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Principles of metaphor interpretation and
the notion of 'domain':
A proposal for a hybrid model[☆]

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Principles of metaphor interpretation and the notion of 'domain': A proposal for a hybrid model*

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Abstract

Metaphor is widely viewed as the (selective) mapping of properties from one conceptual domain (the 'source') onto another (the 'target'). Two different models of metaphor comprehension are distinguished with respect to this characterization of metaphors: the 'domain-as-a-schema' model, and the 'domain-as-a-taxonomic category' model. These models differ radically from each other with respect to: 1. Their representational assumptions regarding the way knowledge is organized and represented in memory; and 2. Their interpretation principles, namely, the connectivity vs. diagnosticity principles.

On the basis of several counter-examples, it is argued that neither model is sufficient to account for certain phenomena regarding metaphor interpretation. As an alternative, a 'hybrid model' of metaphor comprehension is outlined. While preserving the explanatory power of each of the other two models, the 'hybrid model' is capable of accounting for those counter-examples. A multiple-stage experiment is described, which provides some initial empirical support for the hybrid model. © 1999 Elsevier Science B.V. All rights reserved.

Keywords: Metaphor; Metaphor comprehension; Schema; Category; Connectivity; Diagnosticity

1. Introduction

A metaphor is widely viewed as a selective mapping of properties between two (conceptual) domains, the source and the target (e.g., Lakoff and Johnson, 1980;

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Gentner, 1983; Tourangeau and Sternberg, 1981, 1982). However, among the properties that can, in principle, be selected as relevant for interpretation, there is a hierarchy of 'mappability': certain properties are more likely to get mapped than others. Consider, for example, the metaphorical comparison 'A plant stem is like a drinking straw'.¹ Here, the property of 'being used for drawing liquid' is more likely to get mapped than other properties of drinking straw such as 'thin' or 'tubular' (cf. Gentner, 1988). Or take as another illustration the metaphorical comparison 'Lectures are like lullabies', in which the property 'causing drowsiness' would, arguably, be preferred over the property 'is orally transmitted'. Notice, that in these cases the hierarchy of mappability applies to properties which can, in principle, be mapped (since they have a corresponding property in the target domain) but are nevertheless not equally mappable. Thus, nothing in the domain of 'plant stems' a priori rules out the possibility of equally mapping all three source domain properties, namely, 'used for drawing liquid', 'thin', or 'tubular'.

The main question raised by the above examples is: What principles determine the mapping of certain properties in preference to others from source to target domain? This is the main issue discussed in the present paper.

Perhaps the most pervasive and commonly held answer to this question (e.g., Gentner, 1983; Lakoff and Turner, 1989; Tourangeau and Sternberg, 1981, 1982) emphasizes the relational position occupied by the source domain term (for example 'drinking straws') within its entire conceptual domain (in our case 'the domain of drinking straws') with respect to other components of that domain. According to this view, among the properties which get mapped, preference is given to the relational properties which determine the position occupied by the source domain term relative to other components of its domain, rather than to the intrinsic, or non-relational properties of that term. Consider, for example, the metaphorical comparison 'Stems are like drinking straws' mentioned above. In this case, it is assumed that there is a global conceptual source domain of drinking straws, which in addition to the drinking straw itself, consists of other elements, such as the user of the drinking straws, the liquid being drawn through it, and so on. The position of a drinking straw within the entire domain of drinking straws is determined by the relation between itself and the other components of the domain. Thus, it is argued (e.g., in Gentner, 1983) that the relational property of 'used for drawing in liquid' which relates the drinking straw and the liquid, being drawn, is preferred in metaphorical mapping over non-relational properties of the drinking straw itself, such as 'being thin', or 'straight' or 'being tubular'.

