Discourse context effects: Metaphorical and literal interpretations

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Discourse Context Effects: Metaphorical and Literal Interpretations

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Some sentences can have both a literal and a metaphorical meaning, but typically only one is appropriate. What contextual constraints lead readers to the appropriate interpretation? This article focuses on a particular kind of discourse-driven constraint: A meaning may be selected not only because context strongly suggests it, but because the alternative meaning is eliminated by context. It is commonly believed that a metaphorical interpretation may be selected because a literal interpretation would have been inappropriate. This article argues the same for a literal interpretation: A literal interpretation may be selected because a metaphorical interpretation would have been inappropriate. Three experiments demonstrated this claim: In Experiment 1 readers completed sentences and rated them as *literal* or *metaphorical*, in Experiment 2 they judged comprehension difficulty, and Experiment 3 measured comprehension latency. The experiments yielded similar patterns for metaphorical and literal interpretations, suggesting that similar discourse principles govern the selection of both interpretations.

In the book *Being There,* the President of the United States deplores the economic situation and then turns to a Mr. Gardiner for his opinion. Mr. Gardiner responds:

> In a garden . . . growth has its season. There are spring and summer, but there are also fall and winter. And then spring and summer again. As long as the roots are not severed, all is well and all will be well. (Kosinski, 1971, p. 45)

The President considered this to be a very wise economic analysis, but only because he interpreted it metaphorically. The main reason he took it metaphorically was that, given the circumstances, a literal interpretation would have been unacceptable. In other words, the utterance was interpreted metaphorically partly because of the preclusion of a literal interpretation. I propose that the same contextual constraint sometimes leads to a literal interpretation as well. Let me

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first distinguish between two kinds of contextual effects: plausibility and elimination.

Context Effects on the Selection of an Interpretation

Consider the sentence, "This place is a prison." This sentence could be interpreted literally to refer to an actual jail or metaphorically to refer to a place that has a very restrictive atmosphere and inflexible rules. There is no reason to expect one meaning to be available to the reader before the other meaning (Glucksberg, Gildea, & Bookin, 1982; Ortony, Schallert, Reynolds, & Antos, 1978), and often both meanings will be computed in parallel (Keysar, 1989). In a typical text, though, such a sentence would be used to convey one meaning or the other. One goal of comprehension is to arrive at the meaning which was most probably intended; to identify a meaning to be integrated with the remainder of the text. It is this decision—the selection of the appropriate meaning of the sentence—that is the focus of the studies reported here.

One way context may induce the selection of a metaphorical interpretation for an ambiguous sentence is by making the metaphorical interpretation very plausible. For example, if the discourse context describes *this place* as being very confining and restrictive, the metaphorical meaning of *prison* as a place that restricts freedom may be more available. In this context, the likelihood that the interpretation of the utterance "This place is a prison" would be metaphorical may be increased. I will refer to this kind of contextual effect as a "plausibility effect." In contrast, a metaphorical interpretation may be selected not because it is rendered more plausible, but because other alternatives such as a literal interpretation are rendered less plausible. For example, imagine a context which suggests that the place in question has a very liberal atmosphere and that it is a family home. Now, suppose that "This place is a prison" is uttered by a teenager who lives in that home. The context does not describe that the parents are highly controlling and that they are very strict with their child—it does not make the metaphorical interpretation plausible by describing that it is metaphorically a prison—instead, it rules out a literal interpretation by explicitly fixing the referent of the *place* as being different than a jailhouse. I will refer to this kind of contextual effect as an "elimination effect."

So far, I have described two ways by which context can induce the selection of a metaphorical interpretation of an ambiguous sentence. I propose that discourse context may constrain the selection of a literal interpretation in exactly the same way: A literal interpretation can be selected as the intended meaning of the utterance because of the same two discourse constraints. The first contextual constraint, by increased plausibility, is easy to see: A literal interpretation may be more likely to be selected if context includes elements that suggest a literal interpretation. For example, if the discourse includes the mention of wardens and guard dogs, it would induce a literal interpretation of "This place is a prison." In this sense, context would make the literal interpretation more likely to be se-

lected as the intended meaning. There is evidence that contextual plausibility effect operates similarly for literal and metaphorical interpretations (e.g., Gerrig & Healy, 1983; Gibbs & Gerrig, 1989; Gildea & Glucksberg, 1983). Now, consider the second contextual effect: by elimination. A literal interpretation may be selected because of the contextual preclusion of a metaphorical interpretation. To illustrate, consider a context that does not specify what *this place* is, but describes the atmosphere as very liberal, nonrestrictive, and so on. This kind of context does not provide information that makes the literal interpretation more plausible. Instead, it rules out the metaphorical meaning by describing the place as nonrestrictive. In this case, the literal meaning is selected precisely because the metaphorical interpretation is ruled out.

Elimination Is Not a Reincarnation of the Semantic Anomaly Theory

The notion of context effect by elimination may seem like the traditional theory of metaphor that has been rejected by several psycholinguistic studies. This theory assumes that literal meaning has priority over nonliteral meaning, that it is always attempted first and that a nonliteral interpretation is constructed only if anomaly is detected (e.g., Dascal, 1987; Davidson, 1979; Grice, 1975; Lowenberg, 1975; Searle, 1979). In other words, the semantic analysis must detect an anomaly in order for a metaphorical interpretation to be attempted. The requirement of anomaly has been rejected on philosophical grounds (e.g., Stern, 1983) and psycholinguistic evidence (Gibbs, 1984; Keysar, 1989; Pollio & Burns, 1977). Even when a sentence has a true literal meaning, a metaphorical meaning may be readily available (Keysar, 1989). In other words, the construction of a metaphorical meaning does not require a semantic anomaly. In addition, several studies provide evidence against the serial nature of processing as implied by a stage model (e.g., Glucksberg et al., 1982; Glucksberg & Keysar, 1990, 1993; Inhoff, Lima, & Carroll, 1984; Keysar & Glucksberg, 1993; Ortony, 1979; Ortony et al., 1978). The theoretical requirement of semantic anomaly may seem *similar to contextual effects by elimination under consideration here, but this is only a superficial similarity.* The perception of similarity results from a confounding of levels of analysis much like the kind of confusion that Gibbs (1993) identifies in his evaluation of the literature on metaphor.[1] In line with Gibbs's

