

# Understanding Metaphorical Comparisons: Beyond Similarity

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Traditionally, metaphors such as "my job is a jail" have been treated as implicit similes (i.e., this metaphor would be treated as if it were a comparison statement, "my job is *like* a jail"). Tversky's account of similarity is applied to such nonliteral similarity expressions, and is shown to apply as readily to nonliteral comparisons as to literal comparisons. But treating metaphors as comparison statements fails to account for certain important phenomena, including metaphoricity itself (the judgment that a comparison statement is nonliteral). We argue that metaphors are exactly what they appear to be: class-inclusion assertions, in which the topic of the metaphor (e.g., "my job") is assigned to a diagnostic category (e.g., entities that confine one against one's will, are unpleasant, are difficult to escape from). In such assertions, the metaphor vehicle (e.g., "jail") refers to that category, and at the same time is a prototypical exemplar of that category. This account of metaphor provides a basis for a theory of metaphor comprehension, and also clarifies why people use metaphors instead of similes.

How do people understand nonliteral expressions such as *my grandfather is a baby*? Taken literally, this sentence seems false. A grandfather must be an adult, and an adult cannot be of an age to be included in the category *baby*. According to traditional theories of metaphor comprehension (see Ortony, 1979a), the listener must reject this "false" literal interpretation and somehow find a nonliteral interpretation that is appropriate to the context of the conversation. In terms of speech act theory, "where an utterance is *defective* if taken literally, look for an utterance meaning that differs from sentence meaning" (Searle, 1979, p. 114, italics added).

A comprehension model based on this assumption postulates three stages:

1. Derive a literal interpretation of an utterance;
2. Assess the interpretability of that interpretation against the context of that utterance; and
3. If that literal meaning cannot be interpreted, then *and only then* derive an alternative nonliteral interpretation (Clark & Lucy, 1975; Grice, 1975).

Three important psychological claims follow directly from this model. First, literal interpretation has unconditional prior-

ity. The literal meaning of an utterance is always derived, and is always derived before any other meanings can be. This claim is problematic. When people understand nonliteral expressions such as idioms and indirect requests, for example, literal meanings need not be derived at all (Gibbs, 1984; see also Rumelhart, 1979, for a cogent discussion of the psychological status of literal meaning).

The second important claim follows from the first. People require a triggering condition, namely, a *defective* literal meaning, before they search for a nonliteral meaning. It follows that metaphor comprehension is optional. Metaphorical meaning can be ignored if, in a given context, the literal meaning of an utterance makes sense. This claim, too, is unfounded. People apprehend the metaphorical meanings of simple nonliteral statements even when the literal meanings of those statements are perfectly appropriate to the context (i.e., there is no "defective" literal meaning to trigger a search for alternative nonliteral meanings; Glucksberg, Gildea, & Bookin, 1982; Keysar, 1989).

The third psychological claim also follows from the first. Because additional inferential work must be done to derive nonliteral meanings that are contextually appropriate, metaphorical meanings should require both more and different contextual supports for their derivation. This claim, too, is not supported. Gildea and Glucksberg (1983), for example, found that metaphors require precisely the same kind of contextual information as do comparable literal expressions.

This leaves metaphor comprehension as essentially identical to literal comprehension, with the important exception of the recognition problem (Miller, 1979)—how do people recognize when a metaphor is intended? According to traditional views, nominative metaphors of the form

1. a is b

are recognized not as class-inclusion statements, but rather as implicit similes. When a listener hears such a statement, he or she interprets it as

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2. *a* is like *b*.

Thus, the statement

3. My job is a jail

is interpreted as

4. My job is like a jail.

Once this is done—that is, once the class-inclusion statement is recognized as false and transformed into a simile—then the statement is treated as any other comparison statement. Ortony (1979b) drew a related distinction: A metaphor is an indirect comparison, whereas a simile is a direct comparison, albeit also nonliteral. How are comparison statements, whether literal or nonliteral, generally understood? One model was proposed by Tversky (1977), and later elaborated by Ortony (1979b), to account for people's assessments of both literal and nonliteral comparison statements.

### Overview

Both Tversky and Ortony assume that metaphors are fundamentally implicit comparisons. We will first examine this assumption by assessing the extent to which these two models account for metaphoric comparisons. We will argue that the original form of Tversky's contrast model fails to account for two important characteristics of metaphoric comparisons: (a) Metaphoric comparisons are fundamentally irreversible, and (b) people can easily judge whether a comparison is literal or metaphorical. Ortony's salience imbalance model of metaphoric comparisons accounts for these two phenomena, but fails to account for a number of other important phenomena. The most critical of these phenomena is that metaphoric comparisons, such as Statement 4, *my job is like a jail*, can be acceptably paraphrased as a class-inclusion assertion, *my job is a jail* (Statement 3). We suggest an alternative view, that metaphors of the form *a is a b* are intended and understood as class-inclusion assertions, not as implicit comparisons. We argue that this classification operation produces the similarity relation between *a* and *b*, much like the classification of any two objects into a superordinate category specifies the similarity relations between them. We conclude by considering why people use metaphor as a communication strategy instead of the seemingly more direct simile form.

### Metaphor as Implicit Simile: The Contrast Model

We assume, with Tversky (1977), that comparison statements of the form *a is like b* are assessed by comparing features of *a* with features of *b*. People's ordinary interpretations of comparison statements make it clear that not all the features of *a* and *b* are considered. Instead, only a relevant subset of the features of *a* and the features of *b* is selected prior to any comparison or matching operation. When interpreting the statement

5. Harvard is like Yale

people will usually exclude such noninformative features as

have brick buildings; employ deans; have faculties, a library, a computer center, some active and productive scholars and some who are no longer active or productive; pay salaries in U.S. currency, ad infinitum. As Weinreich (1966) noted, the number of features that can be attributed to any given object is unlimited; any theory of feature matching must postulate prior feature selection. Tversky's contrast model postulates prior extraction of those features that are relevant to the task: "Thus the representation of an object as a collection of features is viewed as a product of a prior process of extraction and compilation" (Tversky, 1977, pp. 329–330). Accordingly, the features of Harvard and Yale that are not relevant are excluded; those that might be relevant, such as having sizable endowments and being elite and prestigious, would be included.

Once a relevant subset of features has been selected, the perceived similarity, *s*, between two objects, *a* and *b*, is considered to be a weighted function of selected features that are both common and distinctive:

$$s(a, b) = \theta f(A \cap B) - \alpha f(A - B) - \beta f(B - A), \quad (1)$$

where  $\theta$  reflects the weight assigned to features common to objects *a* and *b*,  $\alpha$  the weight assigned to features of *a* that are not included in *b*, and  $\beta$  the weight assigned to features of *b* that are not included in *a*. For many metaphorical comparison statements, such as (4) *my job is like a jail*, a limited set of shared features should be highly salient, but the distinctive features of the two concepts, *my job* and *a jail*, should be irrelevant. Hence, if this is to be treated as a comparison statement, then  $\alpha = \beta =$  zero, and  $\theta = 1$ . This formulation, however, poses a serious problem. When  $\alpha$  and  $\beta$  are equal to one another, then the judged similarity of *a* to *b* is equal to the judged similarity of *b* to *a*. This is clearly not true:

6. \*A jail is like my job

does not impart the same message as does Statement 4, *my job is like a jail*. One way to deal with this problem is to assume that the direction of comparison influences which features are selected prior to any similarity judgment. This effect of directionality—differential feature selection—seems necessary for metaphorical comparisons. It may also be required for certain literal comparisons.

Literal comparison statements often display marked asymmetry, where the judged similarity of *a* to *b* differs from the judged similarity of *b* to *a*. Tversky attributes such asymmetries to the differential salience of the features of *a* and *b*. Informational value, or diagnosticity of a feature, is one determinant of feature salience. In directional statements of the form *a is like b*, this discourse convention leads people to focus on the subject of a comparison (Clark & Haviland, 1977). In terms of the contrast model, the features of the subject are weighted more heavily than the features of the predicate, and so  $\alpha > \beta$ .<sup>1</sup> In such cases, similarity will be reduced more by the distinctive features of the subject than by the distinctive features of the predicate.

<sup>1</sup> Tversky (1977) uses the term *referent* for the predicate. Because we will later use that term for another purpose, we use the term *predicate* (or *metaphor vehicle* when dealing with metaphors) to avoid confusion.

