related to some specific intuition observed in Study 1.

In general, an analysis of the proportion of times that the five dictionaries listed definitions that were congruent with participants' intuitions in Study 1 showed an overlap of 12 out of 60 possibilities (20%), when adopting a strict criterion (e.g., exact match between definition and embodied intuition), and an overlap of 17 out of 60 possibilities (28%), when the ambiguous cases were included. These data are inconsistent with any claim that participants' responses in Study 1 about their images of paths and roads are due simply to people's understanding of the conventional meanings of *path* and *road*. To the extent that dictionaries reflect something of people's conventional understandings of *path* and *road*, the standard meanings of these terms was not nearly rich or extensive enough to account for people's responses in Study 1. We hasten to add, though, that people's broad experiences with the words *path* and *road* may still shape aspects of their understandings of how paths and roads work in the real-world (cf. Johansson Falck in press b). This issue will be discussed later.

3. Study 2: Corpus analysis of path and road

Study 2 provides a detailed analysis of the metaphorical functions of *path* and *road* in discourse as seen in the *British National Corpus* (*BNC*). Our general hypothesis, again, was that the metaphorical use of *path* and *road* should reflect people's embodied simulations for their actions related to traveling along paths and roads in the real world. Differences between imaginary paths and roads should result in differences between the metaphorical uses of these terms. We expected to find strong correspondences between people's intuitions of their experiences with paths and roads and their metaphorical uses of the words *path* and *road* in discourse. The participants in Study 1 were United States students, and the discourse examined in Study 2 was British English. Of course, American and British English differ in certain respects, with speakers of both possibly having different metaphorical understandings of *path* and *road*. Yet our basic claim is that the metaphorical uses of *path* and *road* are strongly constrained by specific bodily interactions with path and road artifacts, which do

not significantly differ for the US and UK speakers. Thus, Study 2 provides a strong test of the idea that people's use and understandings of *path* and *road* as metaphorical vehicles should be relatively consistent with their embodied, imaginative understandings of the differences between travel along paths and roads.

3.1. *Methods*

We first extracted 1000 random instances of *path* and *road* from the *British National Corpus (the BNC)*, along with the surrounding context of 3–5 lines for each of these items. Next, we identified the metaphorical uses of *path* and *road* using *MIP* or the *metaphor identification procedure* (Pragglejaz Group 2007), with the slight modification that we only consulted a 3–5 lines of context, rather than the entire text, in making our metaphorical judgments. If there was ambiguity about this judgment given the short text, we then consulted a larger segment of the text to figure out the contextual meaning of each *path*- or *road*-instance.

At the next stage, we determined the source and target domains associated with each metaphorical use of *path* and *road* by paying close attention to the surrounding context in which each term was employed. This part of the analysis focussed on identifying (a) which source domains and (b) which target domains are described by means of these specific terms.

Finally, we made a more detailed analysis of the *path* and *road* instances that were viewed as referring to the same target domain. In this part of the analysis we focused on comparing the usage patterns of the *path*- and *road*-instances that are used in talk about the same target domain, and on identifying possible qualitative differences between the uses.

3.2. *Results and discussion*

The *MIP* analysis revealed that there were 284 (out of 1000 total) metaphorical uses of *path* (28%). But 40 of these were subsequently removed from the data because they referred to a proper name (e.g., *True Path Party*) or book titles. This left us with a corpus of 244 metaphorical instances of *path* for further consideration. A similar analysis using *MIP* indicated that there were 49 (out of 1000) metaphorical uses of *road* (4.9%), with 7 of these removed from the data given their being employed as proper names or book titles, leaving a 42 metaphorical *road* items.

Our analysis of the source domains was relatively easy in that each metaphorical instance of *path* and *road* (100%) reflected some aspects of TRAVEL/MOTION (e.g., X is travelling or moving along a path or road).

The identification of the target domains involved a more complicated process. Each instance of *path* or *road* that was used to talk about people's lives

and activities was sorted into one category, thus giving rise to the general target domain of COURSE OF ACTION/WAY OF LIVING. But some of these instances more specifically mentioned some type of purpose on the part of the person traveling along the path/road. Instances that belonged in the latter group were analyzed as members of the target domain category PURPOSEFUL ACTIVITY/LIFE. Furthermore, instances that did not refer to a specific type of activity, but rather some kind of development or process were analyzed as belonging to the target domain category DEVELOPMENTS/PROCESSES. Although some of these developments and processes were quite general, many referred to the more specific domains POLITICAL/FINANCIAL DEVELOPMENTS/PROCESSES, and COMPUTER/MATHEMATICS DEVELOPMENTS/PROCESSES. Instances that did not belong in any of the above groups were categorized as OTHER.