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[1]Gibbs (1993) describes theories that are concerned with metaphor identification and recognition (e.g., Kittay, 1987; Levin, 1977; Searle, 1979), metaphor comprehension processes (e.g., Glucksberg et al., 1982; Shinjo & Myers, 1987), the role of similarity in metaphor identification (Glucksberg & Keysar, 1990; Katz, 1982; Shen, 1989), the conceptual structure that supports metaphorical understanding (e.g., Gentner, 1983; Lakoff, 1987), and the appreciation of metaphor (e.g., Tourangeau & Sternberg, 1982). Gibbs observed that the metaphor literature includes seemingly contradictory theories, probably due to the multidisciplinary interest in the topic and the multiplicity of perspectives that are applied to the study of metaphor. He suggests that once the level of analysis of each theory is explicitly specified, and once the aspect of the process that is in question is clarified, many inconsistencies disappear.

analysis, this study is at the discourse level of analysis and focuses on the way discourse context may affect the final interpretation of a sentence. Different from the notion of anomaly in the traditional theory, the notion of elimination is analogous to the suppression mechanisms that Gernsbacher and her colleagues identify as an important mechanism for the skill of reading: the ability to suppress the contextually inappropriate alternative (Gernsbacher, 1993; Gernsbacher & Faust, 1991).

Overview of the Experiments

Three experiments investigated the extent to which context similarly constrains literal and metaphorical interpretations—the extent to which context may not only facilitate interpretations (plausibility), but also the possibility that an interpretation may be selected by *elimination*. These experiments used ambiguous sentences that could be interpreted either literally or metaphorically. The experiments did not use descriptive sentences such as "This place is a prison," but instead they used related counterfactuals as in: "If this place were not a prison, then. . . ." This counterfactual can be understood literally or metaphorically in the following way. In order to *understand* the sentence, one must recover its presupposition. "If this place were not a prison" implies that this place *is* a prison. The question is, does this sentence presuppose that this place is literally or metaphorically a prison? When interpreted literally, it means that this place is a literal jail. When interpreted metaphorically, it presupposes that the place is very restrictive, confining, and so on, but *is not necessarily* an actual jail. In order to interpret the antecedent of the conditional, then, one must identify its presupposition by relying on previous context. Such counterfactuals were employed to test the effects of discourse context on the way people arrive at either a metaphorical or a literal interpretation of sentences.[2]

EXPERIMENT 1

The goal of this experiment is to investigate whether similar contextual conditions can lead to either literal or metaphorical interpretations of test sentences. All test sentences were counterfactuals of the form: "If X were not a Y, then. . . ."; for example, "If this place were not a prison, then. . . ." This counterfactual presupposes that this place is a prison, therefore, the interpretation

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[2]The experiments use counterfactuals and not descriptive sentences because descriptive statements, such as "This place is a prison," are typically understood as informative statements. As such, the fact that this place is a prison may be taken as "new" information (Chafe, 1976; Clark & Haviland, 1977; Prince, 1981). In contrast to descriptive sentences, the interpretation of the antecedents of counterfactuals must rely on previous context. "If this place were not a prison" presupposes that this place is a prison. In order to interpret the sentence, the reader must disambiguate the presupposition and determine whether this place is literally or metaphorically a prison. In order to do that, the reader must consult previous context.

of the sentences requires the contextual disambiguation of the presupposition. When taken literally, *prison* refers to an actual jail. In contrast, a metaphorical interpretation would suggest that *this place* is confining, restraining, isolating, and so forth, but is not an actual penal institution.

The first kind of contextual effect is straightforward. When context includes hints as to the intended interpretation, that interpretation should become more likely. So, in some contexts the antecedent of the counterfactual would be interpreted literally, and in other contexts it would be more likely to be taken metaphorically. Consider the following scenario which suggests, for most people, a literal interpretation of prison:

> The atmosphere there always depended on who was in charge. Sometimes they would leave you on your own, at other times terror would prevail. If this place were not a prison, then. . . .

In contrast, the following context typically suggests a metaphorical interpretation of prison:

> Most of us have white collar jobs. You know, most of the time you're at your desk, working on one more boring project. If this place were not a prison, then. . . .

Both scenarios are ambiguous, but they do provide hints for a literal interpretation of the antecedent in the first case and for a metaphorical interpretation in the second. This kind of "induced" contextual effect is quite common. The second kind of contextual effect, by elimination, is of interest in this study. The question in focus is, would these interpretations (literal and metaphorical, respectively) reverse if additional contextual information precluded such interpretation? Consider first the case of the context that originally induced a literal interpretation of the antecedent. If additional context precludes a literal interpretation, it is reasonable to expect that the interpretation would reverse and that people would be more likely to take the antecedent metaphorically. The following is an example of additional context that renders a literal meaning false (the added information is italicized to allow for easy comparison with the context):

> *I just quit my job after working there for 20 years.* The atmosphere there always depended on who was in charge. Sometimes they would leave you on your own, at other times terror would prevail. If this place were not a prison, then. . . .

In this case, given that the additional information suggests that *this place* refers to a job, a literal interpretation of *prison* becomes less likely. It is reasonable to expect, then, that readers will be more likely to select the metaphorical interpretation with such additional information.

Crucial to my suggestion is context that provides information which renders a metaphorical interpretation false. For example, consider the following informa-

tion: "You're quite free here; they have a fairly liberal policy. The rules are minimal and not very imposing." This information does not by itself suggest that the speaker is talking about a penal institution, it does not bias a literal interpretation of *prison* in this sense. Yet, it does render the metaphorical meaning of *prison* false: It negates the metaphorical meaning by suggesting that the place is not confining and restrictive, but that it is liberal. The question of interest is, then, would the addition of such information to a context that originally yielded a metaphorical interpretation of *prison* reverse the interpretation to a literal one? The following example presents a counterfactual in the context that originally yielded a metaphorical interpretation, plus the information which renders a metaphorical meaning false (italicized):

You're quite free here; they have a fairly liberal policy. The rules are minimal and not very imposing. Most of us have white collar jobs. You know, most of the time you're at your desk, working on one more boring project. If this place were not a prison, then . . .

