

Schemata, Categories, and Metaphor Comprehension

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Introduction: Presentation of the Problem

The present study focuses on an important but relatively neglected aspect of metaphor comprehension, namely, *mappability*, or: what gets mapped in metaphors. According to a view commonly held in linguistics, psychology, and literary theory (e.g., Lakoff and Johnson 1980; Gentner 1983 inter alia), a metaphor can be described as a mapping of properties between two (conceptual) domains, that is, the mapping of the properties of a certain Source domain onto the Target domain. Given that view, it is proposed that among the properties comprising the former domain there is a *hierarchy of mappability*: certain properties are more likely to get mapped than others.

Consider, for example, the metaphor "Tom is a tortoise," in which the "tortoise domain" and the "human domain" represent the Source and Target domains, respectively. Among the properties of the tortoise domain that can, in principle, be mapped onto the human domain, not all are equally or readily mappable. Thus, although properties such as "slowness," "having short legs," "being brown or green," etc., are equally open to mapping, they are not equally mapped onto the Target domain, as reflected in [1], below:

[1]

Tom is a tortoise.

A. "Tom is slow."

B. "Tom has short legs."

C. "Tom's (face?) color is brown or green."
D. "Tom is a living creature."¹

[1] presents four possible readings for the metaphor "Tom is a tortoise." All four readings are, in principle, accepted, and by implication, all four properties of the "tortoise domain" introduced in these readings can be mapped onto the human domain; nevertheless, they are not equally mapped. Arguably, it is [1A] rather than [1B] which is preferred as a reading for the metaphor, while [1B] is preferred over [1C], and so on.

It should be noted that there is nothing in the target domain which prevents the mapping of all four properties from source to target domain; by contrast, however, such properties as "being an animal" (in the literal sense) are eliminated at the outset as candidates for mappability. Thus, the hierarchy of mappability above applies to those properties which can, in principle, be mapped, but even so they are not equally mappable. One type of constraint on what gets mapped in metaphor comprehension is, therefore, imposed by the specific properties of the target domain; this constraint will be taken as a given in the following discussion.

The main question raised by the example above concerns the constraints determining these preferences in mappability. This question, in fact, constitutes a major issue in metaphor interpretation, one which has neither been appreciated nor addressed by most current studies of metaphor (Lakoff and Turner [1989] and Turner [1990] are exceptions to this generalization; however, they suffer from certain limitations which have been discussed elsewhere with respect to the former theory, specifically, in Shen [forthcoming]). In other words, given that certain properties are more likely than others to get mapped from the source to the target domain, the question is: What are the principles underlying the very selection of properties, as well as the preference for some properties over others? Note that this question involves three notions: domain, concept, and property. In our example, these notions refer, respectively, to the "tortoise's domain," tortoise(s) (as objects in that domain), and properties such as "moving slowly."

Perhaps the most pervasive and commonly held answer to our question has to do with the distinction between relational (or structural) properties versus non-relational ones. It is maintained that, in the mapping from the source to the target domain, preference is given

to relational or structural rather than non-relational properties of the source domain. The four component terms involved in the processing of a given metaphor are: the two terms of the metaphor, *A* and *B*, the *target domain*, and the *source domain*.

The aforementioned view maintains that it is the *relation* between the *B* term and the *source domain* which gets mapped onto the corresponding relation between the *A* term and the *target domain*. Thus, for example, in the expression "he was defending his beliefs" (based on the mapping of elements from the domain of "war" onto the domain of "argument"), it is the *relation* of "the actual defending of some military positions" to its domain ("war") which gets mapped onto the *relation* between the "use of linguistic means in order to 'defend' one's beliefs" and the "argument" domain.