Therefore, when the predicate is more salient than the subject (or topic), then  $s(a, b) > s(b, a)$ , as in

7. Canada is like the United States.
8. The United States is like Canada.

For most residents of the United States, the United States can be considered the prototype (of the implicit category, North American, English-speaking countries), and Canada the variant. Because prototypes are more salient than are variants, the variant will always be more similar to the prototype than vice versa (Tversky, 1977).

Tversky's (1977) account of asymmetry relies on differential salience and differential weighting of distinctive features. However, we would argue that asymmetry may also be produced by differential feature *selection*. In this way, the comprehension process itself yields different products to be used in similarity judgments. A statement likening *a* to *b* may involve different features than a statement likening *b* to *a*. Consider first the literal comparisons of Statements 7 and 8. The features of the United States that are attributed to Canada in Statement 7 may well be different from the features of Canada that are attributed to the United States in Statement 8. In the former, such features as primarily English-speaking, an industrial democratic culture, common Anglo-Saxon backgrounds, and similar periods of immigration come readily to mind. In the latter, the features that come to mind are more typical or salient of Canada than they are of the United States. The problem of a linguistic minority, for example, is salient in Canada, particularly in Quebec; asserting that the United States is like Canada would be one way to say that the United States also has such problems. This *semantic* asymmetry is also consistent with the given-new convention. New information is provided by the predicate term, to be applied to the subject of the comparison.

For metaphoric comparisons, semantic asymmetry is particularly pronounced (Ortony, 1979b; Ortony, Vondruska, Foss, & Jones, 1985). Indeed, reversing a metaphoric comparison normally makes the statement quite hard to interpret (as in Example 6, *a jail is like my job*.) Consider

9. Chicago's linebackers are like tigers.
10. \*Tigers are like Chicago's linebackers.

Statement 9 is readily interpreted as a comment on the abilities and ferocity of certain athletes. Statement 10 cannot be easily interpreted, unless it is implicitly reversed to form a comment on Chicago's linebackers, as in Statement 9. Where a metaphoric comparison can be reversed, then the grounds for comparison shift markedly, as in

11. My surgeon was like a butcher.
12. My butcher is like a surgeon.

In Statement 11, gross incompetence is attributed to *my surgeon*; in Statement 12, deftness and skill are attributed to *my butcher*.<sup>2</sup>

If such feature selection can vary with the direction of comparison, then the asymmetry of both literal and metaphoric comparisons can be adequately accounted for by the feature

contrast model of similarity assessment. With some elaboration, then, Tversky's contrast model seems to apply as easily to metaphorical comparison statements as to literal comparison statements. Both require prior extraction of relevant features, and both require context-contingent weighting of shared features and distinctive features.

There are, however, at least two phenomena that remain untouched by this account. The first is that metaphoric comparisons, unlike literal comparisons, are nonreversible. Although the contrast model can be elaborated to deal with this difference between literal and metaphorical comparisons, it provides no principled reason for the difference. Why are metaphoric comparisons nonreversible?

The second set of phenomena that poses a problem for the contrast model are judgments of metaphoricity itself. People are quite skilled at judging whether a comparison is literal or metaphorical. People can also judge degrees of metaphoricity. For example,

- 13a. John's face was like a beet

is judged as more metaphorical than

- 13b. John's face was red, like a beet.

Specifying the dimension or grounds for the comparison systematically reduces perceived metaphoricity (Ortony, 1979b). What cues do people use to recognize a comparison as metaphorical and to judge degree of metaphoricity?

Ortony (1979b) proposed a modification of Tversky's contrast model to provide a measure of similarity that would be sensitive to metaphoricity. This modification concerns the relative salience of the features that are involved in a comparison. Ortony considers salience imbalance to be the principal source of judgments of metaphoricity. Ortony et al. (1985) also claim that the salience imbalance model can be extended to a model of comprehension: "Additional assumptions can easily be incorporated to try to account for the comprehension process" (p. 588). The next section discusses Ortony's salience imbalance model in detail, and we argue that it cannot, in principle, be extended to account for metaphor comprehension.

### Metaphors as Implicit Comparisons: Salience Imbalance

The salience imbalance model of metaphoric similarity belongs to a class of comprehension models that we will refer to as matching models. Matching models of metaphor comprehension assume that the topic and vehicle of nominative metaphors (of the form *a noun is [like] a noun*) can be represented either as sets of features or by their positions in a geometric semantic space (see, e.g., Johnson & Malgady, 1979; Marschark, Katz, & Paivio, 1983; Tourangeau & Sternberg, 1981; for a

<sup>2</sup> Note that the past tense in Statement 11 seems more apt than the present; after all, who would continue with a surgeon who performs like a butcher? We will have more to say about the pragmatics of discourse later, in the context of the discussion of communicative intent and discourse conventions.

detailed critique of matching models in general, see Camac & Glucksberg, 1984).

Regardless of specific representation assumptions, matching models of metaphor comprehension assume that metaphors are first recognized as comparison statements, and then the features or attributes of the vehicle are compared to, or mapped onto, the features of the topic. The simple forms of such models fail miserably because they cannot account for two of the most salient characteristics of comparison statements, be they literal or metaphorical: (a) selection of relevant features, and (b) the asymmetry of directional comparisons. Tversky's contrast model acknowledges these two phenomena by assuming feature selection as a necessary precondition of the similarity judgment process, and by allowing for a focus on the topic of a comparison. This focus, in turn, can be motivated by the convention for marking given and new information (Clark & Haviland, 1977).

Ortony (1979b) elaborated the contrast model to deal with two additional phenomena. Tversky's original model does not deal adequately with the extreme asymmetry of metaphoric comparisons; in particular, there is no reason to expect that reversing a comparison would result in an anomalous statement. Second, the contrast model is silent with respect to metaphor recognition in the first place. What cues do people use to discriminate between literal and metaphoric comparisons? Ortony's solution to these two problems involves two modifications of the contrast model. First, the salience, or weight, of the matching properties is made to be dependent on the salience value of the matching properties in  $b$ , and so Equation 1 is re-written as

$$s(a, b) = \theta f^B(A \cap B) - \alpha f^A(A - B) - \beta f^B(B - A), \quad (2)$$

where  $f^A$  and  $f^B$  represent the salience of those properties in the objects  $a$  and  $b$ , respectively. In literal similarity statements such as

14. Copper is like tin

the properties of  $b$  (*tin*) that match with those of  $a$  (*copper*) are highly salient in  $b$  and in  $a$  (high  $A$ /high  $B$ ), so objects  $a$  and  $b$  will be judged highly similar. When comparisons involve properties that are of relatively low salience in both objects (low  $A$ /low  $B$ ), then those objects will be judged as less similar, as in

15. Olives are like cherries

(e.g., both olives and cherries have pits). Such statements are trivial and anomalous because they violate Grice's (1975) cooperative principle, namely, they are not informative.

In contrast to such literal comparisons, metaphoric comparisons seem to involve two objects that do not share any salient properties. Instead, the grounds for the comparison involve properties that are highly salient for the vehicle (the  $b$  term) but not at all salient for the topic (the  $a$  term), as in

16. Sermons are like sleeping pills.

The sleep-inducing properties of *sleeping pills* are central to that concept; these properties are not salient nor central to the concept *sermons*, but can be considered a diagnostic property of at least some subset of that category. Statements that involve

this kind of match (low  $A$ /high  $B$ ) are considered to be metaphorical; they are similes. Ortony considers this salience imbalance to be the principal source of metaphoricity, as well as the cue that people use to distinguish among differing degrees of metaphoricity.

Ortony's (1979b) argument also accounts for the nonreversibility of metaphoric comparisons. Reversed metaphoric comparisons involve properties that are high-salient for the topic and low for the vehicle (high  $A$ /low  $B$ ), as in

17. Sleeping pills are like sermons.

Here, the property of inducing drowsiness seems to be the only plausible similarity between the two concepts. This property, however, is salient for the topic of the statement, but not for the vehicle. Therefore, it cannot be used as the "new" information, because according to the given-new principle (Clark & Haviland, 1977), the topic provides the old or given information. The predicate, *sermons*, has no salient property that can plausibly be attributed to that topic, *sleeping pills* (see Gildea & Glucksberg, 1983; Ortony et al., 1985). Following the reasoning in connection with trivial literal comparison statements (15, above), reversed similes are also anomalous because they too are uninformative.

