Conventional Language: How Metaphorical Is It?

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We evaluate a fundamental assumption of Lakoff and Johnson's (1980a, 1980b) view that people routinely use conceptual mappings to understand conventional expressions in ordinary discourse. Lakoff and Johnson argue that people rely on mappings such as ARGUMENT IS WAR in understanding expressions such as *his criticism was right on target.* We propose that people need not rely on conceptual mappings for conventional expressions, although such mappings may be used to understand *nonconventional* expressions. Three experiments support this claim. Experiments 1 and 2 used a reading-time measure and found no evidence that readers used conceptual mappings to understand conventional expressions. In contrast, the experiments did reveal the use of such mappings with nonconventional expressions. A third experiment ruled out lexical or semantic priming as an explanation for the results. Our findings call into question Lakoff and Johnson's central claim about the relationship between conventional expressions and conceptual mappings.   © 2000 Academic Press

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Lakoff and Johnson (1980a, 1980b) proposed a radical theory of concepts and language which we refer to as the conceptual mapping view. It has been extremely influential not only in the cognitive sciences but also in fields such as literary studies (e.g., Gibbs, 1994; Kovesces, 1986, 1988; Sweetser, 1990; Turner, 1987). In a nutshell, the conceptual mapping view departs from current cognitive theory in its two basic assumptions: a conceptual assumption and a linguistic assumption. The conceptual assumption is that all concepts other than those that are strictly perceptual/experiential ones are metaphorical in nature. They do not have a structure of their own. Instead, they are structured via more basic concepts. For example, the concepts of happy and sad are conceptualized via the basic experiential concepts of up and down, respectively: HAPPY IS UP, SAD IS DOWN.

The linguistic assumption is that this kind of conceptual metaphorical mapping is reflected in the expressions that people use every day. For example, expressions such as *My spirits rose* and *Thinking about her always gives me a lift* are claimed to be instantiations of the metaphorical mapping HAPPY IS UP, and utterances such as *I'm depressed* and *My spirits sank* instantiate the mapping SAD IS DOWN (Lakoff and Johnson, 1980a, p. 15). These two assumptions are related but not identical. The first concerns the structure of the human conceptual system. The second is about the relationship between this purported conceptual structure and everyday language use. In this article, we present evidence that challenges this second basic claim of the conceptual mapping view, that conventionalized expressions functionally instantiate metaphorical conceptual mappings.

The Conceptual Assumption

As Gibbs (1994) argued, the theory of conceptual mapping is a theory of thinking. Despite its widespread influence, the theory is controversial (e.g., Green & Vervaeke, 1997; Jackendoff & Aaron, 1991; Kennedy & Vervaeke, 1993; Murphy, 1996; Ortony, 1988; Quinn, 1991; Steen, 1994; Vervaeke & Green, 1997). Murphy suggests that to the extent that it is a psychological theory it must be explicated in terms of both representation and process. Murphy considered two representational interpretations of the view, a strong version and a weak version. In the strong version, all concepts other than those based directly on perception (e.g., the concept of red) are entirely metaphorically based, with no structure of their own. A concept such as argument, for example, would be understood entirely in terms of war. Murphy argued that such a strong view is incoherent because, among other things, there are aspects of war (e.g., armies with chains of command) that are simply not part of our understanding of arguments. The strong view is also problematic from a developmental perspective. Emotion concepts such as anger are said to be based in such conceptual mappings as ANGER IS HEATED FLUID UNDER PRESSURE, as reflected in expressions such as *he blew up.*

Surely, children can understand the concept of anger before they learn about the properties of heated fluids under pressure (Ortony, 1988). With respect to a weaker version, in which conceptual metaphors provide at least partial structuring of ordinary concepts, Murphy argued that the available data do not discriminate between the conceptual mapping view and more parsimonious similarity-based accounts, such as Gentner's (1983) structure mapping theory.

As Murphy and others have pointed out, there is a major problem with using only linguistic evidence to argue for functional relations between thought and language. The history of the linguistic relativity debate clearly shows that using only linguistic evidence to argue for deep connections between language and thought is circular (Glucksberg, 1988). How do we know that people think of happy and sad in terms of up and down? Because people talk about happy and sad using words such as up and down. Why do people use expressions such as his spirits rose? Because people think of happy in terms of UP. Clearly, these arguments are circular and provide no substantive support for the conceptual assumption (See Gibbs, 1997, and Murphy, 1997, for a discussion of these issues). Similar problems arise with respect to the linguistic assumption, to which we now turn.

The Linguistic Assumption

Lakoff and Johnson argue not only that metaphorical conceptual mappings are reflected in the expressions that we use, but also that we use these conceptual mappings to understand those expressions. Consider the expression *He was depressed.* Standard linguistic and psycholinguistic theory would view this as a straightforward literal utterance, and understanding it would entail no more than accessing the lexical entry for "depressed" along with ordinary syntactic and pragmatic operations. In contrast, Lakoff and Johnson would claim that the term depressed is not only a reflection of the metaphorical mapping SAD IS DOWN, but also that this mapping is functionally activated and used to understand expressions using this term. We refer to this process as the functional instantiation of the metaphorical mapping.

Lakoff and Johnson's primary source of evidence is the existence of systematic sets of conventional expressions that seem to cohere with respect to a metaphorical mapping. For example, when people talk about arguments, the following expressions are often used:

Your claims are indefensible, He attacked every weak point in my argument, His criticisms were right on target, If you use that strategy, he'll wipe you out,

and so on (Lakoff & Johnson, 1980a, p. 4). Indeed, upon reading such a list it seems eminently plausible that these expressions might reflect a mapping such as ARGUMENT IS WAR, but subjective plausibility may be misleading. As Keysar and Bly (1995, 1999) argued, a mapping such as ARGUMENT IS WAR can be the result of an inference that is made after learning the meanings of conventional expressions instead of motivating those expressions in the first place.

To point out the difference between the two alternatives, consider Lakoff and Johnson's claim that "it is important to see that we don't just talk about arguments in terms of war. We can actually win or lose arguments [. . .] It is in this sense that the ARGUMENT IS WAR metaphor is one that we live by in this culture; it structures the actions we perform in arguing." Our alternative claim is that we usually *do* "just talk" about arguments using terms that are also used to talk about war. Put more simply, the words that we use to talk about war and to talk about arguments are polysemous, but systematically related. Just as a word such as depress can be used to talk about either physical depression or emotional depression, words such as win or lose can be used to talk about arguments, wars, gambling, and romances, with no necessary implication that any one of these domains provides the conceptual underpinning for any or all of the others. The bottom line is that conventional expressions can be understood directly, without recourse to underlying conceptual mappings. Thus, when we say that an argument is *right on target* we do "just talk" about arguments using terms that we also happen to use when we talk about war—and music, art, literature, journalism, film criticism, and any other human activ-

ity in which something can be more or less on target (see Quinn, 1991, for analogous arguments about conventional metaphoric expressions).