Despite their pervasiveness in leading theories of metaphor structure and comprehension (see, e.g., Lakoff and Johnson 1980; Gentner 1983 *inter alia*), the terms "domain" and "relation" have not been clearly defined. In fact, a closer examination of the theoretical definitions that have been used, not to mention the actual practice of some leading theorists in this field, leads one to conclude that there are at least two basic interpretations of the terms. "Domain" and "relation" are interpreted either as a *schema* and *schematic relation* or as a (taxonomic) *category* and *categorical relation*, respectively (see, e.g., Mandler 1984). Each interpretation entails a totally different proposal for metaphor comprehension, particularly with respect to the issue of constraints on mappability.

In the present paper, my first goal will be to characterize the two conceptions of "domain" and "relation." Section one provides a critical analysis of two leading theories of metaphor comprehension: Gentner's (1983) structure-mapping theory illustrating the "domain-as-a-schema" concept, which results in a *connectivity* constraint, and Tourangeau and Sternberg's (1981, 1982) theory on aptness in metaphors, which yields a *diagnosticity* constraint. My analysis will show that each of these theories represents a separate notion of "domain" and, as a result, a different notion of the concept of "relation"; two totally different theories of metaphor comprehension result from the different constraints imposed by each theory on the notions of domain and relation. Furthermore, I will suggest, on the basis of an analysis of several counterexamples, that neither theory is sufficient to account for everything involved in metaphor comprehension: I will suggest that using each of these constraints leaves a range of phenomena unaccounted for.

I will therefore propose a "modified hybrid model" of mappability, which accommodates both "schematic" and "categorical" constraints: I will propose that the categorical constraint is a necessary condition,

1. Presumably, there is another plausible reading, e.g., "Tom protects himself beneath a 'shell'." I have not included this possibility since it involves a metaphorical reading of one of the tortoise's properties, namely, its "having a shell." I have addressed this issue elsewhere (see Shen 1989). However, not including that reading does not affect the argument which follows.

whereas the schematic constraint is a preference-constraint, in that it selects certain properties which meet the categorical constraint as more likely than others to get mapped. This hybrid model will be presented in section two.

1. Analysis of the Two Paradigms

The two paradigms which I am about to describe differ in two respects: (1) in their representational assumptions, namely, their assumptions regarding the way knowledge is organized and represented in memory. It is precisely here that the difference between the notion of domain as a *schema* and that of domain as a *category* plays a central role; (2) in their assumptions regarding the comprehension of metaphors, that is, in the constraints on mappability derived from them. Accordingly, the following presentation of the two theories (as well as the modified hybrid theory presented later) will be divided into two parts. The first will be dedicated to the representational assumptions, the second to assumptions regarding the constraints on mappability.

1.1. Gentner's View

1.1.1. Representational assumption: a domain is a kind of schema. Gentner's "structure-mapping" theory (1983) focuses on the mechanism of metaphorical and analogical mappings, and in particular on the question of what gets mapped in metaphor comprehension. According to this theory, a metaphorical comparison (e.g., "cigarettes are time bombs") is a mapping from a source domain to a target domain. The main characteristic of the notion of "domain" within Gentner's theory is that it is a kind of *schema*, namely, a knowledge organization, the components of which constitute a certain spatiotemporal contiguity and are therefore related via causal, temporal, and spatial relations. In fact, among current theories of metaphor, Gentner's provides one of the most detailed analyses of the notion of such schema. According to Gentner, such a knowledge structure consists of objects and attributes of objects. To take her favorite example: the solar-system domain consists of several objects, such as "the sun" and "the planets," which function as arguments attached to various predicates. Thus, for example, the predicate "yellow" takes the object "sun" as an argument, as in the proposition "the sun is yellow," which is part of our knowledge representation of the solar-system domain.

The important distinction in such a representation is between two types of predicates, namely, between attributes or object-predicates and relations. Attributes are one-place predicates which take only one object as an argument, whereas relations are multiple-place predicates which take more than one object as arguments, or even one or more relations as arguments. Consider for example, the difference between

the predicate "yellow (sun)," and "more massive than (sun, planets)": "more massive than" is considered a relation, as it takes two objects as arguments, whereas "yellow" is considered an attribute, as it takes only one object as an argument.