¹ The following discussion will be accompanied by metaphorical nominal comparisons, of the form 'X is (like) Y' where X and Y stand for nominals. Thus, the present paper uses the term 'metaphor' to refer both to metaphors and similes. I will also limit my discussion to simple metaphorical comparisons between concepts representing relatively concrete objects, such as 'A plant stem is like a drinking straw', or 'Family albums are like museums'. Note that these metaphorical comparisons are presented out of any context, in order to examine their interpretation without any contextual effects. This is due to the fact that these types of metaphorical comparisons prevail in the major theories of metaphor comprehension which will be critically analyzed here. In addition, it is easier to illustrate and analyze the hierarchy of mappability with this kind of metaphors than with more complex cases.

This is true also of such metaphorical expressions as 'This person is slippery', or 'That woman has a smooth character'. These metaphorical expressions involve the mapping of terms from the texture domain onto the domain of human characters. Again, it is commonly maintained (e.g., Tourangeau and Sternberg, 1981, 1982; Kelly and Keil, 1987; Keil, 1986) that it is the distinguished (relational) position occupied by the 'slippery texture' relative to other kinds of texture comprising the texture domain which gets mapped onto the human character domain, rather than non-relational properties of 'slippery'.

In short, then, the standard view maintains that relational properties (which determine the position of the source term within its entire domain) are more likely to get mapped than non-relational properties. Clearly, the key notion here is the notion of 'domain'. Note, however, that this notion carries a certain ambiguity within it, an ambiguity which has never been pointed out, let alone investigated in light of its implications for the process of metaphor interpretation. Thus, a closer examination of the theoretical definitions of this notion, as well as of the actual practice of some of the leading theorists in this field (e.g., Tourangeau and Sternberg, 1981, 1982; Lakoff and Turner, 1989; Gentner 1983), reveals that there are at least two different conceptualizations of the term 'domain' which have not been fully distinguished, each of which assumes a basically different theory of metaphor interpretation: the domain as a 'taxonomic category' and the domain as a 'schema'. Let me briefly elaborate on this distinction.

The distinction between schema and taxonomic category has been extensively developed in the literature of knowledge-representation (cf. Mandler, 1984). Consider, for instance, the previous example, namely the 'drinking straw domain', which is a typical example of a schema, and the 'texture domain', which represents a taxonomic category. The 'domain of drinking straws' typically consists of such components as 'the person using the drinking straw', 'the liquid being used', 'the sucking out of the liquid from some receptacle into the user's mouth', etc. It represents a schema, that is, a knowledge-structure consisting of a set of entities (such as 'straw', 'liquid', 'user', and so on) which are related to each other via relations of contiguity, such as thematic, causal, spatial, and temporal relations. The relation between each of these components and the entire domain is a part-whole relation. Typical examples of schemata are various scripts such as the 'restaurant script', or schemata for complex objects such as 'a room', 'a car', and so on. The components of the schema of the concept 'room', e.g., 'a door', 'walls', 'a ceiling', 'windows', and so on, bear part-whole relations to their domain which is the concept 'room', as well as spatial relations among themselves.

By contrast, the 'texture domain' is a typical example of a taxonomic category. The components of a taxonomic category such as 'kinds of texture', namely, 'smoothness', or 'slipperiness', are related to each other not via contiguity relations, but rather via taxonomic similarity relations (I use this term in order to avoid the problematic issue of making similarity the basis of category cohesiveness). Unlike the part-whole relation manifested in the case of a schema, the components of a taxonomic category bear a member-set (or member-category) relation to their respective category: 'slipperiness' and 'smoothness' are members, rather than parts, of the

category 'kinds of texture'. These differences between a schema and a taxonomic category are presented in the two upper left rows of Table 1, to which I will return.

As it turns out, different theories of metaphor comprehension have implicitly assumed these two types of knowledge structures in their definition of the critical notion 'domain', without explicating the differences between the two, and without considering the implications of these different conceptions to the theory of metaphor interpretation. My first goal in this paper, then, will be to make explicit both the different conceptions of the critical notion of domain, and the radically different principles of metaphor interpretation assumed by each of these conceptions.