Of course, cognitive linguistic analyses, like this one, face the difficult challenge of articulating the right level of specificity when positing the existence of both target and source domains within conceptual metaphor (Gibbs & Ferriera in press; Kövecses 2010, see also Clausner and Croft 1997). But our analysis clearly acknowledges that the target domains referred to by *path* and *road* metaphors were not completely independent categories, and may best be seen as a hierarchy of domains that ranged from quite general ones, down to ones that referred to very specific activities and processes.

Table 3 presents the proportion of times the various *path*- and *road*-instances fit each of the different target domain categories. The appendix provides examples of the discourse contexts representing each of these categories for *path* and *road*. The contexts in which *path* and *road* were metaphorically used suggest differences in the ways these two terms function as metaphor vehicles. Thus, *path* is used metaphorically most often in reference to COURSES OF ACTION/WAYS OF LIVING, while *road* is used metaphorically much more in regard to PURPOSEFUL ACTIVITY and POLITICAL/FINANCIAL matters. Statistical analyses showed that, indeed, people talk of *path* significantly more often in relation to a given COURSE OF ACTION/WAY OF LIVING than is the case for *road*, $\chi^2(1) = 128.56$, $p < .001$; and also speak of *path* more than *road* in reference to DEVELOPMENT, $\chi^2(1) = 18.13$, $p < .001$, as well as COMPUTER/MATHEMATICAL DEVELOPMENT

Table 3. Results of corpus Study 2

Target domain	Path	Road
Course of Action/Way of living	.58	.12
Purposeful activity	.18	.36
Development	.07	.00
Political/Financial	.06	.52
Computer/Mathematics	.08	.00
Other	.03	.00

more specifically, $\chi^2(1) = 20.11$, $p < .001$, than they do *road*. However, *road* is used far more in talk about someone's PURPOSEFUL ACTIVITY/LIFE than is *path*, $\chi^2(1) = 15.18$, $p < .001$, and people speak of *road* more often in reference to POLITICAL/FINANCIAL processes than they do *path*, $\chi^2(1) = 13.76$, $p < .001$.

A comparison between this corpus linguistic investigation and Study 1 clearly shows that there is a close connection between the metaphorical uses of *path* and *road* and people's mental imagery for paths and roads. First, the focus on travel along the artifacts is shared between the two types of data. Second, the differences between the metaphorical functions of *path* and *road* in the corpus linguistic data are largely coherent with the differences found in the survey. For instance, the tendency for metaphorical uses of *road* to describe people's PURPOSEFUL ACTIVITIES/LIVES (e.g., *the road to riches and power on the grand scale*) is clearly in line with people's imaginative understandings of the road as a more efficient means of transportation than path. To someone who is eager to quickly reach a given goal, travelling along an artifact that is more likely to be wide, straight and paved, and to move people along in a vehicle towards a specific destination, must be a better option than travelling along an artifact that is more closely connected with aimless motion on foot, stopping every now and then, enjoying travelling, and going up and down through problematic terrain. The tendency to use *road* in talk about complex POLITICAL/FINANCIAL DEVELOPMENTS/PROCESSES involving many (e.g., *if we continue to move down the road to a residual, extremely selectivist welfare system*) seem to match people's travel in a vehicle on a road better than an individual's travel on foot on a path. Moreover, the tendency to think of paths as artifacts that on which we move along on foot makes *path* more apt for structuring people's experiences of COURSES OF ACTION/WAY OF LIVING than *road*. Our manner of motion on an imaginary path (i.e., we walk in a more haphazard fashion up or down, sometimes enjoying our walk, and sometimes struggling through difficult terrain, and stopping every now and then) is probably much closer to the way we typically move around in our real lives than is manner of motion on an imaginary road where fast and efficient motion towards a given goal is likely. Accordingly, the imaginary path seems to better match the step by step features of metaphorical paths in talk about COMPUTER/MATHEMATICS DEVELOPMENTS/PROCESSES.

Finally, we compared how *path* and *road* were used in talk about the same target domain, describing COURSES OF ACTION/WAYS OF LIVING, PURPOSEFUL ACTIVITIES/LIVES and POLITICAL/FINANCIAL DEVELOPMENTS/PROCESSES. In this part of the analysis, we specifically examined to what extent *path* and *road* were differentially used in talking about more problematic travel and obstacles, the direction of travel, and the presumed destination of travel, following the main findings from Study 1.