The theoretical issue that we address, then, is whether people use conceptual mappings when understanding expressions that Lakoff and Johnson claim reflect those conceptual metaphors. The empirical evidence on this issue is sparse. One relevant study was reported by Allbritton, McKoon, and Gerrig (1995). Allbritton et al. provided readers with texts that contained potential instantiations of a particular mapping. For example, one text read that "the city's crime epidemic was raging out of control," and later it stated that "Public officials desperately looked for a cure." Both sentences presumably reflect the mapping CRIME IS A DISEASE. Using a postcomprehension cued-recognition measure, Allbritton et al. found that recognition of the first sentence was facilitated when cued with the second, suggesting that a link in memory had been established between these two sentences. While this finding is consistent with the conceptual metaphor view, it still leaves open the possibility that the initial comprehension of the sentences, especially the first sentence in each text, did not entail the use of conceptual mappings.

McGlone (1996) examined metaphor comprehension and provided evidence against the conceptual metaphor view. He compared two accounts of how people understand nominal metaphors of the form X IS A Y. The first is Lakoff's conceptual-mapping account (Lakoff & Johnson, 1980; Lakoff, 1993), the second, Glucksberg and Keysar's (1990) property-attribution model (see also Glucksberg, McGlone and Manfredi, 1997). According to the conceptual-mapping view, nominal metaphors are understood as specific instantiations of systematic conceptual-mappings that are part of our world knowledge. For example, the metaphor *Our marriage was a roller-coaster ride* would be an instantiation of the conceptual mapping LOVE IS A JOURNEY, in which lovers correspond to travelers, romantic relationships to traveling conveyances, interpersonal problems to phys-

ical obstacles on a route, and so forth. In the property-attribution model, metaphors are understood as what they appear to be, i.e., class-inclusion assertions in which the topic (e.g., marriage) is assigned to a category that is as yet not lexicalized (things that are exciting, appear unstable, etc., which roller-coasters exemplify). McGlone examined whether people used conceptual mappings or attributive-category knowledge to understand nominal metaphors. In a metaphor paraphrase task, McGlone replicated earlier findings (Glucksberg & McGlone, 1999) in favor of the attributive-category view. For example, when asked to paraphrase the expression *Dr. Morland's lecture was a full course meal for the mind,* participants gave responses having to do with fullness and completeness, but not with food. In a similarity-rating task, similarity among metaphor meanings did not depend on similarity of hypothetical conceptual mappings, but rather on similarity of attributive categories. Finally, using a cued-recall paradigm, McGlone found that attributive category cues were far better recall cues than were conceptual mappings cues. These results, obtained with a set of converging operations, provided clear evidence that conceptual mappings do not necessarily or even routinely underlie people's comprehension of everyday, conversational metaphors (McGlone, 1996).

Similar problems exist for the data on whether conceptual metaphors might underlie idiom comprehension (see, e.g., Gibbs, 1992; Gibbs & Nayak, 1991; Gibbs & O'Brien, 1990). Idioms such as *he blew his stack* are said to be motivated by mappings such as ANGER IS HEATED FLUID IN A CONTAINER. Gibbs and Nayak (1991) presented people with stories that were consistent with this mapping, using expressions such as *She was getting hotter with every passing minute* and *As it got closer to five o'clock the pressure was really building up.* People preferred to complete such texts with idioms that were stylistically consistent with the earlier ones (e.g., *blew her top*) than with idioms that were not (e.g., *bit his head off.*) Although this finding is consistent with the hy-

pothesis that readers activated and used conceptual mappings, it is not the only alternative. To test the possibility that preference need not reflect functional entailment, Glucksberg, Brown, and McGlone (1993) used both a preference test and an on-line reading measure. They found that while people preferred stylistically consistent idioms, comprehension of the preferred idioms was no faster than the nonpreferred idiom. Glucksberg *et al.* concluded that although such mappings might be available, they are not routinely accessed and used for idiom comprehension. In our terms, the potential mapping was not used for comprehension.

Idioms, of course, are the most extreme case of conventionalized speech. It could be that idiom comprehension does not require the use of conceptual mapping, but that general conventionalized expressions such as *I'm depressed* do entail the use of such mappings. We present three experiments that test this hypothesis and examine the conditions under which metaphorical mappings may be either accessed or created in order to facilitate comprehension.

When Might People Use Conceptual Mappings?

We will argue that conceptual mappings are not routinely used when people comprehend conventional expressions. If this is the case, then there would be no role for purported conceptual-level mappings when people comprehend conventional expressions. In contrast, language users might make use of a conceptual mapping when circumstances are appropriate, either by creating a conceptual mapping or by using a preexisting one. In terms of our earlier example, people should not need to use the mapping SAD IS DOWN to understand a conventional expression such as *I'm depressed.* However, the mapping might well be used for novel and explicitly analogical utterances such as *I'm feeling lower than a piece of gum stuck on the bottom of your boots.* Both the novelty of the expression and the explicit statement of the analogy between emotional state and lowness invite, perhaps require, the use of the analogy to understand the expression. Accordingly, we explore the roles of novelty and explicitness as

conditions that might foster the use of conceptual mappings. Specifically, we expect that people will be more likely to use conceptual mappings for novel, nonconventional than for conventional expressions. Second, explicit mention of a mapping (e.g., stating that "often an argument is like war") might foster use of that mapping if appropriate expressions appear in the text.

How can we test for use of conceptual mappings? We use Lakoff and Johnson's examples of conventional expressions, which presumably instantiate conceptual metaphors. If people use the relevant mappings while reading these expressions, then the mappings should be readily accessible to support the use of other expressions that might require the same mappings. The crucial test, though, is not whether another conventionalized expression is supported by the preceding conventionalized expressions. The reason is that conventional expressions that are about the same topic might very well be associated with one another, but such association might simply be a linguistic association. For example, the expressions *He is a warm person* and *She is very cold* could be associated on the linguistic level because of the high lexical association between *hot* and *cold*. Therefore, if conventionalized expressions support *only* the use of other associated conventional expressions, then one need not postulate the mediation of an underlying conceptual mapping, only a set of highly related linguistic expressions. In contrast, if a conceptual mapping is really being used for the comprehension of conventionalized text, then this mapping should support the use of any novel expressions that it might motivate. Thus, while *his criticism was right on target* might not require use of a mapping between argument and war, *his criticism was a guided cruise missile* might very well do so.