The question is, would readers be more likely to interpret the antecedent literally because the metaphorical meaning would be false?

It is important to emphasize that contextual information that renders a metaphorical interpretation false does not by itself suggest a literal interpretation. If someone tells you about a place that has very liberal policies and a lax atmosphere, you do not typically think that the place in question is a jail. If anything, contextual information that primes the notion of jail would suggest that the place is very confining. Therefore, if the additional information results in a literal interpretation, it could not be attributed to priming or contextual hints that increase the plausibility of the literal interpretation. It can only be attributed to the preclusion of a metaphorical meaning.

Method

Materials. Twelve incomplete counterfactuals were used as test sentences. All were of the form "If X were not a Y, then. . . ." Four context stories for each test sentence were developed in the following way: Two different ambiguous context paragraphs were constructed for each test sentence. As judged by two native English speakers, each test sentence was more likely to be interpreted literally after one type of context paragraph (originally literal) and more likely to be read metaphorically after the other type of context paragraph (originally metaphorical). The other two context conditions were constructed by adding information to the beginning of each of the original paragraphs. This information was relevant to either the literal or the metaphorical meaning of the counterfactual. For example, the sentence "I just quit my job after working there for 20 years" renders false the literal meaning of the assumption behind "If this place were not a prison. . . ." This type of sentence was added to originally literal paragraphs to

form the third context condition. Similarly, information rendering the test sentence metaphorically false was added to the originally metaphorical paragraphs. For example, the test sentence is metaphorically false in the context of the additional information "You're quite free here; they have a fairly liberal policy. The rules are minimal and not very imposing." This type of sentence was combined with the originally metaphorical paragraphs to yield the fourth context condition. To summarize, each of the 12 test sentences appeared in the four context conditions: two were original paragraphs (originally literal, originally metaphorical), and two were original paragraphs plus additional information (literally false/originally literal, metaphorically false/originally metaphorical).

People are expected, of course, to be more likely to interpret a test sentence as metaphoric with the addition of literally false information than without it. Less intuitive is the prediction that readers will be more likely to interpret the test sentence literally when metaphorically false information is present than when the originally metaphorical paragraph alone precedes the counterfactual.

Pretesting of Materials. The pretest was conducted to ensure that the additional information did not bias the results toward the predicted interpretation by making it more plausible. This is particularly crucial for the case in which metaphorically false information is added to the context. In that case, the hypothesis is that the likelihood of a literal interpretation of the counterfactual will be increased. But, suppose that readers do take the test sentence metaphorically when it follows the originally metaphorical paragraph alone and that, as expected, they interpret the test sentence literally when metaphorically false information is added. It could be argued that the additional information simply biased the interpretation in the expected direction. According to this alternative explanation, *prison* would be taken to refer to an actual jail (i.e., literal interpretation) when metaphorically false information is present because the additional context constitutes a good description of the literal referent of *prison*. In other words, it could be that readers change their interpretation from metaphorical to literal not because the additional information renders a test sentence metaphorically false, but because it makes its literal interpretation more plausible. The goal of pretesting was to rule out this alternative explanation by demonstrating that no such bias existed in the added information.

Thirty-six college undergraduates volunteered to rate the context additions. For example, subjects saw the following metaphorically false information for the prison item: "You're quite free here; they have a fairly liberal policy. The rules are minimal and not very imposing." This was followed by the question: "How likely is this to be a description of an actual jail?" Subjects provided their ratings on a 7-point scale labeled from *very likely* (1) to *not at all likely,* (7) with a midpoint that indicated *don't know* (no information). Each subject rated all 12 contexts; 6 were of the metaphorically false type, and 6 were of the literally false type.

Ratings were coded in terms of deviations from the midpoint of the scale (i.e., no information). Positive numbers indicate a bias that goes against the hypothesis (e.g., literal interpretation unlikely with metaphorically false information), whereas negative numbers imply that the context was perceived to be biased in the direction of the hypothesis (e.g., literal interpretation likely for metaphorically false information). The median likelihood rating for each item was calculated. The mean score for both the literally false ($M = 1.3$) and the metaphorically false information ($M = .5$) were positive, clearly suggesting that the information did not bias the experiment toward the expected result. In fact, it was biased against the hypothesis, with the mean for literally false information significantly larger than 0, $t(23) = 4.80, p < .001$; and for metaphorically false, marginally significant, $t(23) = 2.17, p = .053$. This indicates that the context sections were perceived as unlikely descriptions of the predicted reading of test sentences. Therefore, the artifactual explanation regarding induced bias may be rejected; if there were any bias, it is in the direction opposite of the prediction.

Subjects. Twenty-four college undergraduates participated for pay. All were native English speakers, and none had participated in any prior, similar experiments.

Design and Procedure. Each subject received all 12 test sentences: 3 different test sentences in each of the four context conditions. This yielded a 2 (Original Information: literal or metaphorical) × 2 (Additional Information: with [literally or metaphorically false] or without) within-subjects design.

The scenarios were presented to subjects in a booklet. Items and conditions were counterbalanced yielding four different booklets. Each item appeared on a separate page, and the pages were shuffled to randomize presentation of items. The booklet began with six filler items that had the same form as the experimental items. Each item ended with a test sentence of the form: "If X were not a Y, then. . . ." The meaning of the counterfactuals was explained to subjects, and their task was to complete the sentence in a way that described what would be different if indeed X were not a Y. After subjects completed all items, they were told that the sentences could be interpreted either literally or metaphorically. Next, they indicated which interpretation they had in mind when they completed the sentence. There were two dependent measures: (1) subjects' judgments of the way they interpreted the counterfactual; and (2) the way they completed the counterfactuals, indicating either a literal or metaphorical interpretation.