This formulation reveals a fundamental flaw in the salience imbalance hypothesis. As Ortony (1979b, p. 165) suggested, informativeness is a necessary condition for an acceptable descriptive comparison statement; if a statement is not informative, then it is considered to be anomalous and uninterpretable. Consider now the hallmark of literal comparison statements according to the imbalance model: They involve a high  $A$ /high  $B$  match. If such a statement is to be informative, it might involve a high-high match for the speaker, and it might also involve a high-high match for an overhearer who already knows the properties of  $a$  and  $b$ . It cannot, however, be a high-high match for a listener and still be an informative statement.<sup>3</sup> It follows that all informative comparison statements involve a low  $A$ /high  $B$  attribution: Some salient property or properties of  $b$  are attributed to  $a$ . This is as true of literal comparison statements as it is of metaphorical ones. Therefore, salience imbalance cannot distinguish between literal and metaphorical comparisons because such imbalance characterizes all informative comparisons.

This principled failure of the salience imbalance hypothesis

<sup>3</sup> Interestingly, Ortony et al. (1985) did detect some salience imbalance in literal comparison statements as well (Study 3). It seems that subjects comprehend literal comparisons as informative statements in order to avoid trivial interpretations. If the properties that constitute the grounds for comparison are already high-salient in the listener's mental representation of both  $a$  and  $b$ , then that comparison statement simply repeats what the listener already knows. This repetition can be acceptable in one of two cases: The speaker may repeat something to remind the listener that a property is highly salient in the  $a$  term, as in "a cup is like a mug," when used to remind that a cup can serve a similar function. Alternatively, the speaker can use a high-high match as an indirect speech act, to refer to something else. But *taken literally* as a high-high match, a comparison simply states the obvious and is therefore uninformative.

is sufficient to reject it as a basis for a model of comprehension. But there is an even more fundamental problem that applies to matching models in general. As Ortony (1979b) noted, many metaphoric comparisons seem to involve properties that are not present in the listener's mental representation of the topic concept at all *until the metaphor is uttered and understood*. Ortony referred to this as property introduction, and it occurs whenever a listener is told something brand new about the subject of a comparison, as in:

18. Roger is like a tiger in faculty meetings.

The properties of *tiger* in this context were never part of the listener's mental representation of *Roger*. If comprehension involves a search for matching properties, then it could never succeed in this case. It clearly can succeed, and so we must abandon a simple matching mechanism in favor of a property attribution strategy (Camac & Glucksberg, 1984; Ortony et al., 1985; Tourangeau & Sternberg, 1981).

This consideration suggests that matching models in general cannot account for comprehension of either metaphoric or literal similarity statements. Ortony's argument concerning property introduction applies with equal force to the two kinds of similarity statements. If I know nothing about copper, then telling me that it is like tin introduces properties to my mental representation of the concept *copper*. Informative literal comparisons, therefore, also cannot be based on a successful search for matching properties. Instead, as Ortony correctly argued, they must be based on the recognition of salient and relevant properties of a predicate that can sensibly or plausibly be attributed to the subject of the comparison. Matching models, then, may serve as models of comparison-statement *assessment* or *verification*. They cannot serve as the basis for models of comprehension of such statements, be they literal or metaphorical.

These arguments bring us full circle to the question to which salience imbalance was originally addressed: What distinguishes metaphoric comparisons from literal ones? One clear difference is the availability of the class-inclusion construction for metaphoric, but not literal, comparisons. In this respect, metaphoric resemblance is clearly not the same as literal resemblance. *Webster's Dictionary* (1965) defines *simile* as "a figure of speech comparing two unlike things," as in (4) *my job is like a jail*. Literal resemblance, in contrast, occurs between two *like* things, as in (14) *copper is like tin*. This provides an intriguing paradox. Metaphoric comparison statements involving two *unlike* things that are compared can easily be paraphrased to look like *class-inclusion* statements, as in Statement 3, *my job IS a jail*. Similarly, Statement 16, *sermons are like sleeping pills*, can be expressed as

19. Sermons are sleeping pills.

In contrast, literal statements that compare two like things cannot be paraphrased as class-inclusion statements:

20. Bees are like hornets

becomes false if expressed as

21. \*Bees are hornets.

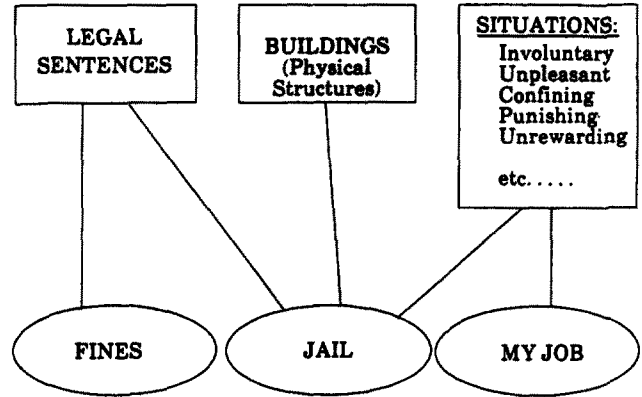


Figure 1. Cross-classification of jails and jobs: partial illustration.

What is the source of this difference between literal and metaphorical comparison statements? In the next section, we propose that metaphorical comparisons are really implicit class-inclusion assertions. Recall that the standard theory of metaphoric comprehension asserts that metaphors are to be understood as implicit similes. We suggest the opposite: that similes (i.e., metaphoric comparisons) are to be understood as implicit metaphors.

### Metaphors Are Class-Inclusion Assertions

#### *Prototypes and Naming Strategies*

Consider the possibility that when people say such things as "my job is a jail," the intended meaning is that their job belongs to a category that is referred to as "a jail." At the simplest level, this would be an example of multiple or cross classification. Just as everything in the world is similar to everything else in the world in some way (Goodman, 1972), so can anything in the world be classified in any number of ways (Barsalou, 1983).

*Jail*, for example, may belong to any number of categories, including the sample illustrated in Figure 1. A jail can be a legal sentence, along with executions and fines. As such, it is a member of the more general category *punishments*, along with scoldings, spankings, curtailment of privileges, and traffic tickets. A jail can also be a building, along with hotels, hospitals, and dormitories. In this grouping it may be seen as a member of the category *multioccupant facility*. If the category includes such concepts as grocery stores, log cabins, ranch houses, cottages, and igloos, then *jail* could be seen as a member of the category *human-made structures*. In each of these cases, the superordinate category to which *jail* may belong has a conventional name: either a single-word name, such as *buildings*, or a multiple-word name, such as *human-made structures*.

*Jail* can also belong to categories that do not have conventional names. One such category is the set of situations that share a number of related properties: They are unpleasant, confining, and stifling; people are there against their will; it is difficult to get out of them; they are not rewarding; and so forth. Other members of this category—this set of unpleasant situations—could be things such as *my job*. Just as *jails* can belong to any number of categories, so can *jobs*: Jobs can be tasks,

adult activities, human activities, paid positions, economic indicators, marks of productive members of society, situations that impose constraints on one's time, situations that can be personally rewarding, situations that can involve power relationships, and so on. These category assignments seem "literal." Somewhat less literal, perhaps, is the category assignment that places *jobs* into the same category as *jails*. What will that category be called?

One possibility is to use the name of a prototypical category member as the name for the category itself, as in Statement 3, *my job is a jail*. This is precisely how many natural languages, including American Sign Language (ASL), label superordinate categories. In ASL, basic-level objects have primary signs, strictly analogous to such single-word English names as *chair*, *table*, and *bed*. The superordinate-level category of *furniture* has no such sign in ASL. Instead, ASL signers use basic object signs that are prototypical of that category, as in

22. HOUSE FIRE [+] LOSE ALL CHAIR-TABLE-BED, ETC., BUT ONE LEFT, BED

which is interpretable as "I lost all my furniture in the house fire but one thing was left: the bed" (Newport & Bellugi, 1978, p. 62). The strategy of using the name of a prototypical noun to refer to a superordinate category that does not have a conventional name appears in classifier languages other than ASL, including the languages of Southeast Asia. In Burmese, for example, "nouns can appear in the classifier slot as well as in the noun slot—this repeater construction . . . provides a way in which the noun can carry out its own function and that of the classifier it replaces" (Denny, 1986, p. 304). Furthermore, "when a classifier is used in conjunction with a full noun . . . it is usually highly prototypical" (Craig, 1986, p. 8).

This same strategy of using the name of a prototypical category member as the name for the category itself can also be seen in nonclassifier languages, such as Hebrew and English. A particularly striking example was reported in a newspaper article about the war-crimes trial of John Demjanjuk, who was accused of being "Ivan the Terrible," a sadistic guard at the Treblinka death camp in Poland. "The name Demjanjuk has become a noun in Israel, a word to identify *an ordinary person capable of committing unspeakable acts*" (Shinoff, 1987, italics added). This category of people was presumably created in the context of many such tribunals, and has now been given a name. That the category name and the person's name are quite distinct is revealed in the following interchange between an American newspaper reporter and an Israeli spectator attending the trial:

Israeli: "If he is a Demjanjuk, then he should be condemned to death."