EXPERIMENT 1: MAKING MAPPINGS EXPLICIT

According to Lakoff and Johnson (1980a, 1980b), people conceive of ideas in many different ways. For example, they conceptualize ideas as plants, products, commodities, and money. According to Lakoff and Johnson, peo-

ple also conceive of ideas as people. That is why we say things such as *Whose brainchild was that?; Look at what his ideas have spawned; Those ideas died off in the middle ages.* If a scenario instantiates this mapping at the conceptual level, then it should facilitate the comprehension of a nonconventional expression that might require the instantiation of the mapping. Consider the following scenario, which presumably instantiates the mapping IDEAS ARE PEOPLE. The italicized expressions are mostly taken from Lakoff and Johnson, and the ensuing underlined expression is an unconventional instantiation of the mapping:

> Implicit-mapping scenario
>   As a scientist, Tina thinks of her theories as her contribution. She is a *prolific* researcher, *conceiving* an enormous number of new findings each year. *Tina is currently weaning her latest child.*

Now contrast this scenario with a scenario that does not use the mapping-related terms:

> No-mapping scenario
>   As a scientist, Tina thinks of her theories as her contribution. She is a dedicated researcher, initiating an enormous number of new findings each year. *Tina is currently weaning her latest child.*

If the conceptual mapping view is correct, then the first scenario should instantiate the conceptual mapping but the second scenario should not. Therefore, it should be easier to understand the final sentence following the first than the second scenario. However, our claim is that the first scenario uses stock phrases that can be understood directly, and so it need not invoke a conceptual mapping. Therefore, there should be no difference in ease of comprehension of the final expression between the two types of scenarios because neither involves conceptual mappings.

We reasoned further that perhaps readers would use conceptual mappings when they are explicitly invited to do so. There are reasons to expect readers to accept such explicit invitations but also reasons why they might not. In an earlier study we had asked readers to generate the meaning of the metaphor A LIFETIME IS A DAY (reported in Glucksberg & Keysar, 1990; see also McGlone, 1996). We found that people

are much more likely to generate a simple attributive interpretation (e.g., "life is short") than to generate an entailment of a conceptual mapping ("death is dusk"). However, a different procedure can lead to a different result. Using a recognition task, Gibbs (1992) presented readers with the explicit conceptual mapping A LIFETIME IS A DAY and asked them to select from a list of sentences those which "best reflected the meanings of this metaphor." He found that readers tended to select sentences that spelled out entailments of the conceptual mapping (e.g., "birth is dawn"). Perhaps, then, if we tell readers that they should think of argument as journey they would realize that when one is talking about *pointing out a position* and about *arriving at a compromise* one might be spelling out a mapping between argument and journey. In other words, perhaps they would do what Gibbs' participants did—recognize that conventional expressions are related to the explicit mappings. One way to invite people to consider a mapping would be to start each scenario with an explicit mention of the mapping, as in:

> Explicit-mapping scenario
> As a scientist, Tina thinks of her theories as her children. She is a *prolific* researcher, *conceiving* an enormous number of new findings each year. *Tina is currently weaning her latest child.*

We call this the "explicit-mapping" condition, in contrast to the "implicit-mapping" and the "no-mapping" conditions illustrated with the first and second scenarios, above. In the explicit-mapping condition, readers might indeed create appropriate conceptual mappings, and thus be better prepared to comprehend the novel target expression. Alternatively, if readers do not understand the target expression with greater ease in the explicit-metaphor condition, then there would be two possible interpretations. Either our experiment is too noisy to detect differences or readers do not use the mapping even under such explicit conditions—they do not recognize or notice the connection of the explicit mapping between ideas and people to the related stock phrases in the scenario such as *conceiving.*

In order to assess whether our experimental paradigm is sensitive enough to detect an effect, we added a fourth condition as a manipulation check. Gibbs (1990), as well as Onishi and Murphy (1993), demonstrated that referential metaphors are more difficult to understand than literal referring expressions. Our novel target expressions (e.g., The journey should not last too long) are metaphorical referring expressions. We added a scenario that rendered these target expressions as literal (i.e., "literal condition"):

> Literal-meaning scenario
> As a scientist, Tina thinks of her theories as children. She makes certain that she nurtures them all. But she does not neglect her real children. She monitors their development carefully. *Tina is currently weaning her latest child.*

Given Gibbs (1990) and Onishi and Murphy's (1993) findings, it should be easier to understand the conclusion when it is intended literally. This would demonstrate the ability of our method to detect differences and would allow us to draw finer conclusions, even if there is no difference between ease of comprehension of the conclusion following the first three scenarios.

Method

Participants. Forty-four[1] University of Chicago undergraduates contributed data for this experiment; all were native American English speakers.

Materials. We generated 16 item sets, each set for a different conceptual mapping. Table 1 provides a sample of item sets. We obtained the conceptual mappings from Lakoff and Johnson's (1980a, 1980b) examples and used them with minor editing to facilitate textual flow. For each conceptual mapping we first constructed the implicit mapping scenario by relying as much as possible on examples of stock phrases provided by Lakoff and Johnson. We then created the no-mapping condition by replacing the metaphorically related phrases with expressions

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[1] In Experiment 1 data from two participants were discarded because their quiz errors exceeded criterion. Data from two additional participants were discarded because of unusually poor cooperation and erratic performance.

TABLE 1

Example Item Sets from Experiments 1 to 3[a]

Love is a patient

No mapping   "Love is a challenge" said Lisa. "I feel that this relationship is in trouble. How can we have an enduring marriage if you keep admiring other women?" "It's your jealousy," said Tom.

Implicit   "Love is a challenge" said Lisa. "I feel that this relationship is *on its last legs*. How can we have a *strong* marriage if you keep admiring other women?" "It's your jealousy," said Tom.

Explicit   "Love is a patient," said Lisa. "I feel that this relationship is *on its last legs*. How can we have a *strong* marriage if you keep admiring other women?" "It's your jealousy," said Tom.

Literal   "Love is a patient," said Lisa. "It is difficult enough to keep alive when everything goes right. But it is impossible when you're not even healthy." "What did the doctor say is wrong with me," asked Tom. "It's cancer," Lisa answered.

Target sentence: "You're infected with this disease."

Target word: Infected

Novel   "Love is a patient," said Lisa. "I feel that this relationship is *about to flatline*. How can we *administer the right medicine* if you keep admiring other women?" "It's your jealousy," said Tom.

An argument is a journey

No mapping   The marriage counselor explained how to solve problems. Think of an argument from a variety of perspectives. You explain your position and build on prior agreements, eventually getting to a compromise. One thing you must remember:

Implicit   The marriage counselor explained how to solve problems. Think of an argument from a variety of perspectives. You *point out your position* and *proceed in a sequential fashion*, eventually *arriving at* a compromise. One thing you must remember:

Explicit   The marriage counselor explained how to solve problems. Think of an argument as a journey. You *point out your position* and *proceed in a sequential fashion*, eventually *arriving at* a compromise. One thing you must remember:

Literal   The travel agent explained to us how to plan our vacation. Think of an argument as a journey. Now think of your travel plans. You want to spend as little time traveling to your destination as possible. So remember one thing:

Target sentence: The journey should not last too long.