Results and Discussion

Judgments of Literal or Metaphorical Interpretations. The interpretation-judgment results strongly suggest similarity in the effect of context on literal and metaphorical interpretations. Figure 1 presents the effect of the two kinds of
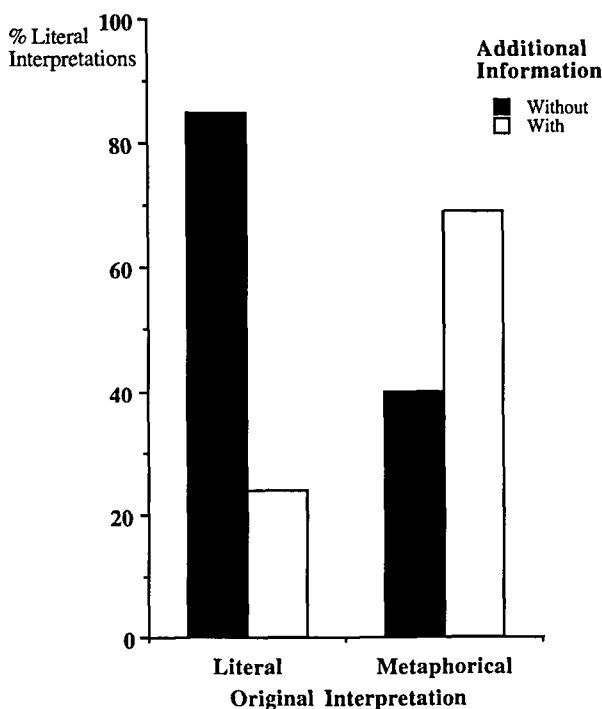
Figure 1.   Percentage of literal interpretations reported as a function of original and additional false information in Experiment 1.

additional contextual information on the likelihood of a literal interpretation. Consider first the effect of literally false information: When the counterfactuals appeared with the originally literal paragraphs, most of the interpretations were literal (85%). But, with the additional literally false information, only 24% of the interpretations were literal, with the majority of the interpretations being metaphorical (76%). This suggests that a metaphorical interpretation may be selected because a literal meaning would be false. Most importantly, the remaining two conditions suggest that an analogous contextual effect leads to a literal interpretation: When the counterfactual followed the originally metaphorical paragraphs, subjects were more likely to interpret the antecedent metaphorically (60%), and less likely to take it literally (40%). However, with the metaphorically false information, more subjects interpreted it literally (70%) than metaphorically (30%).

Interpretation judgments were coded to reflect the ratio of literal interpretations. For analysis with subjects as a random effect, each subject contributed a ratio of literal interpretations for each of the four context conditions. For analysis with items as a random effect, each item contributed a ratio of literal interpreta-

tions to each of the four context conditions. The subjects' data and the items' data were submitted separately to a 2 (Original Information: literal or metaphorical) × 2 (Additional Information: with [literally or metaphorically false] or without) repeated-measures analysis of variance (ANOVA). Throughout this article, analyses over subjects is reported as F_1, and over items as F_2. Indeed, the crossover interaction between original information and additional information was significant, $F_1(1, 23) = 122.85, p < .001, MSE = .0398; F_2(1, 11) = 110.92, p < .001, MSE = .0220$. Pair-wise comparisons revealed that the effect of additional information was significant at both levels of original information: Adding the literally false contexts significantly shifted the interpretation to metaphorical, $F_1(1, 23) = 107.04, p < .001, MSE = .0837; F_2(1, 11) = 61.91, p < .001, MSE = .0723$. More importantly, metaphorically false information significantly increased the likelihood of a literal interpretation, $F_1(1, 23) = 20.49, p < .001, MSE = .0996; F_2(1, 11) = 12.53, p < .01, MSE = .0814$.

Sentence Completions. In addition to self-reports, subjects' completions of test sentences could also reflect their interpretations. Some completions were more diagnostic than others with respect to the way the subject interpreted the antecedent. For example, one subject completed the *prison* sentence in a way that suggests a literal interpretation of *prison:* "If this place were not a prison, then you might think it was a corporation." The reason the completion suggests a literal interpretation of the antecedent is that it is clear from the completion that *this place* is not a corporation. By implication, it may have been taken as a real prison. In contrast, another subject completed the same sentence in a way that is more likely to suggest a metaphorical reading: "If this place were not a prison, then I'm sure I could advance up the corporate ladder." In this case, the completion suggests the assumption that *this place* is a corporation—a restrictive one that does not allow one to advance. Therefore, one can conclude that this subject interpreted the antecedent metaphorically. In general, completions varied in the extent to which they unambiguously revealed the way subjects interpreted the antecedent. For example, several completions were ambiguous, as in "If this place were not a prison, then you wouldn't live in fear." Such completions may indicate either interpretation, or both.

Two independent judges determined the extent to which the completions indicated a metaphorical or literal interpretation of the antecedent. To avoid an effect of contextual expectations, raters heard only the test sentence and its completion but had no knowledge of the context story. The raters classified each completion as indicating a literal interpretation of the test sentence, a metaphorical interpretation, or both, and they indicated the extent to which each completion suggested a particular interpretation. Ratings were coded as follows: *0* and *1* for metaphorical and literal interpretations, respectively; *.5* for completions that could be interpreted either way; *.25* for an ambiguous completion that was probably more metaphorical; and *.75* for an ambiguous completion that was
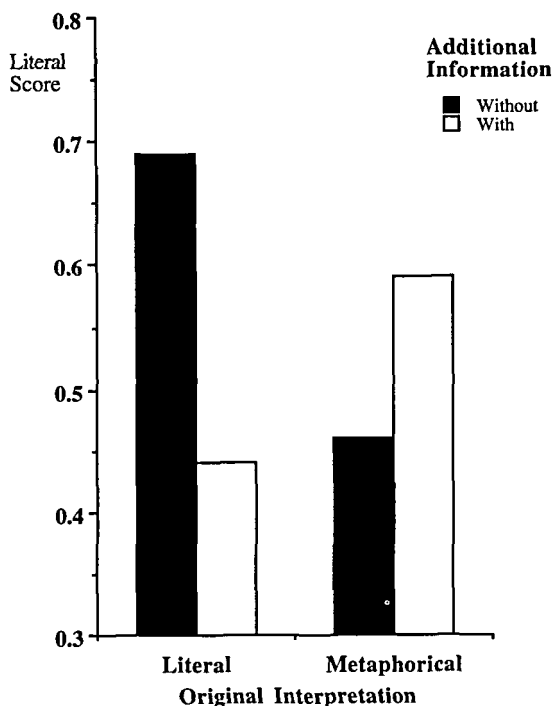
Figure 2. Literal score of completions as a function of original and additional false information in Experiment 1.

more likely to suggest a literal interpretation. The ratings of both judges were averaged for each completion. The closer the mean is to 1, the more it suggests a literal interpretation; the closer it is to 0, the more it suggests a metaphorical interpretation.