Reporter: "But he is Demjanjuk, his name is John Demjanjuk."

Israeli: "I know his name is Demjanjuk, but I don't know if he is a Demjanjuk" (Shinoff, 1987).

Other examples abound. In the southwest United States, a number of American Indian languages occasionally use prototypical category member names as names for the category itself. In Hopi, for example, the name of the most abundant deciduous tree, "cottonwood," is also used as the name for the entire class

of deciduous trees (Trager, 1936–1939). Similarly, the word for eagle is used by Shoshoni speakers to refer to large birds in general (Hage & Miller, 1976). To avoid confusion, more specific terms are often introduced, such as *cottonwood* for trees in general, and *real-cottonwood* for the cottonwood tree itself, as in the Kiowa language in western Oklahoma (Trager, 1936–1939). But even in this case, the general principle is clear. The name of a prototypical category member can be used to name a category that has no name of its own.

We propose that the English statement, *my job is a jail*, uses precisely this strategy of employing a prototypical basic object name to refer to a superordinate category that has no conventional name of its own. This strategy may be more transparent in such statements as

23. My job is a jail, a prison, a dark dungeon!

that use a string of prototypical basic-object terms; however, this is no different in principle from using just one basic-object term.

In the above metaphor, then, "jail" has a different referent than "jail" in the following literal statement:

24. He spent 2 years in jail.

As the metaphor vehicle, it refers to a type of thing, whereas used literally it refers to an actual token, jail. The difference between these two uses of the word "jail" is analogous to that between "Demjanjuk" used to name a person and to refer to a class of people with certain characteristics. Roger Brown captured this very distinction when he argued that metaphors involve categorization: "Metaphor differs from other superordinate-subordinate relations in that the superordinate is not given a name of its own. Instead, the name of one subordinate (i.e., the vehicle) is extended to the other. . . ." (1958, p. 140).

### Structure of the Category

The categories that are designated in this way need not differ structurally from ordinary taxonomic categories that have conventional names at the superordinate level. Ordinary taxonomic categories—natural kind categories—have two sets of important structural properties (Rosch, 1973, 1978). One set of such properties is vertical and reflects the different levels in a hierarchy. The category *food*, for example, is organized hierarchically, with *vegetable* superordinate to *tomato*, and *tomato* in turn superordinate to *plum tomato*. In this taxonomy, *vegetable*, *tomato*, and *plum tomato* are considered superordinate, basic, and subordinate levels, respectively.

Categories other than ordinary taxonomic ones also display this structural characteristic. Consider the functional category *foods to eat on a weight-loss diet*. When people are asked to provide exemplars for such ad hoc categories, the same hierarchical levels emerge (Barsalou, 1983). For the general category *diet foods*, *dairy products* would be at the superordinate level, *yogurt* at the basic level, and *low-fat yogurt* at the subordinate level.

The category of involuntary, unpleasant, confining, punishing, stifling, unrewarding, and so forth situations is another

such functional category. Even though it may be created and named *de novo*, it will exhibit the same hierarchical organization that other ad hoc functional categories do (viz., the organization of natural kind categories). Thus, *jail* would be at the basic level, *county jail* at the subordinate level, and *involuntary, etc., situations* at the superordinate level of this functional category. Likening my job to a jail places *my job* at the basic level, and using the term *jail* in a categorical inclusion statement (as in Statement 3) employs the term *jail* as a superordinate category label. This use of the term *jail* is analogous to the use of prototypical category member names as superordinate-level names in ASL (Newport & Bellugi, 1978; Suppalla, 1986).

Ad hoc functional categories also display the same horizontal structure as do taxonomic categories. In the *vegetable* category, for example, people agree that *tomatoes* would be a prototypical member, *olives* less so. People are also consistent in their judgments about prototypical class membership, and less consistent with nontypical members. People consistently judge *tomatoes* to be *vegetables* and are less consistent about *olives* being *vegetables* (McCloskey & Glucksberg, 1978). Functional categories also have both prototypical and less typical members. In the diet food category, for example, *yogurt* would be a prototypical member; *egg whites* would be less typical. In the situations-that-are-unpleasant category, *jail* would be a prototypical member, exemplifying that category. *Traffic jams* would be less typical.

Categories such as *jail* that exemplify a set of properties can be used to attribute that set of properties to a topic of interest, such as *my job*. Such categories may, of course, preexist, and they may have conventional names. One such preexisting attributive category is *butcher*, as used in expressions of the form

25. *a* is a butcher

where *a* refers to any individual who is grossly incompetent in tasks that require finesse, skill, and expertise. The categorical statement

26. My surgeon was a butcher

assigns *my surgeon* to the class of people who are incompetent and who grossly botch their job. The category of such *butchers* is conventional in contemporary English: It appears as one of the dictionary entries for the word *butcher*: "an unskillful or careless workman" (*Webster's Dictionary*, 1965, p. 304).

More interestingly, such categories need not preexist. Instead, they may be created on the spot to satisfy a communicative need, for example,

27. My accountant is a spreadsheet.

The category *spreadsheet* is created to attribute certain properties to the metaphor topic, *my accountant*. This category should have all the structural properties of ordinary taxonomic categories—organized in levels and having members that vary in typicality.

One reason to expect that such newly created categories will resemble ordinary taxonomic categories can be found in Barsalou's (1987) recent analysis of the nature of concepts (see also Barsalou & Medin, 1986). Barsalou argues that all concepts,

including ordinary taxonomic concepts, are constructed whenever needed:

Rather than being retrieved as static units from memory to represent categories, concepts originate in a highly flexible process that retrieves generic information and episodic information from long-term memory to construct temporary concepts in working memory . . . this concept construction process is highly constrained by goals . . . [and] . . . context . . . (p. 101)

Metaphor vehicle concepts, like ordinary taxonomic concepts, are also goal- and context-sensitive. One source of goal- and context-sensitivity is the family resemblance relationship among different instantiations of a concept. As Wittgenstein (1953) pointed out, members of categories such as *games* bear a family resemblance to one another. The game of soccer has properties of games in general, as does the game of peek-a-boo. The property of competition, however, is not shared by the game of peek-a-boo, just as the property of reciprocal amusement is not shared by soccer.

Similarly, exemplars of newly created categories can bear a family resemblance to one another. When a newly created category is used to attribute a set of properties to the topic of a metaphor, these properties will be partly contingent on the nature of the topic. The category *time bombs*, for example, can include such diverse entities as cigarettes and people. How are cigarettes and people alike in this respect? Cigarettes are time bombs in that they can result in injury or death at some unpredictable time in the future. A person can be a time bomb in that he or she can explode emotionally at some unpredictable time in the future. The unpredictability of a negative future event is one property shared by most members of the category *time bombs*. Other properties, such as exploding emotionally or causing lung disease, are brought to mind by the specific instantiations of the general concept, *time bombs*. This context-sensitivity of concepts provides a mechanism whereby different instantiations of a concept such as time bombs can generate goal- and context-specific similarity relations among members of a category.

### *Mechanism for Similarity Relations: Grouping*

Nelson Goodman, in an essay on the explanatory uses of similarity, claimed that "similarity, ever ready to solve philosophical problems . . . is a pretender, an impostor, a quack" (1972, p. 437). The reason for this diatribe on the similarity concept is that any two things picked at random must be similar to one another in at least some respects. The particular ways that any two things resemble one another are always determined contextually. One powerful contextual effect is grouping itself, as demonstrated by Tversky and Gati (1978) for similarities among countries, and by Keysar (1988) for both literal and metaphorical similarity relations.

Tversky and Gati (1978) gave people sets of four country names each. In the set *Austria, Sweden, Poland, Hungary*, subjects tended to group *Austria* with *Sweden* and *Poland* with *Hungary*. When *Poland* was replaced by *Norway* to form the set *Austria, Sweden, Norway, Hungary*, then the preferred groupings changed: *Sweden* and *Norway* were then grouped together,



Figure 2. Grouping-induced similarity, literal relations. (Percentage of subjects who selected each country as most similar to Austria is presented below the country [after Tversky & Gati, 1978].)

leaving *Austria* to be paired with *Hungary*. When these same pairs of sets were used in a similarity rating task, the similarity ratings paralleled the groupings. People were given either Set 1 or Set 2 (see Figure 2), and asked to decide which of the three alternatives was most similar to the target country, Austria. In Set 1, where *Sweden* and *Austria* had been grouped together, *Sweden* was judged most similar to *Austria* more frequently than was *Hungary*. In Set 2, where *Hungary* and *Austria* had been grouped together, *Sweden* was no longer the popular choice. Instead, *Hungary* was preferred as the most similar to *Austria*.