Target word: Journey

Novel   The marriage counselor explained how to solve problems. Think of an argument as a journey. You *pinpoint out your coordinates* and *drive along an established route*, eventually *parking at* a compromise. One thing you must remember:

Ideas are people

No mapping   As a scientist, Tina thinks of her theories as her contribution. She is a dedicated researcher, initiating an enormous number of new findings each year.

Implicit   As a scientist, Tina thinks of her theories as her contribution. She is a *prolific* researcher, *conceiving* an enormous number of new findings each year.

Explicit   As a scientist, Tina thinks of her theories as her children. She is a *prolific* researcher, *conceiving* an enormous number of new findings each year.

Literal   As a scientist, Tina thinks of her theories as children. She makes certain that she nurtures them all. But she does not neglect her real children. She monitors their development carefully.

Target sentence: Tina is currently weaning her latest child.

Target word: Weaning

Novel   As a scientist, Tina thinks of her theories as her children. She is a *fertile* researcher, *giving birth* to an enormous number of new findings each year.

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[a] The four conditions of Experiment 1 appear first, followed by the target sentence, then the modified Explicit condition appears, with the novel expressions as they appeared in Experiment 2. The target word from Experiment 3 is below the target sentence. The metaphor-related expressions are italicized for expository purposes.

that carried similar meanings but were not from the base domain.

According to Lakoff and Johnson, it is possible that phrases in our no-mapping condition would still conjure up concepts related to the metaphorically mapped domain. For example, the word "argument" by itself might be understood by mapping onto "journey." We verified that the no-mapping condition did not conjure up such mapping by asking 12 native English speakers to rate the no-mapping and the implicit contexts.[2] We explained to them that expressions such as *He's overflowing with ideas* suggest that minds are like containers that can hold ideas. We then asked them to decide for each context what the topic is being compared to; for example, we asked them to fill in the blank in this sentence, "In this scenario, minds are metaphorically likened to ____" For the no-mapping scenarios only 7% identified the intended mapping; in the remaining 93% of the cases participants either wrote "none" or identified a different mapping. This test serves as a manipulation check, showing that there is no implied mapping in the no-mapping condition.

In contrast, in 26% of the implicit scenarios participants identified the intended mapping. The rate of mapping identification in the implicit condition was reliably higher than in the no-mapping condition, $F1(1, 11) = 13.31$, $MS_e = .069$; $F2(1, 13) = 7.39$, $MS_e = .153$. Note that even in the implicit-mapping condition, participants generally did not identify the intended mapping. This is curious because we created the implicit-mapping scenarios with expressions from Lakoff and Johnson (1980), where these expressions are presented as evidence for this very mapping. It is, of course, still possible that even though participants were not able to explicitly report the mapping in some cases, they could still rely on such conceptual mapping during comprehension. Experiment 1 is designed to test this.

The explicit-mapping condition was identical to the implicit-mapping condition, except that the first or second sentence was replaced with a

sentence that spelled out the mapping between the two domains, as in *life is a gambling game* or *love is madness.* The final target sentence was a nonconventional expression related to the conceptual mapping, and it was identical in all conditions. Last, we created a scenario that allowed a literal interpretation of the target sentence.

In addition to the experimental items, the lists included 10 filler scenarios so that participants would not anticipate or notice a particular pattern. Here is a sample filler:

> My two-year-old is a real comic. Last night I said to him "Darrel, have you finished dinner now? Is your belly full, full, full?" "Yes, Dad," he replied. "But I want some chocolate!" A little angrily I asked: "If your belly is full, where will you put that chocolate?" He replied, "My mouth!"

The fillers' final sentences were neither metaphorical nor novel, and none of the fillers had consistent allusions to a conceptual mapping. To make sure that participants paid attention to the text, they received a surprise quiz after eight scenarios. The quiz included yes/no questions that tested for comprehension of details. We set a conservative criterion for quiz performance and discarded the data of participants who made more than one error on the quizzes (more than 12.5% error rate).

The materials were divided into four subsets, each including one case from each item set, a fourth in each condition. The conditions were counterbalanced.

Procedure and design. Participants read each scenario on a computer screen. The scenarios were presented line by line, with each line containing a full sentence unless a sentence was relatively long, in which case it was broken down in a way that allowed the reading to flow normally. They were instructed to press a button as soon as they comprehended each line. The target sentence was not singled out and appeared as the final sentence for each of the 16 items. At the end of each scenario participants received an "end of scenario" message which remained on the screen until they pressed a continue button. Participants were encouraged to take advantage of these break points whenever they wanted to rest. After they pressed the

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[2] This test was conducted after the main experiment but is presented here for better flow of presentation.
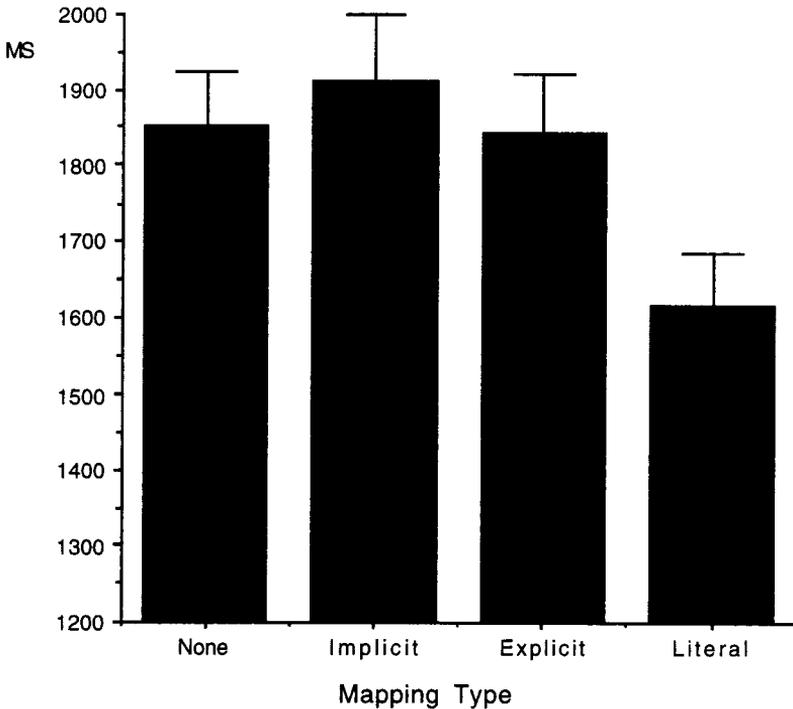
FIG. 1. Mean reading times in Experiment 1 for novel target sentences in contexts that suggested no metaphorical mapping, implicit mapping, explicit mapping, or a literal reading.

continue button, a "Prepare for next scenario" message appeared on the screen for 5 s, and then the next scenario began. Following eight of the scenarios, a "quiz" message appeared with a question to which participants replied by pressing a yes or no button. Before the experiment started, participants received three practice scenarios, and following two of the practice scenarios they received a quiz, one which required a *yes* answer and one which required a *no* answer. The computer collected reading time for each line and registered the answers to the quizzes. Items and fillers appeared in a different random order for each participant.