The pattern of raters' judgments paralleled the pattern of interpretations subjects reported. The completions suggested that interpretations were more likely to be literal with originally literal paragraphs (.69) but less so when literally false context sections were added (.44; see Figure 2). Metaphorically false information had the reverse effect. With the originally metaphorical paragraphs, interpretations were more likely to be metaphorical than literal, but when metaphorically false information was added, completions suggested more literal interpretations (.46 and .59, respectively). These data were then submitted to a 2 (Original Information) × 2 (Additional Information) repeated-measures ANOVA. Most importantly, the crossover interaction between original information and additional information was significant, $F_1(1, 23) = 30.43$, $p < .001$, $MSE = .0285$; $F_2(1, 11) = 32.85$, $p < .001$, $MSE = .0132$.

Comparisons within original information conditions revealed significant effects for both the literally false and metaphorically false additional information: Adding literally false information caused a significant reduction in the literal interpretation scores, $F_1(1, 23) = 22.07, p < .001, MSE = .0689; F_2(1, 11) = 26.37, p < .001, MSE = .0288$. Similarly, adding metaphorically false information significantly increased the likelihood of a literal interpretation of the antecedent, $F_1(1, 23) = 5.04, p < .05, MSE = .0786; F_2(1, 11) = 6.56, p < .05, MSE = .0302$.

This experiment focused on the way context constrains the final interpretation of a sentence and showed that the same kind of contextual constraint governs both metaphorical and literal interpretations. The addition of literally false context information resulted in a reversal of the interpretation from predominantly literal to predominantly metaphorical. More importantly, when metaphorically false information was added to the originally metaphorical paragraphs, it caused subjects to switch from a predominantly metaphorical interpretation to a literal interpretation of the antecedent. The results suggest that the product of the interpretation (i.e., literal or metaphorical) may result from contextual elimination. The goal of Experiments 2 and 3 was to explore the possibility that these contextual constraints have similar processing implications for both literal and metaphorical interpretations.

EXPERIMENT 2

When people read text they try to integrate the interpretations of new sentences with the mental representation of the preceding discourse. Because every sentence may be interpreted in a variety of ways, integration with context requires on-line choices among alternative interpretations. It is reasonable to assume that an interpretation by elimination would put more demand on the comprehension process than the choice of a contextually-biased interpretation. One can think about such contextual effects in terms of structure building (Gernsbacher, 1990). As the reader receives the contextual information, he or she builds mental representations that are to be integrated with new text. If the new text can be easily accommodated by the existing structures, comprehension should be easy. In contrast, if the new text requires the construction of new structures, comprehension should be more difficult.

The two kinds of contextual constraints used in Experiment 1 map onto these two kinds of contextual integration. When context suggests a literal or metaphorical interpretation because it primes the concepts, the reader is probably using contextually-constructed structures and integrates the new text with already existing mental structures. Consider the counterfactual "If this place were not a junkyard, then. . . ." When the context includes reference to old car parts, it provides mental structures that can naturally integrate a literal interpretation of *junkyard.* In contrast, when the context induces an interpretation by elimination, the

reader must build new structures in order to integrate the new text. For example, if the context suggests that the referent of *junkyard* is somebody's room, a metaphorical interpretation of the antecedent will require the reader to build new structures. This is because the structures yielded by the preceding context do not include subparts that correspond to the metaphorical meaning of *junkyard* (e.g., untidy, disorganized). Instead, those structures only specify that the place is a room. Similarly, if the context induces this interpretation by elimination only, one would need to build new structures in order to reach a literal understanding of the counterfactual. If the context does not provide structures that accommodate a literal reference to *junkyard,* but only includes structures that preclude the metaphorical meaning of *junkyard* (e.g., the place is very organized and tidy), then a literal interpretation will require the construction of new structures. In this case, a literal interpretation would be relatively difficult. If contextual constraints apply similarly to both literal and metaphorical interpretations, then comprehension should be easier when the interpretation is suggested by context than if arrived at via elimination.

The materials from Experiment 1 were used to test this possibility. Recall the four context conditions used in the previous experiment: two original information contexts suggesting a literal or a metaphorical interpretation. It should be relatively easy to comprehend the test sentence in these two conditions because the resulting interpretations are biased by context. In contrast, the other two context conditions induce interpretation by elimination and require building new structures. According to the results of Experiment 1, when literally false information is added, the test sentence is interpreted metaphorically; and as a result of adding metaphorically false information, a literal interpretation is preferred. If interpretation by elimination increases the difficulty of the comprehension process, then whenever context eliminates either literal or metaphorical interpretations comprehension should be harder. Ease of comprehension, then, should only be a function of additional information. Experiments 2 and 3 test this hypothesis with two different measures. Experiment 2 uses an indirect measure of ease of comprehension, namely, subjective ratings. In Experiment 3, comprehension latency measured ease of comprehension.

Method

Subjects. Forty college students, enrolled in introductory psychology class, participated in this experiment as partial fulfillment of course requirements. All were native English speakers and had not participated in this type of study before. One subject's data were discarded because he did not follow instructions.

Materials. The original materials from Experiment 1 were modified in two ways due to the nature of the tasks in Experiments 2 and 3. First, in these two experiments the counterfactual's antecedent was followed by a conclusion. Con-

clusions were constructed to agree with either a literal or a metaphorical inter-
pretation of test sentences. For example, the antecedent "If this place were not a
prison, . . ." was concluded with "then I might be more motivated." This makes
sense when the antecedent is interpreted literally as well as metaphorically, and it
is consistent with the information in all context paragraphs. Thus, in Experi-
ments 2 and 3 the test sentence had two parts, the antecedent ("If . . .") and its
conclusion ("then . . ."). Secondly, because Experiment 3 measured comprehen-
sion latency, text was added to the beginning of original information contexts so
that they would be equivalent in length to the other two context conditions which
also included the literally and metaphorically false information. These additions
were carefully chosen to be as neutral as possible and to preserve the meaning of
the context stories and the test sentences. For example, the original information
context conditions of the *prison* test item started with: "I spent 3 years in that
place already." A native English speaker judged these additions as neutral with
respect to literal and metaphorical interpretations.