First, we compared instances of *path* and *road* used in talk about COURSES OF ACTION/WAYS OF LIVING. Not surprisingly, *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*). Unlike the examples of *roads* in these contexts that tend to lead *to* something, the prepositional phrases in the *path* expressions clearly focus on providing information about a specific COURSE OF ACTION/WAY OF LIVING represented by the path. This is reflected through the use of the prepositions *along* (36%) and *of* (14%) in *path* examples (e.g., *Tanzania's later advance along a socialist path*, or *the path of drinks and drugs/class conflict/Soviet favour/green consumerism*), compared to the use of *to* (9%) which focuses on the end result of someone's ACTIVITY/LIFE (e.g., *He may be setting a youth off down a path to nowhere*). Again, the metaphorical *path* seems less efficient than the metaphorical *road*.

The less efficient quality of people's imaginary paths through their LIVES/ACTIVITIES is consistent with the fact that more than 40% of all *path* instances included implicit or explicit mention of more than one possible path as seen in the use of pronouns such as *this, that, what, which, one* and *many* (e.g., *had to follow this path, it may be difficult to say which path led to success, it was known on what path he would be returning, one path of enquiry leads to, and by many paths*), modifiers such as *preferred, alternative, different, favoured* and *wrong* (e.g., *considered the preferred path, and is not always the surest path*), and the indefinite article *a* used together with a modifier and path (e.g., *an easy path, a delicate path*).

Overall, then, people use both *path* and *road* when referring to most any sort of COURSE OF ACTION/WAY OF LIVING, but differ in many more specific ways which of these two metaphorical terms are employed in context. We contend that these differences are at least partly, but still significantly, motivated by people's ongoing bodily experiences of traveling along these specific artifacts in the real world. Similar to the results above, this part of the analysis suggests that motion along metaphorical paths referring to PEOPLE'S ACTIVITIES/LIVES involve more difficult terrain, more stopping, and slower progress than does motion along metaphorical roads.

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 through the barriers of error to seek the road to truth*). Moreover, some of the prepositions with *path*, but none of the prepositions with *road* suggest that there are obstacles on the artifact, or that the area that the path goes through is problematic (e.g., *in the path of*, *path out of*, and *path through*). For example, in (3) below, the obstacles on the path come in the form of measures that make seeking asylum in the UK difficult.

- (3) “Instead of introducing procedures which can be relied upon to identify and protect all those at risk of human rights violations in their own country, Government has introduced a range of measures which create obstacles in the **path** of those seeking asylum in the UK.”

Again, 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 close connection between people's metaphorical uses of *path* and *road* and their embodied experiences with these different artifacts is also evident in the ways these are used in talk of POLITICAL/FINANCIAL DEVELOPMENTS. Study 1 showed that imaginary roads are more likely to be perceived as straight, paved and wide than imaginary paths. From this we may infer that a larger number of people can travel along roads than paths, and that their surfaces are likely to be easier to distinguish from that of the land that they go through than those of paths. In the same way, then, the corpus linguistic study showed that metaphorical roads in POLITICAL OR FINANCIAL contexts tend to be travelled by fairly large groups of people as they move according to well-defined, often planned, courses of action, developments or outcomes (e.g., towards *power*, *communism*, *socialism*, *serfdom*, *ruin*, *an extremely selectivist welfare system*, or *a republican state*). The groups of people on the *road* are typically referred to in a metonymic way by means of a geographical name, the name of a state, a company or a team etc. (e.g., *Britain*, *North America*, *a republican/German state*, *a royal house*, and *regional governments*). Their taking to the *road* symbolizes the beginning of a given course of action or development (e.g., there are *roads of monopoly*, *of monetary union*, *of EMU*, and *of different regional governments having different tax rates*), and their collective character is reminiscent of a vehicle full of people travelling down a real road.

The travel along the *road* towards a given outcome is emphasized by prepositions (e.g., *to*) that suggest motion towards something. 54% of the *road*-instances, but only one of the *path*-instances include such a preposition. Sentence (4) below, for instance suggests that European nations will be taken *to* the monetary union, EMU.

- (4) “But West Germany, always cautious about monetary union, has shrugged aside attempts by the Italians to bring forward by several months the start of the inter-governmental conference that will discuss the **road** to EMU.”