The design of the experiment was within-subjects, with four context conditions: no mapping, implicit mapping, explicit mapping, and literal.

Results and Discussion

Extreme reading times for target sentences were trimmed: Latencies below 500 ms and above 4 *SD*s longer than the mean reading time were excluded. This eliminated only 4 data points (less than 1% of the data). We report the results for 15 of the 16 items because of experimental errors in one item.[3] (The pattern of results is identical when the 16th item is included.) Unless otherwise noted, all statistical tests were two-tailed, with the *p* value less than .05.

We submitted the latency data to a one-way ANOVA with repeated measures. There was a significant main effect of condition, [$F1(3, 129) = 9.80$, $MSe = 65060$; $F2(3, 42) = 6.68$, $MSe = 38507$]. The pattern of mean reading times appears in Fig. 1. Consider first the means for the no-mapping (1853 ms) and the implicit-mapping (1912 ms) conditions. According to

[3] By mistake, item 1 did not include the correct conditions in Experiments 1 and 2; item 3 did not include the correct information in Experiment 2. The data from the mistaken items were not included in the analyses for Experiments 2 and 3 and the manipulation checks.

the conceptual metaphor view the comprehension of the target sentence should have been facilitated by the mapping-related terms of the implicit-mapping condition compared to the no-mapping case. Clearly, no such facilitation occurred. In fact, the target sentence took slightly longer to comprehend following the implicit-mapping than following the no-mapping condition. The response time in the implicit-mapping condition was not significantly slower than in the no-mapping condition (both Fs $<$ 1; all planned contrasts). In contrast, the literal condition (M = 1617 ms) was faster than all the other three, [$F1(1, 43)$ = 34.5, MS_e = 53109; $F2(1, 14)$ = 22.9, MS_e = 32014]. This suggests that the procedure was sufficiently powerful to detect differences had they existed.

The explicit-mapping condition yielded interesting results. The mean reading time for that condition was almost identical to that of the no-mapping condition (1844 and 1853 ms, respectively; both Fs $<$ 1). This suggests that even when the mapping is spelled out, it is not sufficient to lead readers to use the mapping in the process of comprehending the stock phrases. The explicit mapping mean reading time was 68 ms faster than that of the implicit mapping condition. Though this might suggest facilitation, the difference was not significant (both Fs $<$ 1).

The results of this experiment are straightforward. Comprehension of the target sentences was not affected by the type of context: An implicit suggestion of conceptual mappings did not show any indication that mappings were used, and even an explicit mention did not facilitate comprehension. These results cast doubt on a major claim of the conceptual metaphor view—that conventional expressions that seem to be motivated by conceptual mappings functionally instantiate such mappings.

EXPERIMENT 2: DO NOVEL EXPRESSIONS ELICIT CONCEPTUAL MAPPINGS?

Experiment 1 demonstrated that even explicit mention of conceptual mappings did not lead readers to use those mappings when stock phrases were used. In addition, we discovered that an explicit statement of the mapping was not sufficient to make the connection between the stock phrases and the metaphors that they presumably instantiate. In Experiment 2 we tested our second claim, that contexts with novel or nonconventional expressions do instantiate conceptual mappings. We reasoned that if we changed the stock phrases in the explicit-mapping condition to be less conventional, then perhaps that would lead readers to create conceptual mappings. Consider again the example from Experiment 1, using the mapping IDEAS ARE PEOPLE. The explicit mapping condition in Experiment 1 used stock phrases, as in:

> As a scientist, Tina thinks of her theories as her children. She is a *prolific* researcher, *conceiving* an enormous number of new findings each year. *Tina is currently weaning her latest child.*

In this experiment, the novel-mapping condition of this item uses less conventional expressions:

> As a scientist, Tina thinks of her theories as her children. She is a *fertile* researcher, *giving birth* to an enormous number of new findings each year. *Tina is currently weaning her latest child.*

So while *conceiving* is a relatively conventional way of talking about ideas, *giving birth* is quite unconventional. If comprehension of target sentences is facilitated following such unconventional context, then that would indicate that readers retrieved or created and considered the relevant conceptual mappings. We therefore predict shorter reading times for target sentences in the novel-phrase condition in Experiment 2.

Method

Participants. Forty-eight University of Chicago undergraduates, all native English speakers, participated for pay.

Materials. The same 16 items and 10 fillers from Experiment 1 were used in this experiment, except that in the explicit mapping condition we replaced the mapping-related stock phrases with less conventional phrases. Table 1 illustrates these changes.

As a manipulation check we tested the items to make sure that the phrases we replaced re-

sulted in a less conventional context in the novel condition than in the implicit condition.[4] Twelve native English speakers received an explanation about how expressions can vary in conventionality with respect to the idea that they are supposed to communicate. We illustrated this by contrasting a conventional way of describing someone who was running very quickly, *he was running like the wind,* with a much less conventional expression, *he was running like a Porsche on a German highway.* The participants received the implicit and novel scenarios for each item side by side, with the corresponding phrases underlined. We did not include the final, target sentence, as this sentence was novel across all conditions. Participants then performed two tasks. First, they indicated which story version conveyed the underlying theme in a more conventional way. Then they rated the conventionality of each scenario separately on a 6-point scale. For example, after reading the scenarios for TIME IS MONEY, participants first chose which version was more conventional and then answered the question "How conventional do you think each story is with respect to TIME?" Two identical rating scales were provided, one for each version; the scales went from 1, *more unconventional,* to 6, *more conventional.* Scenarios were presented in a random order.

As expected, participants were most likely to select the implicit contexts as more conventional than the novel contexts (83% vs 17%, respectively). We coded each implicit context choice as $+1$ and each novel context choice as -1, and found that the mean was significantly different from zero, $[t1(11) = 8.03, t2(13) = 7.49]$. For the separate ratings of each version, the novel contexts were rated as less conventional ($M = 2.7$) than the implicit contexts $[M = 4.6$; difference score significantly greater than zero, $t1(11) = 9.07, t2(13) = 6.55]$. This verifies that our items were constructed as intended, with the novel contexts containing less

conventional expressions than the original implicit conventional contexts.

In addition to the conventionality manipulation check, we wanted to avoid a confound. There is a possibility that the novel instantiations of the metaphor might tend to be more specific instantiations of the base domain. For example, in the ARGUMENT IS A JOURNEY mapping the phrase *proceed in a sequential fashion* in the implicit context was replaced with the phrase *drive along an established route* to create the novel context (see Table 1). Driving is a specific way of proceeding in a journey, and more specific contexts might facilitate the comprehension of an often specific target sentence. To make sure we did not confound novelty with specificity, we evaluated corresponding phrases in the novel and implicit conditions for their specificity of reference.