Another important distinction within this framework occurs between lower- and higher-order relations, based on the type of arguments which relations take, objects or relations, respectively. A case in point is the distinction between "more massive than (sun, planet)" and "cause [more massive than (sun, planet), revolve around (planet, sun)]." Note that in the former case the argument nodes are filled in with objects, whereas in the latter they are filled in with relations.

To return to our initial statements and to the question of defining the notions "domain" and "relation," we may conclude that within Gentner's framework a domain is conceived of as a kind of schema, namely, a knowledge structure which consists of certain interrelated objects. A relation is conceived of as the "schematic relations" holding among the objects within a domain, namely, relations of contiguity of various sorts (causal, temporal, spatial) which connect the objects within a certain domain. Thus, the assumption that a domain is a kind of a schema provides us with a very straightforward way of talking about relations: relations are predicates through which objects in the same spatiotemporal domain are related to each other.

1.1.2. Constraints on mappability: the connectivity constraint. Given the representational notation above, the implications regarding metaphor comprehension, and particularly mappability, follow directly. Thus, Gentner's schematic paradigm yields what might be called the *connectivity constraint*. According to that constraint, it is relations rather than attributes which are more likely to get mapped; among relations preference is given to second-order ones.

The principle underlying this hierarchy of mappability is that the higher the number of elements (within the domain) connected via a certain predicate, the higher the probability of that predicate's being mapped. Higher-order relations outrank lower-order relations, as the former connect at least two (lower-order) relations, each of which connects at least two objects; lower-order relations connect only objects and, therefore, are lower in their connectivity, namely, in the number of elements they connect.²

To conclude, the strong logical connection between the representational assumptions of the "domain-as-a-schema" concept and the constraints imposed on metaphor comprehension should be emphasized.

2. Findings obtained in experiments on metaphor comprehension lend support to this hierarchy of preference (Gentner 1983).

Thus the connectivity constraint directly follows from the "domain-as-a-schema" paradigm, as the latter assumes that elements comprising a given domain are not independent of each other but are interrelated. Having established this assumption enables the theory to develop the connectivity constraint, which is based on the schematic relations holding between elements in the domain.

1.1.3. *Counterexamples to Gentner's proposal.* Having described Gentner's theory in some detail, let us briefly consider two representative counterexamples to that theory. The main argument that I am trying to advance against Gentner's proposal is that the connectivity constraint is neither a necessary nor a sufficient condition for mappability.

"Lectures are like Lullabies":

The Lectures schema:

Objects: speaker, listeners, utterances.

Predicates: conveying information (speaker, listener); uttering lectures to (speaker, listeners); can be boring and induce drowsiness sometimes (utterances, listeners), etc.

The Lullabies schema:

Objects: adults, kids, lullabies.

Predicates: Are uttered at sleeping time (lullabies, kids); uttering lullabies to (adults, kids); induce drowsiness (lullabies, kids).

The immediate and preferred reading for the metaphor is, arguably, "induces drowsiness." Gentner's connectivity constraint does not provide us with a sufficient condition for explaining mappability here. Though this constraint may account for the fact that the relation "inducing drowsiness" gets mapped easily, it does not explain why, from among the other relations that can be mapped, such as "uttering lullabies to (adults, kids)," which are of the same "connectivity degree," it is the "drowsiness" relation that gets mapped. What is needed here is an additional constraint which will account for the fact that, in many cases, certain predicates among those which equally meet the connectivity constraint are more likely than others to get mapped. (I will argue later that such an additional constraint is provided by the alternative paradigm in metaphor comprehension, that is, the categorical paradigm.)

Yet another counterexample to Gentner's proposal can be found in the case of "Tom is a tortoise." Without going into a detailed description of the "tortoise-domain schema" and the "human-domain schema" involved, the property that gets mapped immediately is the "slowness" of the tortoise, which is preferred over other properties of the "tortoise schema." Note, further, that this cannot be accounted for by the connectivity constraint, as the "slowness" of the tortoise is an object-predicate, that is, an attribute rather than a relation, and it is

preferred even over a property of the relation type [e.g., "eat (tortoise, vegetables)"].