Design and Procedure. Subjects rated ease of comprehension of either the
antecedent or the conclusion of each test sentence. The phrase to be rated was
underlined, and when the antecedent was rated it was not followed by the
conclusion. Each subject received a booklet with 12 items, and each item ap-
peared on a separate page. They were instructed to read each paragraph and to
rate ease of comprehension of the underlined phrase given the previous text.
They indicated their decision by circling a number on a 21-point scale, with 1
marked *very easy,* 21, *very hard,* and the midpoint, *average.* Each subject saw
all 12 items, in random order, 3 in each of four context conditions. Six of the
items in each booklet were rated for ease of comprehension of the antecedent and
six for ease of comprehension of the conclusion counterbalanced for items across
booklets. Subjects then indicated their guesses regarding the purpose of the
experiment. None of them successfully identified the purpose of the experiment.
   Data were analyzed separately for the antecedent and the conclusion ratings.
Each set of ratings yielded a 2 (Original Information: literal or metaphorical) × 2
(Additional Information: with [Literally or Metaphorically False] or without)
within-subjects design.

Results and Discussion
Ratings for each item were averaged for each of the four conditions separately for
antecedents and conclusions. As shown in Figure 3, the results support the
hypothesis: The antecedent was rated as harder to understand with additional
literally false information ($M = 12.8$) than with the originally literal context
alone ($M = 8.3$). Similarly, the antecedent was rated as harder to understand with
metaphorically false information than without ($Ms = 11.6$ and 9.6, respectively.)
Mean ratings were submitted to a 2 × 2 repeated-measures ANOVA. The addi-
tional information effect was significant, $F(1, 11) = 17.72, p < .01, MSE =$
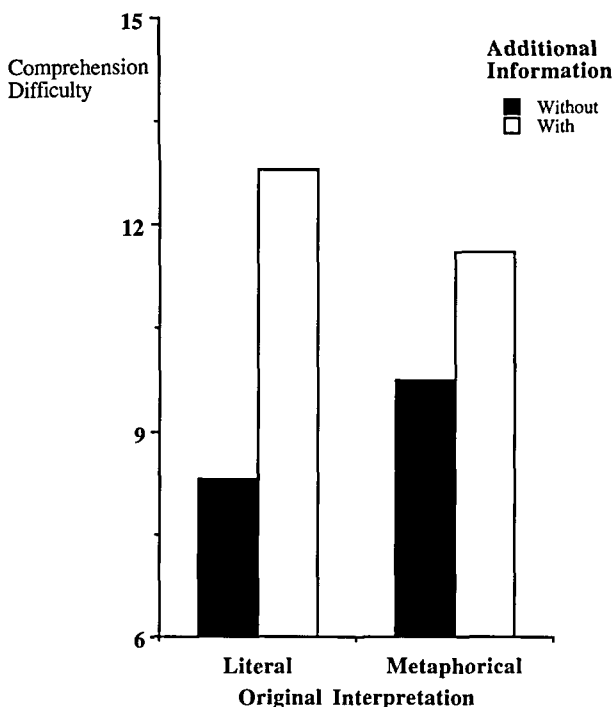
Figure 3. Rated comprehension difficulty of the antecedent as a function of original and additional false information in Experiment 2.

7.308. In contrast, there was no effect of original information, $F < 1$. Because the additional information effect was greater for originally literal than for originally metaphorical contexts, there was a marginal interaction between additional information and original information, $F(1, 11) = 4.49, p = .057, MSE = 3.968$. Crucial for the hypothesis, a simple effect analysis verified that the additional information effect was indeed significant for the originally metaphorical contexts, $F(1, 11) = 6.31, p < .03, MSE = 4.059$.

Although ratings of the antecedent of the test sentences showed the expected effect, ease of comprehension of the conclusion was more uniform across the different conditions. There was virtually no difference between the two originally metaphorical context conditions ($Ms = 10.6$ and 10.5, respectively). Following the originally literal context, the conclusion was rated as harder to understand with the literally false than without it ($Ms = 11.7$ and 9.8, respectively), but this difference was not statistically significant. An ANOVA revealed no significant effects: Original information did not have an effect, $F < 1$; nor did additional information, $F(1, 11) = 1.94, p = .19, MSE = 4.907$; nor did the two factors interact significantly, $F(1, 11) = 1.74, p = .21, MSE = 7.313$. It is reasonable

that the expected differences were found with the antecedent and not the conclusion because only the interpretation of the antecedent varies across conditions. The antecedent is the part of the test sentence that is interpreted either literally or metaphorically depending on the additional information. In contrast, the interpretation of the conclusion does not depend on the contextual manipulation. These ratings also confirm that the concluding sentences were constructed in a nonbiased way, given that ease of comprehension did not vary across conditions.

Ratings of the antecedent, then, indicate that interpretation by elimination is harder regardless of whether the final interpretation is literal or metaphorical. When a metaphorical interpretation was preferred by elimination (i.e., with literally false information), the antecedent was rated as more difficult than when a literal interpretation was suggested by context (originally literal). In the same way, when the antecedent was interpreted literally by elimination (metaphorically false), it was rated as harder to comprehend than when it was metaphorically suggested by context (originally metaphorical). In general, interpretation by elimination was perceived to be harder than when an interpretation was biased by context. Experiment 3 was designed to investigate the same issue with a different measure: comprehension latency.

EXPERIMENT 3

In Experiment 3, comprehension latency is used to detect the effect of context on ease of comprehension of the counterfactual separately for the antecedent and for the conclusion. In Experiment 2, the effect of adding literally and metaphorically false information on ease of comprehension was revealed for the antecedent but not for the conclusion. This is reasonable because subjects were required to rate each line independently. In contrast, in Experiment 3, comprehension latency may reveal the effect either for the antecedent or the conclusion. This will depend on whether subjects resolve the ambiguity of the antecedent before continuing to read the conclusion, or whether they defer that resolution until the end of the sentence. In this case, the incomplete phrase may be kept in mind partially processed, only to be fully disambiguated when the complete sentence is read. This would be in line with existing evidence that readers typically wait until the end of the sentence to construct their interpretations (e.g., Haberlandt & Graesser, 1985). Two possible patterns of results will support the hypothesis: If subjects disambiguate the antecedent immediately, then one would expect contextual effects to be most pronounced with the antecedent. In contrast, if subjects defer the completion of the interpretation until the end of the sentence, then the effects should appear with the conclusion and not with the antecedent.