Unlike imaginary roads, imaginary paths are seen as unpaved, and more difficult to travel on. The less delineated, more aimless, quality of these paths matches the uses of *path* to describe POLITICAL OR FINANCIAL DEVELOPMENTS. All the vehicles in these target domain contexts are abstract concepts whose value can change over time (e.g., *currency*, *production*, *ratio*, *costs*, *planned savings* and *investments*, *rate of interest*, *economy*, *real wages*, and *French capital*). These paths typically move up or down (e.g., *upward* or *downward*, or they are *upside-down U-paths*, or *growth paths*) rather than directed towards something. Neither the paths nor the roads in this type of context are connected with obstacles.

The findings from the psychological survey and the corpus linguistic investigation suggest that people’s embodied understandings of paths or roads are quite predictable. When imagining themselves in the context of a real path or road, or when thinking about what it must be like to be located in the context of a metaphorical path or road, people tend to focus on what appears to be central and expected features. For example, Study 1 demonstrated that people imagine that roads are more efficient artifacts to travel along than are paths; the surfaces of roads are less rough than are those of paths (e.g., roads are paved, but not so for paths) and roads are generally considered straighter, faster and wider than paths. Accordingly, the term *road* 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*.

4. Conclusion

Both studies suggest that when thinking about paths or roads in imaginative ways, people are strongly influenced by their interactions with the world around them, and what different artifacts best afford for embodied action. Thus, the details of the travel connected with these artifacts correspond with differences between the patterns involving paths or roads in the two types of

data, which involved American students in Study 1 and British English being analyzed in Study 2.

The link between people's embodied understandings of paths and roads and the metaphorical uses of *path* and *road* in discourse has several theoretical implications. First, people's mental imagery for paths and roads and their different metaphorical uses of these terms are both motivated to a significant extent by their embodied understandings of paths and roads as artifacts meant for travel through space and by the specific contexts for travel that these related, but still quite different, artifacts provide. 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. The fact that Study 1 employed American English speakers and Study 2 examined discourse from British English speakers also offers greater generality to the predictions we verified. People's metaphorical uses of *path* and *road* do not seem to be motivated by just any experience that they might have of paths or roads, but precisely by those experiences that are related to the functions of these artifacts. If metaphorical uses of other terms that refer to other artifacts are equally influenced by people's perception of these artifacts, then the patterns involving these terms should also be partly predictable from people's embodied understandings of these artifacts, or in terms of what these artifacts afford.

Most importantly, our findings point to the interaction between experiences at various levels of organization in metaphorical thought and language. Traditionally, metaphor theories have tended to focus either on the level of language, or on the level of thought, but not on how patterns at these two levels of organization are integrated (cf. Müller 2008). Zinken's (2007) study investigated the metaphorical functions of related vehicle terms, and speculated that these differences may arise from the interactions between speakers in discourse. But he voiced skepticism about the possibility that metaphorical meanings may be partly motivated by higher level generalizations as part of thought and from embodied experience. As he stated, "... it cannot be decided on the grounds of verbal behavioral data whether such general mappings are a psychologically real additional level of analogical schemes, or whether they are a post-hoc artifact of sorting utterances on the part of the researcher" (Zinken 2007: 461).

But 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 explanations in terms of mappings at the levels of primary or complex metaphor, nor in terms of negotiations between speakers, sufficiently account for the link between metaphorical meaning, mind and

world. Converging evidence from the psychological and corpus linguistic surveys indicates that people's perceptions of paths or roads are influenced by their understandings of these artifacts through embodied experience.

On the one hand, the focus on travel through space gives metaphorical *path* and *road* expressions a structure that is coherent both with other metaphorical uses of these terms, and with conventional motion metaphors such as ACTION/CHANGE/TIME IS MOTION, PURPOSES ARE DESTINATIONS, and LIFE/LOVE/PURPOSEFUL ACTIVITIES ARE JOURNEYS. On the other hand, differences between the contexts for travel along these artifacts result in differences between the metaphorical uses of the terms. Without a close connection between the metaphorical functions of *path* and *road* and the anticipations for bodily interaction that paths and roads afford, we are left with no apparent reason for why, for example, *road* is much more frequent in language about PURPOSEFUL ACTIVITIES/LIVES than *path*, and why *path* is more often used in language about, for example, people's WAYS OF LIVING. These differences, therefore, are not simply motivated by common conceptual metaphors or discrete conceptual pacts between speakers, but are significantly rooted in people's embodied simulations of different real-world experiences with artifacts.