What this and many other, similar examples show is that, in order for a predicate to get mapped, it does not have to be a relation; in opposition to Gentner's definition of the notion "relation," attributes are sometimes even preferred over relations. Later on, I will argue that within the categorical paradigm, the slowness of the tortoise does indeed count as a relation since it determines the relative position of the tortoise within its natural category, namely, "animals." Note, however, that within Gentner's schematic representation no knowledge regarding the relative position of tortoises in their natural category is included in the "tortoise domain," which includes only the schematic knowledge about an object that is part of the immediate spatio-temporal context of that object and the relation holding between them (e.g., the food eaten by tortoises, and so on). Thus, Gentner's framework lacks the appropriate mechanism for representing that aspect of knowledge which has to do with the relative position of a certain concept within its natural category. (For a similar view, see Turner [1990]).

These two examples clearly show that the representational assumptions of the schematic paradigm, as well as the connectivity constraint it entails, must be supplemented by additional representational assumptions and by additional constraint(s) on mappability.

1.2. Tourangeau and Sternberg's View

1.2.1. *Representational assumption: a domain is a category.* The alternative categorical paradigm can be illustrated by Tourangeau and Sternberg's theory (1981, 1982). Due to space limitations, I will briefly summarize the main representational assumptions of that paradigm and the *diagnosticity constraint* proposed in its framework.

The main purpose of Tourangeau and Sternberg's proposal is to construct a theory of apiness in metaphors, namely, to address the question of which metaphors are more apt than others, and why. I will not elaborate on their entire theory, which is of no relevance to the present paper. What is relevant, however, is their interpretation of the notion of "domain" and the constraint on mappability which, though not fully stated in their papers, may nevertheless be inferred.

A domain is conceived of in this context as a (taxonomic) category. Thus, in a metaphor such as "Reagan is a shark," the two domains compared are the domain of "political leaders" (of which Reagan is a member) and the domain of animals (of which the shark is a member). There are two main differences between the "domain-as-a-schema" notion and the "domain-as-a-category" conception: (1) The relation between the domain and its components in the schematic paradigm is

a whole/part relation, in that objects are part of a whole schema; by contrast, the categorical paradigm maintains that the relation between a component and its taxonomic category is a member/set relation, as is the relation between "Reagan" and the category of "world leaders." (2) Of greater importance is the difference between the paradigms with regard to the relation holding among those components comprising a given domain. Whereas the schematic paradigm assumes a "contiguity relation," the categorical paradigm assumes a "similarity" relation among objects in a given domain. (I use the term "similarity" in the broadest sense possible, without committing myself to any single or simple principle of similarity.) Thus, the relation between Reagan and, say, Mao, is a sort of similarity relation between two political leaders, which is responsible for their being members of the same category.

Furthermore, this difference in the conception of domain yields a different conception of the notion "relation." According to the categorical paradigm, there are several dimensions³ structuring a domain, relative to which each member is located. Thus, for example, "political aggressiveness" is a dimension relative to which Reagan is presumably to be located at one extreme end, whereas Mahatma Gandhi would be found at the other end of this aggressiveness scale. Here, the whole notion of relation gets a totally different interpretation than the one it had in the schematic paradigm: the relation holds between a certain member and other members of the same category relative to some dimension or scale which structures that category.

1.2.2. Constraints on mappability: the diagnosticity constraint. Having presented the representational assumptions of the categorical paradigm, let us turn now to the way it addresses the issue of mappability. As this paradigm maintains that it is preferentially a relation which gets mapped, and as the notion "relation" is conceived of within that framework as the position of a certain member on a certain scale (relative to the other members of the category), the main problem is how these dimensions are selected: that is, what is the principle underlying the selection of a dimension among several possible ones?