Method

Subjects. Forty-three college students participated in this experiment. All were native English speakers and were participating in this kind of experiment for the first time.

Materials. This experiment used the same materials as Experiment 2: 12 counterfactual test sentences each appearing in all four context conditions. Each paragraph was divided to allow for line-by-line presentation on a computer monitor. Line breaks corresponded with clause boundaries as closely as possible so that lines made sense even though they were not always complete sentences. Items always ended with the test sentence that was divided into two lines: an antecedent and a conclusion. Nine filler items of the same format were included.

Design and Procedure. An IBM XT computer controlled the experiment. Materials appeared on the monitor one line at a time. Subjects were instructed to read the text and to press the keyboard space-bar as soon as they understood each line. Immediately after subjects pressed the space bar, the next line appeared on the screen. Items ended with an "end of story" message that allowed subjects to rest between items. The items and fillers were presented in random order. Each session started with two practice items and lasted approximately 15 min.

Subjects were instructed to respond quickly but only after they understood each line, and they were provided with occasional quizzes as an incentive to comply with these instructions. The quizzes were several sets of yes/no questions about an immediately preceding item. The questions were designed to test comprehension, not memory, for details or verbatim recognition. Subjects wrote their answers on a "quiz" sheet that led them to believe that the number of quizzes would be relatively large. Only four quizzes were actually used with a total of 14 questions. Data from 5 subjects who erred more than twice were discarded. Therefore, only 38 out of the 43 subjects contributed data for the analysis. Upon completion of the experiment, subjects wrote down their best guess about the purpose of the experiment. None of the subjects detected any feature of the materials or the design that had relevance to the hypothesis under consideration.

Each subject saw all 12 test sentences, and comprehension latency was recorded for their understanding of antecedents and conclusions. Subjects saw each test sentence only once, and they received three different items in each of the four context conditions. Conditions and items were counterbalanced in different subsets. This yielded a 2 (Original Information: literal or metaphorical) × 2 (Additional Information: with [literally or metaphorically false] or without) × 2 (Line: antecedent and conclusion) within-subject design.

Results and Discussion

The hypothesis suggested that the effect of adding false information (literally or metaphorically false) should be the same for literal and metaphorical interpretations. That is, if a metaphorical interpretation achieved via elimination is a more demanding process, then a literal interpretation by elimination should be taxing as well. The data from Experiment 2 supported this hypothesis because the antecedent was perceived as harder to understand with additional information than without. In this experiment, analogous evidence is provided by comprehen-

sion latency of the conclusion of the counterfactual. The pattern of results for the conclusion will be reviewed first, followed by that for the antecedent. As expected (see Figure 4), comprehension latency was longer for the conclusion of test sentences following contexts that included literally false information than originally literal contexts alone (Ms = 1,373 and 1,194 ms, respectively). This indicates that a metaphorical interpretation by elimination was harder to construct than the original literal interpretation. More importantly, the same pattern was revealed for contexts that result in a literal interpretation by elimination. It took longer to understand the conclusion of test sentences that followed additional metaphorically false contexts than originally metaphorical contexts alone (Ms = 1,334 and 1,260 ms, respectively).

The antecedent yielded a different pattern of results than the conclusion. Whereas the comprehension of the antecedent was not harder with additional information, the pattern was identical for literal and metaphorical interpretations. Comprehension of the antecedent was virtually identical with literally false contexts and originally literal contexts alone (Ms = 1,195 and 1,196 ms, respec-
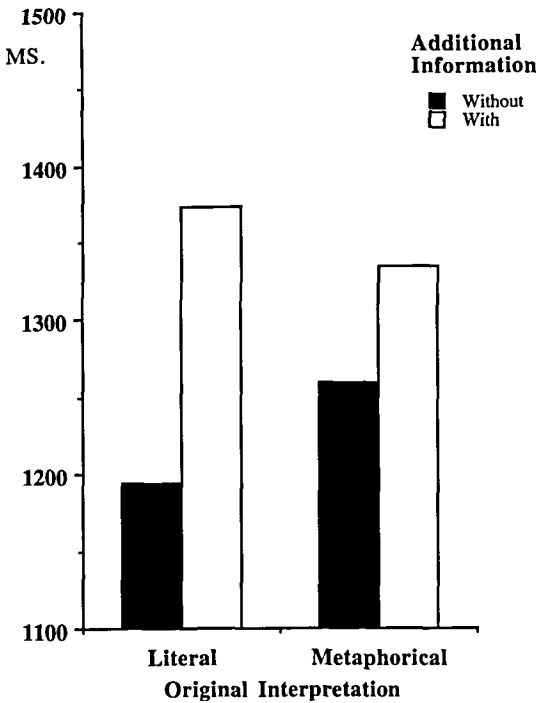
Figure 4. Comprehension latency of the conclusion as a function of original and additional false information in Experiment 3.

tively), and the latency did not differ between metaphorically false contexts and originally metaphorical contexts alone (Ms = 1,251 and 1,254 ms, respectively).

The data were submitted to a 2 (Original Information) × 2 (Additional Information) × 2 (Line: antecedent and conclusion) repeated-measures ANOVA. The ANOVA revealed that the only significant differences were those predicted for additional information, $F_1(1, 37)$ = 5.61, p < .03, MSE = 51,910; $F_2(1, 11)$ = 6.16, p < .05, MSE = 15,581. Line had an effect only when analyzed over subjects, $F_1(1, 37)$ = 4.96, p < .05, MSE = 67,602, but not over items, F_2 < 1. Additional information interacted with line, $F_1(1, 37)$ = 6.01, p < .02, MSE = 52,298; $F_2(1, 11)$ = 8.91, p < .02, MSE = 11,262. The reason for this interaction is the differential effect of additional information for each of the two lines, antecedent and conclusion. Indeed, simple effects confirmed that additional information had a significant effect only for the conclusion, $F_1(1, 37)$ = 8.18, p < .01, MSE = 73,959; $F_2(1, 11)$ = 13.67, p < .01, MSE = 14,362. Additional information did not interact with original information in the conclusion data, Fs < 1. For the conclusion, then, additional information had the predicted effect regardless of original information context. In contrast to the conclusion data, additional information did not have any effect in the antecedent data, Fs < 1.