The same grouping and context effects can be shown for objects that are related metaphorically (Keysar, 1988). Consider the objects in Figure 3. In Set 1, people tend to group *paintings* with *billboards* and *pimples* with *warts*. In Set 2, the preferred groupings are *paintings* with *statues* and *billboards* with *warts*. In contrast to the first grouping, where *warts* is grouped with *pimples*, the grouping of *billboards* with *warts* is metaphorically based. When people are asked to choose the object most similar to the target, *billboards*, in these two sets, the similarity choices again parallel the grouping choices. Thus, in Set 1, *paintings* is the popular choice as most similar to *billboards*. In Set 2, however, people choose *warts* over either of the other two “literally similar” objects. As Tversky (1977) noted, just as similarity can influence grouping, the reverse is also true—grouping can in-

duce similarity: “The similarity of objects is modified by the manner in which they are classified. Thus, similarity has two faces: causal and derivative. It serves as a basis for the classification of objects, but it is also influenced by the adopted classification” (p. 344).

The effect of metaphorical grouping has direct implications for the construction of the ad hoc category. The grouping of a topic with a metaphor vehicle constrains the ad hoc category that is named by that vehicle. In

28a. Cigarettes are time bombs

the category *time bombs* may include the property “will kill.” This property is not appropriate when it cannot apply to a different metaphor topic, as when a particularly volatile and temperamental colleague is referred to with

28b. Conrad is a walking time bomb.

If Conrad is the sort of person who is likely to harm or murder someone, then harming and killing may be properties of the category *time bomb*. If Conrad is not likely to “blow up” in these ways, however, then harming and killing would not be properties of that category.

Grouping can, then, select those properties that relate two or more objects. More important, metaphoric grouping selects the

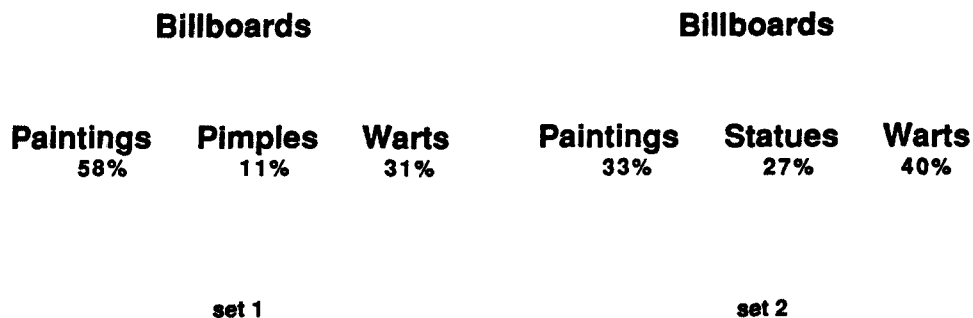


Figure 3. Grouping-induced similarity, literal and metaphorical relations. (Percentage of subjects who selected each item as most similar to billboards is presented below the item [after Keysar, 1988].)



particular instantiations of the general properties that are attributed to the metaphor topic. The way that cigarettes are time bombs is different from the way that even a murderous Conrad is a time bomb; the way that jobs are jails is different from the way that a marriage might be a jail. This interaction of topic and vehicle (in Black's terms, 1962, 1979) provides the *ground* of the metaphor. This is accomplished by the metaphor topic and vehicle specifying the category to which they jointly belong. The vehicle is a prototypical member of the category to which it lends its name: It exemplifies that category (see Brown, 1958). The metaphor topic, together with the context of the utterance, suggests the instantiation of that category's general properties.

This grouping accomplishes more than just establishing the ground or dimensions of similarity between topic and vehicle. By creating a new categorization, it also creates new variants of both the topic and the vehicle: The vehicle now refers to a category of things that it also exemplifies. The topic is now seen in light of that created category. It now has the complex of properties entailed by membership in that category.

The similarity that is thereby perceived among category members is thus a product of that categorization, not an antecedent of it. That is, the categorization produces the similarity, not the other way around.<sup>4</sup> Goodman's characterization of the relation between metaphor and similarity is both relevant and apt here:

Similarity does not explain metaphor . . . a reversal in order of explanation might be appropriate: the fact that a term applies, literally or metaphorically, to certain objects may itself constitute rather than arise from a particular similarity among those objects. Metaphorical use may serve to explain the similarity better than . . . the similarity explains the metaphor. (1972, p. 440, italics added)

We suggest that this view of the relation between similarity and metaphor can be extended to the process of metaphor comprehension. Recall the standard view whereby metaphors are assumed to be recognized as false, and so are treated as comparison statements (Davidson, 1978). We have already seen that metaphoric comparisons do not behave as do literal comparisons. They behave, instead, like class-inclusion statements. Therefore, we propose that Goodman's claim has direct psychological implications. When comparison statements suggest two different levels of categorization, statements of the form *a is like b* are recognized as class-inclusion statements of the form *a is b* and treated as such. This categorization then induces the relevant similarity relation.

*Categorization as a selection mechanism.* When any two objects are compared, only a small subset of properties is usually involved, namely, those that are relevant to the context (Tversky, 1977). Comparison statements such as Statement 15, *olives are like cherries*, involve selected properties of the predicate, *cherries*. Both grow on trees, can be costly or cheap depending on the season, have pits, and so forth. Any one of these may be intended, along with any of the other properties that are shared by olives and cherries. The particular properties that are selected will depend on the context of the utterance. If the topic of conversation is about mixed drinks, then olives and cherries are alike in that both are used to garnish cocktails. The property selection, then, can be induced by grouping, that is, by the way

olives and cherries are classified (e.g., agricultural products vs. cocktail garnishes). The properties of the class become the grounds for comparison.

For literal comparisons, the properties to be shared are often based on an implicit categorization. Lemons and grapes are alike in that they are both fruits—note that the similarity relation itself is most easily expressed in terms of joint category membership. The more specific the category, the greater the degree of similarity. Thus, lemons and limes are both citrus fruits and so are more similar to one another than are lemons and grapes, which can only be categorized at a higher level in the hierarchy.

For metaphoric comparisons, we suggest that the categorization is made explicit by having a predicate serve as a referent to the class of things that it itself exemplifies. Thus, in

28c. Cigarettes are like time bombs

the term *time bombs* refers to a superordinate category that has a set of properties that are attributable to both the basic-level object "time bomb," and to the topic of the comparison, "cigarettes." Because of this dual function, the comparison can be expressed as a class-inclusion statement, *cigarettes are time bombs*.

*Class inclusion versus identity.* The form *a is a b* can be used to express identity relations as well as class-inclusion relations (see Brachman, 1983, on the ambiguity of the *is a* expression). Davidson (1978), for example, treats metaphors as expressions of identity statements. As such, they are usually false: "The most obvious semantic difference between simile and metaphor is that all similes are true and most metaphors are false . . . the earth is like a floor, but it is not a floor" (p. 39). Davidson even suggests that metaphors are comprehended as such: "What matters is not actual falsehood but that the sentence be taken to be false" (p. 40). If a metaphor expresses a false identity, it is only reasonable to resort to the simile form in order to recover the intended meaning.

However, if metaphor vehicles can have two referents simultaneously (e.g., time bombs can refer to the actual bombs and to the class of deadly, etc., things), then the metaphor can be understood as class inclusion, not identity. How any particular *is a* statement is to be interpreted will, of course, depend on semantic knowledge and on rules of conversation and discourse. The statement

29. An ophthalmologist is an eye doctor

would usually be understood as an identity assertion that could be informative in context. In contrast,

30. Boys are boys

cannot be informative if it is an identity statement; it would be a truism. If interpreted as a class inclusion, then it can be

<sup>4</sup> An analogous theoretical shift had been proposed in categorization research. Though early theories of categorization were similarity based (Rosch & Mervis, 1975), recent accounts divorce themselves from explanations that depend on similarity per se (Medin, Wattenmaker, & Hampson, 1986; Murphy & Medin, 1985).

informative. The first and second uses of *boys* have different referents. The first *boys* refers to tokens of a type; the second *boys* refers to a type (viz., the class of people who behave in stereotypical boyish fashion). Similarly, a recent comment on the situation in Asia asserted that Cambodia had become Vietnam's Vietnam. As in Example 30, the first and second uses of *Vietnam* have different referents. The first refers to the country itself, the second to a class of disastrous military and political interventions that the American–Vietnamese war has come to exemplify.