3. I am using the term "dimension" because this is the term used by Tourangeau and Sierberg. However, the position taken in a given concept on certain dimensions can easily be translated into Gentner's terms and considered as a type of predicate. Thus, e.g., where Tourangeau and Sierberg would describe the concept "tortoise" as holding an extreme position on the speed dimension or scale, this can be translated into Gentner's framework by the attribute "very slow" which is attached to the object "tortoise" in the "tortoise domain." Note, however, that Gentner's framework is incapable of representing the fact that this attribute is a highly diagnostic property of tortoises with respect to the natural category to which they belong ("animals"). I will return to this important point later on.

Here is where the diagnosticity constraint comes to play an important role. According to this constraint, among the various dimensions which structure a given concept in the source domain (category) and which are potentially mappable onto the corresponding concept in the target domain (category), the one most likely to get mapped is the one with the highest diagnosticity value for the concept in question. In the case of "Reagan is a shark," the concept in question is "a shark" and the source domain is "sea creatures"; evidently, among the various dimensions along which sharks can be located (e.g., shape, color, size), "aggression" has one of the highest diagnostic values assigned to sharks relative to other sea creatures (e.g., dolphins, etc.)⁴ Thus, in the case of "Reagan is a shark," the comprehender is assumed to map the relative position sharks occupy on the aggression dimension of their natural domain (namely, sea creatures) onto the relative position of Reagan in his own domain (political leaders).

The diagnosticity constraint, then, offers us, within the categorical paradigm, a mechanism for the selection of preferable dimensions for mapping from source to target domain. Note, further, that this diagnosticity constraint may provide us with the mechanism needed to account for those metaphors presented previously as counterexamples to Gentner's theory. Let us consider each of these again.

The first metaphor was "lectures are like lullabies." The reader may recall that the problem here was the connectivity constraint's inability to account for the fact that "inducing drowsiness" is more likely to get mapped than, say, "uttering an utterance (speaker, listener)," although both predicates meet the connectivity constraint equally. Note, however, that they differ with respect to the diagnosticity constraint: "inducing drowsiness" has a high diagnostic value, as it is one of the distinguishing properties of lullabies relative to other members of the category "songs" (the natural category of lullabies). "Uttering utterances" does not distinguish lullabies from other kinds of songs, as this is a property they all share. The diagnosticity constraint accounts for the preferability of "inducing drowsiness" over "uttering utterances."

The same argument holds for the second counterexample to Gentner's proposal, namely, "Tom is a tortoise." Recall that there prefer-

4. On the present account, the "diagnostic value" of a given dimension (that is, property) refers to the extent to which a given dimension can distinguish the concept in question from other concepts. Clearly, this notion is a complex one wherein several parameters converge. As the present paper does not focus on the question of diagnosticity, I will not propose either a formal definition of the concept or an account of its determinants. Presumably several parameters, such as prototypicality, prominence, and familiarity, contribute to the diagnosticity of a given dimension or property with respect to the concept of which it is a part. (For a more detailed discussion of this topic, see Shen [forthcoming]).

ence was given to an attribute ("slowness") over some other relations, such as "eat (tortoise, vegetable)," a fact which contradicts the prediction of the connectivity constraint. Note, however, that if we postulate the diagnosticity constraint, the problem will be resolved. Thus, "slowness" meets the diagnosticity constraint, as it is a distinctive property of tortoises relative to their category (i.e., animals), whereas "eating vegetables" is of a relatively low diagnostic value with respect to that category.

In summary, let me emphasize that here, as in the case of the schematic paradigm, there is a strong logical connection between the representational assumptions of the "domain-as-a-category" conception and the constraint imposed on metaphor comprehension. Diagnosticity is defined within that framework's assumption that elements comprising a given category are compared and evaluated relative to other members of the same category. We can see that, although the categorical paradigm shares with the schematic one the assumption that relations, rather than other properties, of the source domain are more likely to get mapped, the paradigms' interpretation of "relation" varies in accordance with the difference in their conception of "domain."