After they judged the conventionality of contexts, the same participants were asked to evaluate the specificity of expressions in the context scenarios. Here is an excerpt from the instructions: "In many situations, there are multiple ways of expressing the same idea, and one important way in which linguistic expressions can differ is in how explicit or specific they are with respect to the idea that they are trying to communicate." Participants were instructed that "For each pair of terms, you should indicate which one seems to be more *specific* or *explicit* in how it expresses the underlying idea." They then received the implicit and novel contexts of each item side by side. We underlined the conventional expressions in the implicit context and their corresponding novel instantiations and asked the participants to compare the extent to which these expressions were specific or explicit with respect to the underlying idea. Their task was to select the expression that was more specific, or they could indicate that they were equally specific.

For each pair of expressions we coded a preference for the novel expression as 1, for the implicit expression as -1, and no preference as 0. Items had anywhere from two to five such pairs of expressions, so we summed the score for each subject for each item, which gave items

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[4] This manipulation check as well as the specificity norming was conducted after the main experiment but is presented here for better flow of presentation.
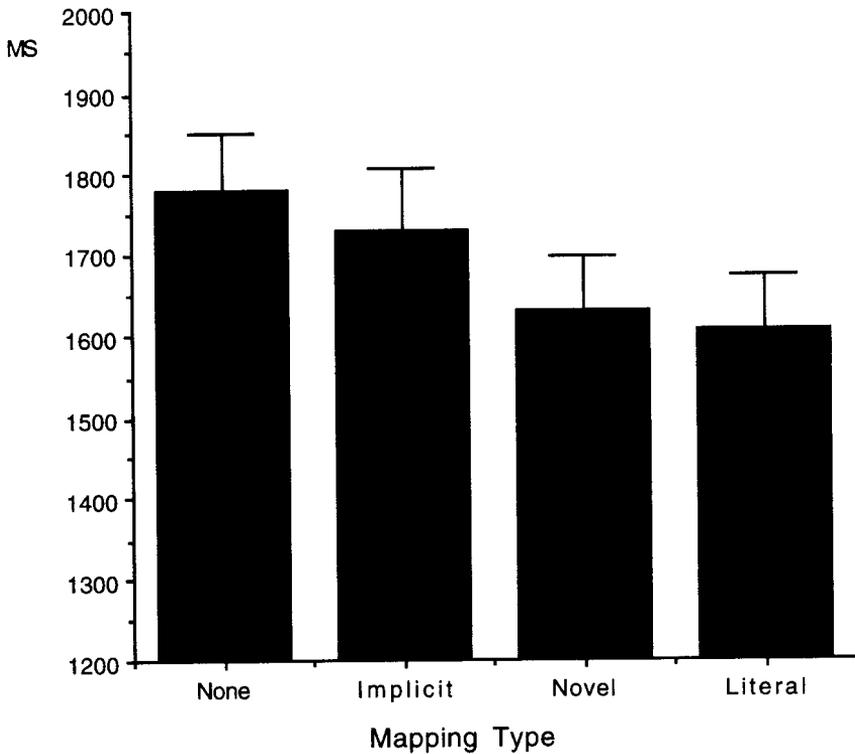
FIG. 2. Mean reading times in Experiment 2 for novel target sentences in contexts that suggested no metaphorical mapping, implicit mapping, included novel instantiations, or a literal reading.

with more pairs more relative weight. An overall positive mean, then, would indicate that novel scenarios were more specific, a negative mean would indicate that implicit scenarios were more specific, and a zero mean would suggest no such differentiation. The mean of all these sums was .07, which was not reliably different from zero ($Fs < 1$). When the data are analyzed by averaging the score for each item for each subject instead of summing it, the overall mean is even closer to zero ($M = .01$, $Fs < 1$). These results clearly show that the novelty manipulation is not confounded with specificity or explicitness of items.

Procedure and design. The procedure and design were identical to that of Experiment 1. Participants received the same instructions and practice. We predicted that comprehension latencies for target sentences would be faster in the novel condition compared with the no-mapping and the implicit-mapping conditions.

Results and Discussion

Extreme reading times for target sentences were trimmed as in Experiment 1 (below 500 ms and above 4 SDs longer than the mean). This resulted in the elimination of 1.2% of the data. A one-way ANOVA with repeated measures yielded a significant main effect of conditions $F1(3, 141) = 4.83$, $MS_e = 6135$, $F2(3,39) = 3.91$, $MS_e = 25127$].

As Fig. 2 reveals, the pattern of mean reading times was precisely in accord with our prediction. Consider first the part that replicates Experiment 1. The mean reading time in the implicit-mapping condition was not significantly faster than in the no-mapping condition (1731 and 1782 ms, respectively; both $Fs < 1$). This suggests that readers did not use the mappings in the implicit-mapping condition. As predicted, the novel condition was faster than the no-mapping and the implicit-mapping conditions.

In fact, the mean latency to comprehend target sentences in the novel condition was virtually as fast as in the literal condition ($M = 1629$ and 1607 ms, respectively). The literal and novel conditions were significantly faster than the no mapping and implicit mapping conditions, $[F1(1,43) = 15.14, MS_e = 57933, F2(1,14) = 13.36, MS_e = 26315.]$

These results replicate the findings in Experiment 1 that show that conventional expressions did not facilitate the comprehension of an instantiation of the conceptual mapping. This shows no evidence for the claim that a stock phrase instantiates a conceptual mapping during comprehension. The results supplement the first experiment and show that novel expressions that reflect conceptual mappings between domains do lead readers to either retrieve or create analogies between those domains. Only scenarios that used novel expressions showed evidence that readers relied on conceptual mappings.

There are, however, at least two alternative explanations for our results, both simpler than our hypothesis: (1) The results could be explained as an outcome of lexical priming and (2) it is possible that the novel condition facilitated the comprehension of the target sentence because of its discourse structure. We report a test of the second explanation here, and Experiment 3 tests the priming explanation.

Novelty of instantiation or discourse-level inferential support? It is possible to explain the pattern of results in Experiment 2 in terms of general discourse processes. In the IDEAS ARE PEOPLE item, the test sentence was "Tina is currently weaning her latest child." In order to understand this sentence, the reader looks for a referent for "her child" in the preceding context. This referent might be more easily available in the novel context, which stated *Tina thinks of her theories as her children* than in the implicit context which only stated *Tina thinks of her theories as her contribution.* The reader, then, might have to draw more complex inferences following the implicit than the novel contexts. If the novel context provides better inferential support in this way, this might be sufficient to explain our results.