However, our empirical findings, and emphasis on embodied simulations, should not be seen as a rejection of other constraints on metaphoric thought and language. People's experiences with language, including different uses of *path* and *road*, may lead them to form metaphorical concepts similar to COURSE OF ACTION/WAY OF LIFE. For example, people hearing repeated instances of *path* in contexts like "we were prepared to smooth a path of transfer" could facilitate understanding of how *path* can be metaphorically used in thinking about abstract courses of action. Similarly, hearing instances of *road* such as "they will be well on the road to enjoying reading" may enhance understanding of a specific metaphorical meaning of *road* to refer to PURPOSEFUL ACTIVITY/LIFE. Moreover, similar to culture (cf. Yu 2008: 259), language may partly filter people's bodily experiences. Johansson Falck (in press b), shows that speakers' L1 may function like a lens that influences how they conceive of, and talk about ideas and events metaphorically in their L2.

Nonetheless, the motivation for why we employ *path* and *road* for specific metaphorical purposes cannot be explained through a simple induction process from the vast collection of linguistic tokens. The difficulty is that speakers began using *path* and *road* to express metaphorical meanings in the first place, and these uses, as we have shown, are not at all arbitrary or from very local speaker-listener negotiations. Instead, the motivations for metaphorical word meanings arise from systematic, bi-directional couplings between embodied experience, thought, and language that are continually shaping one another in the minds of contemporary speakers. It may be difficult to tease apart different types of motivations (e.g., embodied, cognitive, linguistic, pragmatic) for why

various words are ultimately used in specific metaphorical ways. At the very least, though, bodily experience provides a major role in how conceptual metaphors emerge and places an ongoing constraint on the ways different metaphorical understandings are applied, in nuanced ways, in talk of varying abstract entities and experiences.

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Appendix

Examples of *path* and *road* in different contexts

COURSE OF ACTION/WAY OF LIVING

path

and a minority of them proved exceptionally capable. Some of our misgivings proved unfounded. We expected that a number—perhaps an embarrassingly large number—of students would decide that they simply did not like our courses, and we were prepared to smooth the **path** of transfer. In the event, there were a few who wished to leave, and a few others who decided that other initial choices had been mistaken, and who wished to join. In terms of students staying with their decisions, and continuing their studies

road

His quest for glory has caused him to stretch his energies to the absolute limit. And he accepts that he set out on the lonely **road** to stardom too early in life. ‘The biggest mistake I made was to start playing professional golf so early,’ he explains. ‘I turned professional when I was only 16. It was my decision, mainly because I had nothing else to do.

PURPOSEFUL ACTIVITY/LIFE

path

The European central bank cannot function in a political vacuum. If it were to do so, the very existence of the currency union would be placed in jeopardy. The above considerations imply that the **path** to the European currency union is unlikely to be smooth. Concluding remarks The decision to proceed to a currency union and accordingly revise the Rome Treaty was reached on political grounds, just as was the case with the signing of the original Treaty

road

They become readers in the sense of having positive expectations and motivation long before they go to school. They will need to develop skills and to

exercise skills to become competent, independent readers, but they will be well on the **road** to enjoying reading. We are, of course, presuming a great deal. We are thinking of the advantaged children. We are thinking about those children who, whatever their socio-economic background, have parents who have the time, or somehow make the time,

DEVELOPMENT

path

NETWORK GENERAL'S SNIFFER GETS EXPERT EXTENSIONS Network General Corp, Menlo Park, California has enhanced its Distributed Sniffer System, and added Expert Analysis capabilities as the first phase of the product's development **path**. The new Expert Analysis software, which includes automatic problem identification, is claimed to provide three types of diagnostic information: Symptoms, Diagnoses and Explanations. At the lowest level, symptoms to which network managers are alerted include such things as a file

road (no examples)

POLITICAL/FINANCIAL

path

Indeed, as the **path** of economic development over the eighteenth century moved the composition of retained imports away from manufactured goods towards raw materials, the possibility of increasing revenue without harming the productive side of the economy narrowed steadily.

road

in resisting this idea, have become noticeably more enthusiastic of late. But West Germany, always cautious about monetary union, has shrugged aside attempts by the Italians to bring forward by several months the start of the inter-governmental conference that will discuss the **road** to EMU. This week President Mitterrand renewed the call for an early conference. Mr Delors, for whom EMU is the next castle in his European crusade, wants to drive EMU forward too. He hopes to sweeten EMU for the Germans by mixing in

COMPUTER/MATHEMATICS

path

We shall soon see that some good search algorithms involve remembering many states. Thus, if one search **path** turns out to be wrong, the planner can recover and try a different path. A plan is a path in the simulation from its start to a goal.

road (no examples)

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