1.2.3. Counterexamples to Tourangeau and Sternberg's proposal. Having described in some detail Tourangeau and Sternberg's theory, let me briefly point out the main shortcoming of their proposal. The primary objection to the diagnosticity constraint as a selection mechanism is that it does not fully account for the preferability of certain dimensions over others. Consider again the "Reagan is a shark" metaphor. As has been said, the immediate dimension selected by subjects (in an informal test I have conducted) is that of "aggressiveness," where the relative position of sharks in that dimension gets mapped onto the relative position of Reagan in his respective category. The point is that the diagnosticity constraint does not account for the fact that this dimension has been preferred over others, such as size, which are no less diagnostic. Arguably, the relative position that sharks occupy in the dimension of size is as prominent and could, therefore, be considered of as high a diagnostic value.

Note that this dimension and the relative position sharks occupy in it could be mapped onto the political domain. Reagan could be considered a "big" political figure (where bigness refers to his leading a superpower), similar to the "bigness" in size of sharks among sea creatures (at least according to our folk theory of sea creatures).

Thus, meeting the diagnosticity constraint is not sufficient for a given domain to be selected for the mapping process. What this analysis suggests is that the diagnosticity constraint must be supplemented by additional constraint(s) on mappability. Let me suggest in advance

that such a supplement is to be found in the connectivity constraint proposed by the schematic paradigm. In the case of sharks, the difference between "being aggressive" and "having a big size" (both of which equally meet the diagnosticity constraint) is that the former is (in Gentner's terms) a relation (holding between sharks and the sea creatures they attack), whereas the latter is an attribute of sharks and cannot relate sharks to other "objects" in the shark schema.⁵

It should be emphasized that the connectivity constraint functions here as a "preference principle," accounting for the preferability of certain properties (attributes, relations, dimensions, and so on) which meet the diagnosticity constraint over others.

To summarize: we observed that supplementing the categorical paradigm with the connectivity constraint, functioning as a "preference principle," provides us with the kind of selection mechanism that is needed in order to account for the mapping of dimensions in cases such as those above.

2. The Modified Hybrid Model

Having criticized the two paradigms above, let us now introduce the outline of a "hybrid model" which can account for the objections raised against them. As this hybrid model is based on the two paradigms, and since the main arguments supporting it have already been presented, the model will be introduced briefly. It consists of representational assumptions accompanied by principles of mappability, each of which I shall discuss in turn.

2.1. Representational Assumptions

Recall that the main problem of each of the two theories discussed was its failure to represent those aspects of knowledge captured by the other one. It was concluded that, in order to account fully for mappability in metaphors, both schematic and categorical knowledge about a specific concept must participate in the knowledge representation of a given domain. This problem is solved by the hybrid model proposed below, in which it is assumed that the knowledge representation of concepts includes both schematic and categorical aspects of the domain to which these concepts belong.

5. As previously explained, the reason for this is that, within Gentner's framework, the very notion of schema refers only to the *immediate temporal context* of the objects in that domain. Applying this conception to the case of sharks, it becomes evident that the "shark schema" cannot include all sea creatures, as there is no spatiotemporal contiguity relating sharks to all other sea creatures (save for the very trivial and uninformative relation of being "located in the sea," which cannot count as a contiguous schema since, if it does, then our "shark schema" would be too general to be of cognitive use).

The hybrid model takes Gentner's model of representing knowledge as its base with one major modification: knowledge about a given domain is assumed to include objects and properties, where properties can be either attributes or relations. In addition, each property must be assigned a special marking or "tagging," indicating its diagnostic value with respect to its natural superordinate category. For example, the knowledge representation of the "tortoise domain" may include a set of objects (tortoise, food, and so on) as well as a set of properties (its living location, eating habits, and so on); in addition, the knowledge representation is assumed to include knowledge about the tortoise's relative position within its superordinate category, namely, "animals." Thus, a property such as "slowness" would be tagged as a highly diagnostic property of tortoises with respect to their superordinate category, whereas a property such as "lives in swamps" would be marked as of relatively low diagnostic value.