This formulation resolves our original paradox: The comparison of two unlike things can be described in terms of class inclusion because similes are, in fact, implicit category statements. This formulation also resolves a number of other important problems, including the nonreversibility of metaphoric comparisons, judgments of metaphoricity, and the determinants of metaphor aptness.

### Metaphor as Class Inclusion: Some Implications

#### *Metaphors Are Not Reversible*

Class-inclusion statements, when one set is properly included in the other, are not reversible. The statement

31a. A tree is a plant

is false or anomalous when it is reversed:

31b. \*A plant is a tree.

Metaphoric comparison statements behave in exactly the same way. Simile 16, *sermons are like sleeping pills*, is also anomalous when reversed as in Statement 17, *sleeping pills are like sermons*. The anomaly follows from the argument that metaphoric comparisons—similes—are actually implicit class-inclusion statements. Statements 16 and 17 should, on this account, be recognized as comparisons between category levels and so should be interpreted as:

16'. Sermons are sleeping pills.

17'. \*Sleeping pills are sermons.

These statements obey the ordering constraint on literal class-inclusion statements: They are not reversible.

The available data generally support this assertion (Ortony et al., 1985). Reversed metaphors are considered anomalous unless one of two important conditions is met:

1. The new vehicle happens to exemplify a category to which it can lend its name and in which the topic can be a member. In this case the ground of the metaphor changes markedly.

Examples 11 and 12, involving surgeons and butchers, illustrate this special case. Likening a surgeon to a butcher is a positive attribution; the reverse is a negative attribution.

2. The reversed statement does not affect the meaning: The relation between topic and vehicle is unaffected by the *surface* ordering of the assertion.

This second condition is less well understood, even though examples are easy to come by. Consider

32a. A mighty fortress is our God.

This can be considered a poetic inversion rather than a genuine reordering of

32b. Our God is a mighty fortress.

In each case, *our God* is identified with *a mighty fortress*. In neither case is a fortress intended as an object of worship. Here, the semantics and pragmatics of the statement somehow combine to force only the single interpretation. The surface reversal, then, can be acceptable only when the relative roles of topic and vehicle are unaffected by that reversal. The original topic remains an exemplar of the original vehicle category irrespective of surface ordering. In Statements 32a and 32b, *our God* is assigned to the category of entities exemplified by the concept *mighty fortresses* (i.e., things that provide protection against the ills of the world, etc.).

When an occasional investigator does find little or no effect of reversals on metaphors, the lack of effect may be attributable to either one or the other of the two conditions described above. Gentner (1980), for example, reported no effects of reversing metaphors on judgments of metaphoricity or aptness. However, she used only eight metaphors, and did not inquire about their interpretations. As Ortony et al. (1985) pointed out, some of those metaphors could be sensibly reinterpreted when reversed, such as the surgeon–butcher example, in which the ground changes with topic–vehicle ordering. Others appeared to have the characteristic of Example 32, above, where the semantics and pragmatics resist the surface ordering (and which Ortony et al. refer to as “spontaneous reversals”).

In any case, the implications of the current view are unambiguous. Reversing a metaphoric comparison reverses a class-inclusion statement. Unless Condition 1 or 2, above, is satisfied, a simile cannot be reversed, just as a class-inclusion statement cannot be reversed. In the next section, we examine how this view of metaphors as categorizations provides the mechanism for distinguishing metaphoric comparisons from literal ones. Put simply, metaphoric comparisons involve items at different category levels, and so they are implicit categorization statements. Recognizing a comparison as metaphorical involves the recognition that the comparison is intended as an implicit categorization.

#### *Categorization as the Source of Metaphoricity in Similes*

Literal comparison statements typically involve objects at the same level of categorization, as in

33a. Harpsichords are like pianos.

This statement cannot be paraphrased as

33b. \*Harpsichords are pianos.

Similarly, when two objects differ in level of categorization, they cannot be literally likened to one another:

33c. \*Grand pianos are like pianos; pianos are like musical instruments.

Instead, the categorical relation must be expressed explicitly:

33d. Grand pianos are a type of piano; pianos are musical instruments.

This is simply an extension of the observation made earlier, that when two like things are compared, the comparison statement cannot be paraphrased as a class-inclusion statement. The other side of this coin is that class-inclusion statements that involve two different levels of a particular category cannot be paraphrased as comparison statements.

Metaphoric comparison statements do not obey these constraints: Statement 28c, *cigarettes are like time bombs*, can be paraphrased as a class-inclusion statement, as in Statement 28a, *cigarettes are time bombs*. In such class-inclusion statements, the predicate (metaphor vehicle) refers to a category that includes both the metaphor topic and the metaphor vehicle as exemplar, with the vehicle being a prototypical exemplar of that ad hoc attributive category. In Statement 28a, for example, cigarettes are assigned to a category that is referred to as *time bombs*, with time bombs being a prototypical exemplar of the set of things that can abruptly cause serious damage at some unpredictable time in the future.

Metaphoric comparisons, then, differ from literal comparisons in this central respect: They can be expressed as class-inclusion statements. They can be expressed in this way because, we suggest, that is what they are: implicit class-inclusion statements. This characteristic of metaphoric comparisons—that they are implicit class-inclusion statements—is a cue that people can use to identify metaphoricity.

### *The Effect of Hedges on Metaphoricity*

We have argued that a metaphoric comparison is actually an implicit class-inclusion assertion. It follows that the degree of metaphoricity should be a function of how strongly it suggests the class-inclusion nature of a comparison. Therefore, hedges that affect the class-inclusion character of a comparison should affect its metaphoricity.

The available data on this issue are sparse, but consistent. First, people can judge degree of metaphoricity reliably (Ortony et al., 1985). Second, Ortony (1979b) pointed out that judged metaphoricity of a comparison statement can be reduced by specifying a dimension of similarity, as in Statements 13a and 13b, *John's face was like a beet* and *John's face was red like a beet*. Ortony interpreted this phenomenon in terms of salience imbalance. The original simile (13a) is a low-high match, and so it is judged to be a metaphorical comparison. In Statement 13b, specifying *redness* increases the salience of this property in the metaphor topic, *John*, and so converts the low-high match in Statement 13a into a high-high match in Statement 13b: "The result is a match of high-salient to high-salient attributes. Accordingly, judged metaphoricity should diminish from statement . . . [13a] . . . to statement . . . [13b] . . ." (Ortony, 1979b, p. 170).

There are several problems with this interpretation. First, it

does not explain why Statement 13b, which is now a high-high match, is still considered informative or relevant. As we argued earlier, any high-high match should be anomalous for the same reason that high-low matches are anomalous: Such statements are not informative. Second, if specifying the color *red* makes the statement a high-high match, then it should make the statement reversible. Clearly, it does not. Third, any statements about *John* cannot involve a matching operation to begin with. A listener's mental representation of John's face cannot have the property *redness*, whether low- or high-salient, until the statement is perceived and understood. Thus, this is clearly a case of property *introduction*, not property matching as would be required by the salience imbalance model.

Finally, the salience imbalance hypothesis cannot account for the systematic effect of hedges on perceived metaphoricity, as illustrated in the following statements:

- 34a. Cigarettes are literally time bombs.
- 34b. Cigarettes are time bombs.
- 34c. Cigarettes are virtual time bombs.
- 34d. Cigarettes are like time bombs.
- 34e. In certain respects, cigarettes are like time bombs.
- 34f. Cigarettes are deadly like time bombs.
- 34g. Cigarettes are as deadly as time bombs.

Statements 34a through 34g cannot vary in salience imbalance, yet they clearly vary in apparent metaphoricity, with Statement 34a being most metaphorical, Statement 34g least. Statements 34f and 34g in fact are literal: Both cigarettes and time bombs can, literally, kill people.

What, then, induces this gradation of metaphoricity? We would argue that the more a statement suggests a class-inclusion relation, the more metaphorical it will seem. Indeed, Statements 34a-c have the surface form of class inclusion, and they seem more metaphorical than Statements 34d-g, which are variants of a simile (i.e., with the surface form of a comparison).