To evaluate this possibility we asked 12 native English speakers to rate the degree to which the context "prepares them" for the critical noun phrase in each of the target sentences. To illustrate this we provided three pairs of sentences. In the first pair, the first sentence prepares the reader quite well for understanding "their tip" in the second sentence:

> *Mary and Stan thoroughly enjoyed the new restaurant. Their tip was particularly generous.*

In the second pair the first sentence provides less such preparation:

> *Mary and Stan thoroughly enjoyed their evening. Their tip was particularly generous.*

And the third provides the least amount of preparation:

> *Mary and Stan thoroughly enjoyed themselves. Their tip was particularly generous.*

Participants read one context for each item and rated the amount of support it provides the underlined noun phrase. For example, they rated the support that context provides for *journey* in the target sentence *The journey should not last too long.* They used a 5-point scale, with 1 marked as *no support* and 5 as *complete support* for the critical noun phrase in the target sentence.

We used three context types: the explicit context from Experiment 1 and the novel and the implicit contexts from Experiment 2. Recall that comprehension of the target sentence was *not* facilitated following the explicit context compared to the implicit context in Experiment 1. If the novel context was facilitated in Experiment 2 because it provided better inferential support for the target sentence, then it should be rated higher than the implicit context. At the same time, the explicit context should not be rated higher than the implicit context. If the explicit context is also rated as providing more inferential support than the implicit context, then such inferential support cannot explain the results of Experiments 1 and 2.

Participants rated both the novel (4.0) and the explicit contexts (3.7) as providing more inferential support than the implicit context (2.8). The main effect was significant, $[F1(2, 22) =$

15.17, MS_e = .338, $F2(2, 26)$ = 18.79, MS_e = .298]. Planned contrasts revealed that the novel context was rated significantly higher than the implicit [$F1(1, 22)$ = 27.89, MS_e = .338, $F2(1, 26)$ = 34.69, MS_e = .298], and the explicit higher than the implicit [$F1(1, 22)$ = 15.87, MS_e = .338, $F2(1, 26)$ = 19.5, MS_e = .298]. The novel and explicit contexts did not differ statistically [$F1(1, 22)$ = 1.69, MS_e = .338, $F2(1, 26)$ = 2.17, MS_e = .298]. If the novel context facilitated comprehension because it provided more inferential support, then the explicit context in Experiment 1 should have facilitated comprehension of the target sentence as well, especially relative to the implicit context. It did not, allowing us to reject inferential support as an alternative explanation for the results of Experiments 1 and 2.

EXPERIMENT 3: CONCEPTUAL MAPPING OR PRIMING?

It is still possible that the facilitation in the literal and novel conditions was due to semantic priming. For example, consider the IDEAS ARE PEOPLE mapping in Table 1. The novel context included *fertile* and *giving birth* in the sentence *She is a fertile researcher, giving birth to an enormous number of new findings each year.* This could have primed the word "weaning" in the target sentence *Tina is currently weaning her latest child.* In contrast, the parallel sentence in the implicit-mapping condition was *She is a prolific researcher, conceiving an enormous number of new findings each year.* It is possible that this sentence had no such priming potential. If priming at the word level is indeed responsible for the facilitation in the literal and novel conditions then it voids our argument. In order to claim that the facilitation in the novel condition results from instantiation of the mapping, it is crucial to show that it is not due to lexical or semantic priming.

If word-specific priming is responsible for the facilitation of the target sentence for the novel condition in Experiment 2, then such differential priming should occur to those specific words following the context scenario. To test this hypothesis, eight independent participants selected the single word from each target sentence that would most likely be semantically primed by the novel context. For example, for the IDEAS ARE PEOPLE item, the word *weaning* was selected in a pretest from the target sentence *Tina is currently weaning her latest child.* Participants read the scenarios without the target sentences and then performed a lexical decision task on those target words. If the preceding novel context facilitates the recognition of the word *weaning* in the target sentence via semantic priming, then such facilitation should occur in this experiment as well. If, however, the novel condition is not facilitated in Experiment 3, then we can conclude that the results of Experiments 1 and 2 are not due to semantic priming.

Method

Participants. Thirty-two University of Chicago undergraduates, all native English speakers, participated for pay.

Materials. The experiment used the items from Experiment 2 without the target sentences. All the target words were true English words, and therefore we added filler scenarios that were followed by a nonword target. The nonwords were all in accord with English orthography and reflected the same variety of morphology as the target words (e.g., plural vs singular). To make sure that participants read the scenarios, the experiment included eight additional fillers that were followed by a quiz instead of a target word. The correct answer to half the quizzes was YES and to the other half NO. Each participant saw each item in one of the four conditions; versions and conditions were counterbalanced as in Experiment 2. Fillers were identical for all participants.

To select the target word from Experiment 2's target sentences, we recruited eight additional participants. We presented them with the novel context of each item and asked them to choose the one word from the target sentence that is most related in its meaning to the context. The word that received the majority of the votes for each item was selected as the target word. Note that this selection procedure biases the results toward the alternative explanation be-
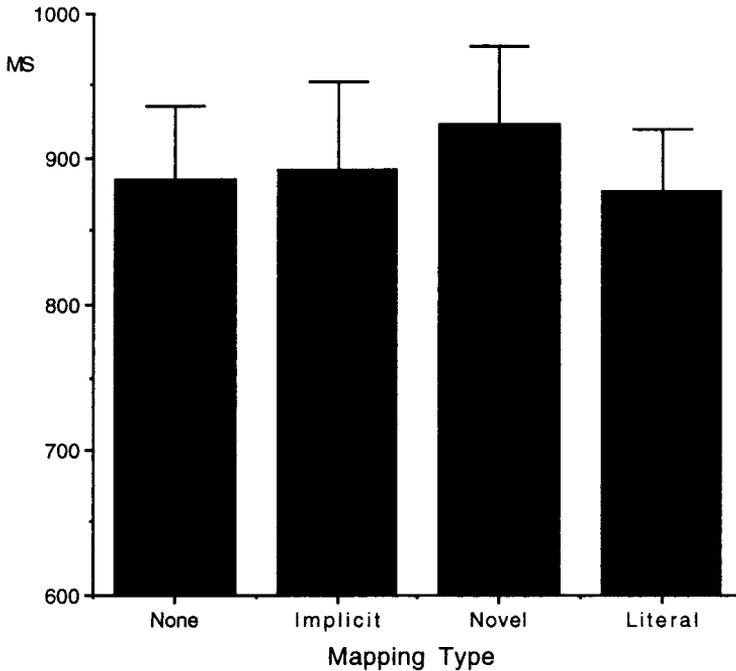
FIG. 3. Mean reaction times in Experiment 3 to perform a lexical-decision task following each of the four context types.

cause the words were selected vis-à-vis the *novel* context. This increases the chances that the novel context would prime the target word in Experiment 3. Table 1 provides examples of target words.