In that way the knowledge representation of concepts (namely, objects belonging to certain domains) and, in particular, the knowledge required to comprehend metaphors, represent both the "schematic" aspects of the concepts in question (structuring its "schematic relations" with other concepts within the "schematic domain"), as well as knowledge about the relative position of the concepts in question with respect to their superordinate category.

Clearly, this sketchy outline cannot count as a representational model but, rather, as a framework for constructing such a model whose details will be worked out at a later stage.

2.2. Processing Assumptions: Principles of Mappability

The model's second part consists of principles of mappability, which are introduced below.

The diagnosticity constraint

In order for a property (an attribute or a relation) to get mapped from Source onto Target domain, it must be a highly diagnostic property of that concept with respect to its superordinate category.

The connectivity (preference) principle

Given two properties which are equally mappable from Source onto Target domain, map the property with the higher connectivity.

These principles are derived directly from the two paradigms introduced previously. Let me just elaborate on the difference between the diagnosticity constraint and the connectivity (preference) principle. Recall that my main observation concerned both the connectivity and diagnosticity constraints' being needed in order to account fully for the various counterexamples to both Gentner's and Tourangeau and Sternberg's proposals. Note, however, that an important difference was found between them: the connectivity constraint was found

to be neither a necessary nor a sufficient condition for a given property to get mapped, whereas the diagnosticity constraint has only been rejected as a sufficient condition. Thus, in all three counterexamples discussed, the properties (attribute, relation, or relative position on a certain dimension) of the concept that were mapped met the diagnosticity constraint, that is, were among the properties of the (relatively) highest diagnostic value with respect to their concept. By contrast, the connectivity constraint functioned as a "preference principle," that is, mechanism of selection from among properties that met the (necessary) diagnosticity constraint.

The principles presented above, therefore, capture the difference between diagnosticity and connectivity. According to these principles, a necessary condition for a given property to get mapped is its being a highly diagnostic property; the connectivity principle operates on those properties which meet the former constraint equally and selects those which are more likely to get mapped.

Conclusion

The main purpose of the present study has been to highlight an important issue within metaphor comprehension, namely, principles of mappability. This aspect of metaphor comprehension plays a central role in the process of assigning an interpretation to metaphors, a role which has not been sufficiently appreciated in philosophical, linguistic, or literary studies of metaphor comprehension.⁶

More specifically, this paper has emphasized the central role of both schematic and categorical aspects of knowledge representation in determining mappability. The incorporation of these aspects of knowledge enables the proposed model to capture more refined distinctions within the hierarchy of mappability.

From a broader perspective, the present proposal can contribute indirectly to the study of knowledge-representation of concepts in general. It might be proposed, in a speculative manner, that the link between the study of metaphor comprehension and the study of knowledge representation holds both ways. Not only should a theory of mappability borrow concepts from theories of knowledge representation, but the latter can also benefit from the former with respect to a central issue within the study of concepts, namely, "salience" (of properties). It is generally held (see, e.g., Tversky 1977) that properties comprising a given concept are not equally salient. The examples analyzed above suggest that the likelihood of a given property's getting mapped depends on its relative salience within its own domain. Thus,

6. Lakoff and Turner (1989) as well as several other proposals are exceptions to this generalization.

for example, the fact that "slowness" is more likely to get mapped in the metaphor "Tom is a tortoise" is related to its high salience in the "tortoise domain" (this relation has been extensively discussed in Shen [forthcoming]). To the extent that this relation holds, then, one may conclude that diagnosticity and connectivity, as the factors which determine mappability, are also those responsible for the determination of salience of properties.⁷

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7. Clearly, this is not a direct relation, as there are other factors determining mappability which have nothing to do with salience, such as the requirement that only properties of the source domain for which some "counterpart" property can be found (or constructed) in the target domain are mappable.