### *Metaphor Comprehensibility and Aptness*

Metaphors will be easily understood when the newly created classification is perceived as relevant and informative. More specifically, when the grouping that is created by the metaphor induces a similarity relation that is informative about the metaphor topic, then that metaphor should be comprehensible. Whether a grouping is relevant and informative will depend, of course, on what a listener already knows about any given metaphor topic, and whether the metaphor vehicle has salient properties that are diagnostic and relevant to that topic, as well as on the context of the utterance itself. Consider

- 35a. George Washington's dentists were butchers.

Anyone who has been told the story of George Washington dying of a tooth infection caused by inept dental treatment should understand this metaphor with no difficulty whatsoever. Statement 35b, in contrast, may be understood, but its relevance is obscure:

- 35b. George Washington's cobblers were butchers.

With no prior knowledge of Washington's cobblers or their relative skill, one has no idea of precisely how they might have been butchers. They could, given Statement 35b, have been meat cutters in addition to being shoemakers. Statement 35b, then, is ambiguous, and so it is difficult to interpret, even though the proposition expressed by the sentence is apprehended. This is not different in principle from the comprehension problem posed by such statements as

36. Dogs are animals,

which is a true class-inclusion statement, but which also requires a communicative context for interpretation. Does the speaker want to inform me that *dogs* belong to the category *animals* rather than *plants*? If so, why? Or, is the statement a comment on *dogs* that is intended to assert that dogs do not have human-like traits and so should not be treated as one would treat people or children? Unless the relevance of a particular categorization is apparent, that categorization cannot be sensibly interpreted, whether it be conventional, as in ordinary taxonomic categorizations, or novel, as in newly created metaphors.

Beyond these general principles of discourse comprehension, the class-inclusion view of metaphors has specific implications for the role of the metaphor vehicle in metaphor comprehension: The vehicle's prototypicality is crucial for construing the category.

*Vehicle prototypicality.* Ad hoc functional categories have graded structure (Barsalou, 1983). Metaphoric categories, as a special case of ad hoc functional categories, should have graded structure as well. In Statement 34, for example, *time bombs* would be a prototypical member of the category of things that can abruptly and unpredictably cause harm or injury. Metaphor comprehensibility may be a function of the prototypicality of a metaphor vehicle for a particular functional category. Consider the *time bomb* metaphor. Other things can also injure or kill at unpredictable times in the future, such as *strokes* and *heart attacks*. Nevertheless, using either of these terms as the name for a time-bomb-like category does not seem to work:

37. \*Cigarettes are strokes.

38. \*Cigarettes are heart attacks.

One reason that these metaphors are both difficult to understand and not apt may be that neither *strokes* nor *heart attacks* are prototypical members of the class of things that can suddenly cause harm. Another may be that cigarettes are known to cause or contribute to strokes and heart attacks, a relation that is not generally true of exemplars and their superordinate categories.

Metaphor aptness may vary independently of metaphor comprehensibility and should be particularly sensitive to the typicality of the metaphor vehicle. In Statements 39a–39d, what is intended is easily understood, yet only 39a seems apt:

39a. Not even Einstein's ideas were all gold.

39b. Not even Einstein's ideas were all platinum.

39c. Not even Einstein's ideas were all silver.

39d. Not even Einstein's ideas were all sapphires.

In each case, the meaning is clear: Not all of Einstein's ideas were valuable. *Gold* is a prototypical member of the category of valuable, rare things; *platinum*, even though more costly than *gold*, is not a typical member of that category, at least not in North American culture, and neither are *sapphires* or *silver*.

As with the metaphor vehicle *butcher*, *gold* may be considered a conventional vehicle for attributing properties to a topic of interest. Such conventional vehicles form part of the set described by Lakoff and Johnson as "metaphors we live by" (1980). These are metaphors that are conventional in a culture and that represent basic concepts such as love, time, and communication, among many others. They are more systematic than the simple attributive metaphors that we have discussed here, but they may follow the same principles. To say that a theory's foundation is crumbling implicitly acknowledges that the concept *theory* belongs to a category of *structures*. The particular structure category is specified by the exemplar–superordinate grouping of *theory* and *structure*, and it permits one to describe theories in terms of the appropriate parts of a structure. What parts of a metaphor vehicle category are appropriate?

Parts of objects vary in "goodness" (Tversky & Hemenway, 1984). Good parts are those that are functionally significant and often perceptually salient. The *wing* of an airplane is a good part; the *floor* of an airplane is not. This concept of part goodness is theoretically analogous to the concept of prototypicality–goodness of a category member, and so the goodness of a part may, for this purpose, be analogous to the prototypicality of a metaphor vehicle in simple nominative metaphors. This suggests that for the conceptual metaphor of *theories as structures*, some parts of *structures* should be more apt than others for describing theories, specifically, good parts. The parts *foundation*, *walls*, and *plumbing* may be "good" parts vis-à-vis the concept *structure* as it applies to *theories*. The parts *chimney*, *window*, and *corner* may be poor parts because their functional roles in the structure of a theory may not be important or salient.

In general, then, prototypical members of ad hoc metaphorical categories should produce highly comprehensible and apt metaphors. People's intuitions about such examples as 39a–39d, above, seem to be consistent with this proposal. In addition, metaphors such as

40. The wolf is the shark of the forest

are most comprehensible and judged most apt when the metaphor vehicle (e.g., *shark*) is at the extreme of one or more relevant semantic dimensions (Tourangeau & Sternberg, 1981). In this case, the dimension is ferocity among predators, and *shark* would thus be a prototypical member of the category *ferocious predators*.

Similarly, when a metaphor is systematic and has parts that may be functionally relevant to that metaphor, then "good" parts should produce more comprehensible and more apt metaphors than less good parts. Examples discussed by Lakoff and Johnson (1980), including the *theory as structure* metaphor, are consistent with this hypothesis.

Yet, a word of qualification is needed—though consistent

with our suggestions, Lakoff and Johnson's approach is quite different from ours. In the next section we draw a distinction between the (hypothesized) conceptual basis of metaphors and their use in a communicative context.

*A communicative context or conceptual structure?* Lakoff and Johnson (1980) and, more recently, Lakoff and Turner (1987) have argued that the human conceptual system is partially metaphorical. Conceptual metaphors such as A LIFETIME IS A DAY are inferred from the use of metaphorical language suggesting an analogy between the concepts of LIFE and DAY. We would argue that in a communicative context, the comprehension of a metaphorical expression is not necessarily related to these assumed conceptual structures.

To illustrate this point, we asked 18 people what someone might mean by uttering the statement "a lifetime is a day" in the course of a conversation. Seventy-five percent responded with "life is short" or with a similar paraphrase. Only 25% gave any indication of an elaborated conceptual analogy (e.g., dawn = birth, dusk = old age). Therefore, even with a direct statement of the LIFETIME IS A DAY metaphor, people did not necessarily think of the analogy between the parts of a day and the stages of a lifetime. We suggest that conceptual metaphors need not bear on comprehension per se, unless that conceptual structure is contextually relevant. When a conceptual structure is relevant, then comprehension of the metaphor may use such structure. Yet this structure does not have to be "metaphorical." For example, the comprehension of "some marriages are iceboxes" presupposes a cultural norm that marriage should involve affection between spouses, yet it does not rely on any specific conceptual metaphor.

### Why People Use Metaphors

Metaphors are generally used to describe something new by reference to something familiar (Black, 1962), not only in conversation but in such diverse areas as science (Gentner, 1982) and psychotherapy (Rothenberg, 1984). Also, as Ortony (1975) argued, metaphors are not just nice, they are necessary. They are necessary for conceptualizing abstract concepts in terms of the apprehendable, as people do, for example, when they metaphorically extend spatial concepts and spatial terms to the realm of temporal concepts and temporal terms. All English words for temporal relations are derived from words that referred originally to spatial relations: *Then* (from *thence*) and *when* (from *whence*) are two common examples of "dead" metaphors that were once transparently spatial terms (Traugott, 1985). This usage reflects the way people conceive of time in terms of a unidimensional space, a time-line that extends ahead of them into the future and behind them into (or from) the past (Clark, 1973; Traugott, 1978).

Although the conceptual functions of metaphors are beyond the scope of this article, the communicative and discourse functions are central. Any model of similarity presupposes the principle of relevance and diagnosticity: Only those features of similarity that are relevant to a particular context will be involved in any particular comparison (Tversky, 1977). A model of classification must presuppose the same principles for the same reason that models of similarity do: Both similarity and classifica-

tion are, in isolation, unconstrained. Any two things must be alike in some way. Similarly, "there is always some category to which two terms belong" (Tourangeau & Sternberg, 1981, p. 28). For this reason, Tourangeau and Sternberg summarily reject both similarity and categorization models of metaphor comprehension. In either the similarity or categorization view, "there is not always some reasonable interpretation of a metaphor" (p. 28).