Procedure and design. Participants first received an explanation about the lexical decision task and the quiz questions and then practiced the procedure. They received feedback about their accuracy during practice but not during the experiment. Participants received the context on the computer screen, pressed a button when they finished reading it, and then the target word or a quiz appeared on the screen. When a target word appeared, participants decided if it was an English word and responded YES or NO as quickly as they could. The YES response was always mapped to the participants' dominant hand. The design was identical to that of Experiment 2.

Results and Discussion

The analysis included the same items analyzed for Experiment 2. Error rates were low,

ranging between 0 and 3%. As Fig. 3 illustrates, latencies of correct responses revealed a pattern opposite to the results of Experiment 2. While the novel condition was faster than the implicit and no-mapping conditions in Experiment 2, here it was the slowest (Ms = 885, 891, and 923 ms for no mapping, implicit, and novel, respectively). The mean reaction time following the literal context was nominally the fastest (876 ms), but a one-way analysis of variance revealed no significant difference among these conditions ($Fs < 1$).

The data of Experiment 3 clearly rule out the priming-based alternative explanation of the results of the first two experiments. In Experiment 2, we argued that the novel context condition instantiated the conceptual mapping. Consequently, the reading of the target sentence was facilitated compared to the no-mapping and implicit-mapping conditions. In Experiment 3, the response latency in the novel condition was slightly *longer* than both the implicit and the no-mapping conditions. This demonstrates that the target word was not primed more in the

novel condition than in any other condition. We can therefore confidently conclude that semantic priming at the lexical level was not responsible for the results of Experiment 2.

GENERAL DISCUSSION

Taken together, the results of our three experiments challenge a major claim of Lakoff and Johnson's theory of conceptual metaphor— that conventional expressions instantiate metaphorical mappings. In Experiment 1, we found that even explicit mention of a mapping such as ARGUMENT IS WAR did not yield evidence for conceptual mappings, most likely because the explicit mentions were used with conventional expressions. In Experiment 2, when the context included novel instantiations of the conceptual mapping, we did find evidence for the use of conceptual mappings.

The pattern of our results supports a straightforward conclusion. People can understand conventional expressions, such as *I'm depressed,* without recourse to any mappings between domains or, in Lakoff and Johnson's terms, conceptual mappings such as SAD IS DOWN. In essence, conventional expressions function as do frozen metaphors such as the *arms, legs, seats,* and *backs* of chairs. In both cases—conventional expressions and frozen metaphors— understanding is accomplished directly and literally. When, on the other hand, an expression or metaphor is novel, more inferential work must be done. To understand an expression such as *the crime rate has reached meltdown proportions,* people might either access or create an analogy between crime situations and nuclear reactors. If nuclear reactors had previously been encountered as a metaphor for dangerous situations, then the conceptual mapping between nuclear reactors and dangerous situations could be accessed and instantiated in terms of criminal activities. On the other hand, if a person had never before encountered a likening of crime situations to nuclear reactors or, more generally, nuclear reactors as a metaphor for dangerous situations, then such an analogy must be created on the spot. As Bowdle and Gentner (November, 1995; See also Gentner & Wolff, 2000) have suggested, the processes used to under-

stand any particular metaphorical expression may change as a function of familiarity and conventionality. When a metaphor is completely novel, it may require different kinds of inferential work than when it is very familiar.

Our findings are consistent with Gentner and her colleagues' suggestion that when a metaphorical mapping is switched, readers encounter more difficulty than when the same mapping persists (Gentner & Boronat, 1992, 1999; Gentner & Wolff, 2000). Gentner and Boronat had participants first read sentences such as *Her anger had been simmering all afternoon.* They were then faster to read a consistent continuation such as *When Harry got home, she was boiling over* than a nonconsistent one: *When Harry got home, she was glacially cold.* Moreover, when more conventional expressions were used, the difference disappeared. These results seem analogous to the results of our Experiments 1 and 2.

Conceptual mappings, then, are not routinely used, but instead may be generated and used from perceived or inferred similarities between domains. As Murphy (1996) has argued, similarity-based analogical reasoning models, such as Gentner's (1983) structure-mapping model, can account for comprehension of both novel and frozen expressions more parsimoniously than the conceptual mapping view. Murphy bases his argument primarily on the inadequacy of the conceptual mapping view as a model for how people represent concepts, i.e., at the conceptual level. Our results enable us to extend his critique beyond the conceptual level to the level of language use.

Put most simply, the conceptual mapping view fails to distinguish between the direct understanding of frozen and conventional expressions on the one hand, and the inferential work that may be needed to understand novel expressions, on the other. The failure of the conceptual mapping view is attributable in large part to Lakoff's conflation of literal and metaphorical language. As Jackendoff and Aaron (1991) pointed out, many expressions that people consider straightforward and literal are treated by Lakoff and his colleagues as metaphorical (cf. Lakoff & Turner, 1989). The expression *I'm*

depressed is one example, as is *The road goes from London to Canterbury.* Lakoff and Turner would argue that roads cannot literally go from one place to another in the sense of physical travel. Our alternative is simple: the word "go" is polysemous and can be used to refer to extents (e.g., the crack in the wall went from one end of the room to the other) or to physical movement (e.g., the ant on the wall went from one end of the room to the other).

How can we distinguish between polysemy of this sort and metaphor? Jackendoff and Aaron (1991) suggest a test for whether or not an expression is literal or metaphorical. Consider the *road goes* expression. If asked, most people would not judge the expression to be metaphorical. More to the point, consider a question such as "If roads could be thought of as going from one point to another, would it make sense to say that the road goes from London to Canterbury?" Most people would find this question distinctly odd because roads going from one place to another is simply not thought of as metaphorical. In our terms, the expression does not instantiate any conceptual mapping between roads and traveling entities.

But this is exactly Lakoff and Johnson's primary claim—that linguistic expressions that most of us think of as literal are, in essence, metaphorical. They are metaphorical because they instantiate metaphorical conceptual mappings. Whatever merit the conceptual mapping view might have for a theory of concepts, we find this view without any serious merit for a theory of text or discourse comprehension. Surely, there is a difference in what people must do to understand frozen metaphors such as the *arm* of a chair and novel ones such as *the crime rate has reached meltdown proportions.* In the context of our three experiments, people understood conventional expressions without using conceptual mappings, but apparently did use (and perhaps even generate) conceptual mappings when understanding novel expressions. To argue, as Lakoff and Johnson do, that people routinely use conceptual mappings even when understanding familiar and conventional expressions unduly complicates models of language comprehension.

Finally, to not just blur but to categorically eliminate any distinction between literal and figurative language violates not only our everyday intuitions but also the very notion of metaphor as a distinct linguistic concept. As Gilbert and Sullivan wrote, "When everyone is somebody, then no one's anybody." Analogously, when everything is metaphor, then nothing can be literal. Surely, this cannot be literally true.

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