As predicted, metaphorical interpretations took longer to construct when contextually induced by elimination of alternative literal interpretations. Similarly, the construction of literal interpretations took longer when arrived at via elimination of metaphorical interpretations. This pattern appeared only for the conclusion. The comprehension latencies of the antecedent did not differ across the different contextual conditions. This difference between the antecedent and the conclusion suggests that subjects delayed interpretation until the end of the sentence.

GENERAL DISCUSSION

These experiments support the hypothesis that literal and metaphorical interpretations can result from similar contextual constraints. Experiment 1 demonstrated that readers are more likely to select a metaphorical interpretation when a literal interpretation would be false given context, and they are more likely to select a literal interpretation when a metaphorical interpretation would be false in context. Experiment 1 suggested that context can induce either a metaphorical or a literal interpretation by elimination. Experiments 2 and 3 demonstrated that both literal and metaphorical interpretations resulting from contextual elimination are more difficult to construct. In Experiment 2, subjects rated the antecedent as harder to understand when it appeared in the contextual elimination conditions than in the biased context conditions. In Experiment 3, comprehension latencies of the conclusions were longer for the same contextual conditions.

Taken together, these findings illustrate a similar pattern of contextual effects for literal and metaphorical interpretations in discourse. People will interpret a

sentence metaphorically when it is literally false, but they will also interpret it literally when it is metaphorically false. Readers are not guided only by literal truth. Instead, they may be trying to satisfy what Miller (1979) termed truth in the "model," regardless of whether it is literal or metaphorical truth. Such a model is a set of potential state of affairs so that "any particular state of affairs must be consistent with all the information the reader has been given" (Miller, 1979, p. 206). In this sense, the same kind of search for consistency guides both literal and metaphorical interpretations.

This conclusion has implications for the view of discourse comprehension as a special case of problem solving (Clark, 1978). The traditional conception is that the listener has an interpretation problem whenever the intended meaning is different from the sentence meaning, when the speaker does not mean what he or she literally says. However, even when speakers "mean what they say," listeners still face an interpretation problem and must infer from the discourse that a literal meaning is intended. That is, unless literal meaning has unconditional priority in discourse, listeners should have an interpretation problem regardless of what a speaker might mean. The notion of the priority of the literal meaning is no longer widely accepted (e.g., Gibbs, 1984; Glucksberg, et al., 1982; Keysar, 1989), and therefore, there is no reason to expect an advantage of a literal interpretation when the speaker means literally what he or she says. Therefore, a listener must use a procedure to determine not only when a literal meaning is not intended, but also when a literal meaning *is* intended. The results of these experiments demonstrate that readers do indeed apply such procedure. They may use this procedure similarly in order to determine whether a sentence was meant metaphorically or literally.

Though the pattern of results was similar for literal and metaphorical interpretations across all experiments, there were also some differences in the size of the effects. Whereas Experiment 1 revealed comparable effects for the two interpretations, Experiment 3 suggested that the effect is larger for literal than for metaphorical contexts (see Figure 4). This may be related to findings by Gibbs (1990) that suggest that referential metaphors may be harder to understand than their corresponding literal interpretations. For example, he demonstrated that sentences such as "The creampuff didn't even show up," referring to a boxer, were harder to understand than comparable literal sentences. Furthermore, Onishi and Murphy (1993) showed that this finding is unique to referential metaphors and does not generalize to nominative metaphors. It seems that a metaphor that requires a search for a referent in preceding context involves additional comprehension difficulty. In contrast, when there is sufficient information in the sentence itself as in a nominative metaphor, there is no additional difficulty of comprehension. This finding may account for the differential effect size in Experiment 3 because the test sentences were more similar to referential than to nominative metaphors: They required a search of context in order to determine the referent, and the information in the antecedent was not sufficient to determine

the interpretation. In "If this place were not a prison," the phrase *this place* is not informative at all with regard to the interpretation; it could accommodate either literal or metaphorical interpretation. Consequently, a metaphorical interpretation may have involved additional difficulty, as in studies of referential metaphor. Yet, in spite of the advantage of literal reference, the pattern of results was the same for both interpretations.

In a 1984 article, Gibbs argued against the psychological reality of the notion of literal meaning. The distinction between literal and metaphorical meanings that was maintained throughout this article does not suggest that these two meanings are distinct in terms of underlying psychological processes. Although the two interpretations could be distinguished in a metalinguistic manner, as the subjects in Experiment 1 demonstrated reliably, they need not require a psychologically real notion of literal meaning. The important question here is how are these two different metalinguistic interpretations induced by context? It is proposed that the literal meaning per se does not serve as the basis for metaphorical interpretation, but that the possibility of interpreting an utterance literally is important to the process of understanding. In the same way, the possibility of a metaphorical interpretation may affect a literal interpretation: Language users may play off the alternative metaphorical meaning in order to imply the literal. If this is correct, then the expectations that the act of communication creates and eventually exploits (cf. Sperber & Wilson, 1986) are comparable for literally and metaphorically intended language.

I have focused on contexts in which a unique interpretation of an utterance must be identified. This is typical of casual conversations, informational materials, newspaper articles, and so on. But, this need not be the case with all texts. Some genres promote the multiplicity of interpretations. For example, poetic language thrives on the interplay of literal and figurative meanings of utterances and often requires that they not be "disambiguated." It would be interesting to investigate the kind of contextual techniques that poets and novelists use to induce the simultaneous plurality of interpretations of sentences. Recall the opening quote from *Being There*. In that passage, the President takes Mr. Gardiner's comment about the seasons and the roots metaphorically because he can't believe he could possibly have meant it literally. Yet, the author plays with two audiences here: In addition to inferring the metaphorical interpretation that the president has made, readers of the book know that Mr. Gardiner understands nothing about the economy and that he has spent all of his life in his garden. The readers take Mr. Gardiner literally because they know he couldn't have meant it metaphorically.

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