This is, of course, unarguable, just as there is not always some reasonable interpretation of a nonmetaphorical similarity statement or categorization statement. As we saw with Statement 36, *dogs are animals*, even true "literal" categorizations are uninterpretable without relevant contextual information. Principles of discourse are equally necessary for literal and for nonliteral language comprehension, including principles of the kind proposed by Grice (1975) for conversations. For present purposes, we assume that such principles operate in ways that make extraction of relevant properties possible, both for comparisons such as similes and for implicit categorizations, as exemplified by nominative metaphors. The issue, then, is not the comprehensibility of similes and metaphors per se, but why people would choose to use a metaphor—a class-inclusion statement—instead of a simile.

Consider the problem of describing a particular actor to a friend who has never seen that actor. The actor typically plays roles in the Chinese theater that involve lurid characters, often of a supernatural nature, who do evil and macabre deeds, are often unctuous, sneaky, and generally weird and eerie. If the speaker can assume that the listener is familiar with American movies (can assume relevant mutual knowledge; Clark & Marshall, 1981), then he or she can use the metaphor

42a. Xiao-Dong is a Bela Lugosi.

This provides not just one property of the Chinese actor, but a patterned complex of properties in one chunk: all those properties that Bela Lugosi, the quintessential player of Dracula and other vampire-like creatures, exemplifies. The simile form of this metaphor

42b. He is like a Bela Lugosi

does not quite capture the force of the metaphor, perhaps because the explicit "like" suggests that only some properties of the category "a Bela Lugosi" are to be applied to Xiao-Dong.

The implication that the properties of a metaphor-induced category are intended can thus be tempered by the simile form. Recall the striking example of Demjanjuk's name being used as a name for *an ordinary person capable of committing unspeakable acts* (Shinoff, 1987). To describe a person as *like Demjanjuk* is not nearly as forceful as identifying that person as *a Demjanjuk*. It may well be that people use metaphor instead of simile when such attribution is intended, and will only use simile when they want to hedge or qualify the underlying metaphor.

A second possible function of metaphor, as compared with literal comparison, is to alert a listener that a specific relation is intended, not a more general assertion of similarity. The simile

42b can be transformed into a literal comparison by omitting the article:

42c. He is like Bela Lugosi.

Here, the comparison is with Bela Lugosi—with the individual. The two actors can be likened along a number of dimensions, depending on how they are implicitly classified: males, income level, height, acting style, and so forth. The literal comparison statement 42c does not indicate which of these classifications is intended. Thus, the reader is not constrained to a specific interpretation. Each of these dimensions can contribute to the similarity between them. In contrast, the metaphorical comparison 42b does suggest a specific grouping—Xiao-Dong is likened to *a* Bela Lugosi (i.e., to the type of actor best exemplified by Bela Lugosi). As a result, Xiao-Dong takes on all the properties of this *type* of actor, not of the actor Bela Lugosi himself.

The crucial difference between simile and metaphor, then, stems from the communicative function of metaphors. Metaphors are used to communicate a complex, patterned set of properties in a shorthand that is understood by the members of a speech community who share relevant mutual knowledge. When I say that *my job is a jail*, I communicate all those properties of the superordinate category *jail* with that statement. I need not—indeed, I probably could not—list each of those properties exhaustively. In this way, my use of the metaphor is more efficient and more precise than a partial listing of those properties that the superordinate *jail* both denotes and connotes. If the attribution of all such properties is the communicative purpose, then the appropriate communicative form is the metaphor.

### Conclusions

Aristotle (1952) is the source of the comparison view of metaphor, as well as the view that the topic and vehicle of a metaphor may belong to the same category. Contemporary theorists share this general view and treat comparison as the basic process underlying metaphor comprehension. George Miller (1979), in perhaps the most articulated development of this view, argues that metaphors are recognized as false and then treated as comparison statements: “‘Man is a wolf’ is false in fact. In order to understand it, the reader must associate it with ‘Man is like a wolf’ or, even weaker, ‘Man seems like a wolf’ (to the author)” (p. 214). Miller concludes that “the grounds for a metaphor . . . can be formulated as relations of similitude that can be expressed as comparison statements” (p. 248).

We have argued exactly the opposite case. Metaphors are not understood by transforming them into similes. Instead, they are intended as class-inclusion statements and are understood as such. When metaphors are expressed as comparisons (i.e., as similes), then they are interpreted as implicit category statements, rather than the other way around. The grouping that is created by the metaphor induces the similarity relation, and so the grouping is prior.

This view of nominative metaphors, together with appropriate rules of discourse, provides a principled account of the following metaphor phenomena that have heretofore remained unexplained.

1. Metaphoric comparisons, two unlike things compared, can be expressed as class-inclusion statements. Literal comparisons, two like things compared, cannot. This follows directly from the view of metaphoric comparisons as implicit class-inclusion statements.

2. Metaphoric comparisons are recognized as such because they involve a comparison between category levels in an assumed hierarchy. The categorization nature of the comparison is the cue to metaphoricity.

3. Metaphors, whether in canonical class inclusion form or simile form, do not retain the same meaning when reversed. They are nonreversible because metaphor expresses a class-inclusion relation, and this relation is not symmetrical.

4. Hedges and specification of the grounds for similarity of a metaphor reduce perceived metaphoricity. These effects follow from the class-inclusion nature of metaphors. The canonical metaphor explicitly expresses an unqualified class-inclusion relation. Anything that qualifies the class-inclusion character or reduces its scope will reduce metaphoricity.

5. The simile, perhaps used as a qualifier or hedge, potentially poses a more difficult comprehension problem for a listener. Listeners must recognize that the comparison is between levels of an assumed category, and then treat the simile as an implicit categorization. This requirement may impose an additional cognitive burden on a listener. If so, then similes may be more difficult to understand than their corresponding metaphors because similes do not express the class-inclusion relation explicitly.

We have focused exclusively on nominative metaphors, but the account can be extended in principle to another important class of conversational metaphors, predicative metaphors. Predicative metaphors employ verbs in novel ways, as in

43. She hopped on her bike and flew home.

In this case, the term *flew* can be construed to include the category of actions that are extremely swift and direct. Flying can be considered a prototypical action in that category, and so the verb “to fly” can be used to refer to any action that belongs to that category. On this suggested analysis, action categories may behave as do object categories, and verbs can be used in the same way nouns can: to label categories that have no conventional names. A more detailed analysis of such metaphors must await further investigation of action categories.

Finally, a word of qualification. Our account of metaphors as categorizations that create new, relevant, and useful groupings simply recasts the problem of how people come to understandings of metaphors. It does not solve that problem, but it does outline what an adequate psychological model might look like. Such a model of metaphor comprehension must include general principles of discourse comprehension, such as Grice’s (1975) cooperative principle and the given-new convention, as well as more specific principles of conversational interaction and inference. In addition, the model would specify how people process multiple classifications, how classification affects perceptions of similarity, and how people select, from the many possible interpretations of any given classification, the one that is intended in a given conversational context.

Tversky observed, in his treatment of similarity, that "an essay . . . occasionally ends with a flip of the tail" (1977, p. 349). We conclude with just such a flip. Metaphors are not understood as implicit similes. Instead, metaphors are understood as they are—as class-inclusion statements. To complete this flip of standard theory, similes are understood as implicit categorization statements. The implication for future work is clear. Understanding similarity is not central to understanding metaphor: The central problem is to understand categorization.

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### Beutler, Levin, Tesser, and Miller Appointed New Editors, 1991-1996

The Publications and Communications Board of the American Psychological Association announces the appointments of Larry E. Beutler, University of Arizona; Joel R. Levin, University of Wisconsin; Abraham Tesser, University of Georgia; and Norman Miller, University of Southern California, as editors of the *Journal of Consulting and Clinical Psychology*, the *Journal of Educational Psychology*, the Attitudes and Social Cognition section and the Interpersonal Relations and Group Processes section of the *Journal of Personality and Social Psychology*, respectively. As of January 1, 1990, manuscripts should be directed as follows:

- For *Consulting and Clinical* send manuscripts to Larry E. Beutler, *Journal of Consulting and Clinical Psychology*, Department of Psychology, University of Arizona, Tucson, Arizona 85721.
- For *Educational* send manuscripts to Joel R. Levin, Department of Educational Psychology, University of Wisconsin, 1025 West Johnson Street, Madison, Wisconsin 53706.
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