In what follows, I will first present a critical analysis of the two paradigms (section 2). The schematic paradigm will be illustrated by Gentner's structure-mapping theory which, typically, falls within the 'domain-as-schema' and generates an interpretive principle based on connectivity. The categorical paradigm is based on the common denominator of various leading theories of metaphor comprehension, such as Tourangeau and Sternberg's domain interaction theory, Keil's theory of metaphor and others. The 'domain-as-category' view yields the diagnosticity principle of metaphor interpretation. Throughout the analysis of these two paradigms, I will introduce several metaphors which, so I will argue, cannot be accounted for by each of the two paradigms. My main argument will be that these cases suggest that neither theory on its own is sufficient to fully account for various aspects of metaphor comprehension. My second goal will be to introduce a hybrid model, based on components of both the schematic and the categorical paradigms. I will argue that such a model, while preserving the explanatory power of each of the two paradigms, is capable of accounting for those cases which the two paradigms fail, respectively, to account for. The hybrid model will be outlined in section 3.

In section 4, a multiple-stage experiment will be described, which provides some empirical support for the predictions made by the hybrid model.

2. Analysis of the schematic and the categorical paradigms

Let me start by analyzing the two paradigms. As already proposed, these paradigms differ in two respects (presented in the two upper rows of Table 1). First, they differ in their representational assumptions regarding the notion of domain (these are presented in the left column of Table 1). Second, they differ in their assumptions regarding the interpretation of metaphors (these are presented in the right column of Table 1).

2.1. The schematic paradigm

2.1.1. Representational assumption: A domain is a kind of schema

The representational assumptions of the schematic paradigm are best illustrated in Gentner's 'Structure-mapping theory'. This theory focuses on the mechanism of metaphorical and analogical mappings, and in particular, on the question of what gets mapped in metaphor comprehension. The main characteristic of the notion of 'domain' within Gentner's theory is that it is a kind of *schema*, namely, a knowl-

Table 1
The schematic, categorical, and the hybrid paradigms

Representational assumptions	Interpretive principles
The schema paradigm	The connectivity principle: Given two properties which are equally mappable from source to target domain, prefer a relation over an attributive, and a higher order over a lower order relation via 'part-whole' relations.
The categorical paradigm	The diagnosticity principle: Given two properties which are equally mappable from source to target domain, prefer a high diagnostic property of the concept in question within its respective category, over a low diagnostic one.
The hybrid framework	(1) Out of the properties of the source concept, select those which are compatible with the target domain concept. (2) The connectivity principle: Given two properties of those selected by means of (1), prefer the one which is higher in connectivity (i.e., prefer a relation over an attributive), all other things being equal. (3) The diagnosticity principle: Given two properties of those selected by means of (1), prefer the one which is higher in diagnosticity, all other things being equal.

edge-organization whose components have a certain spatio-temporal contiguity, and are therefore related via causal, temporal, thematic, and spatial relations. In fact, Gentner's theory provides one of the most detailed analyses of the notion of schema among current theories of metaphor.

Take, for example, the previously mentioned 'drinking straw domain'. As already explained, this domain typically consists of such entities as 'a drinking straw', 'the user of the drinking straw', 'the liquid being used', 'the receptacle from which the

liquid is drawn', etc. Clearly, these objects constitute a coherent domain by virtue of the contiguity relations obtaining between them: they are related to each other via the causal, spatial, and thematic relations (e.g., a thematic relation obtains between the user and the drinking straw, a spatial relation obtains between the receptacle and the drinking straw). In addition, our knowledge about this schema contains certain non-relational properties of drinking straws, such as the fact that they are tubular, thin, and so on.

This knowledge-structure is represented within Gentner's framework in a propositional form as a set of propositions consisting of predicates and arguments, such as 'the drinking straw is tubular', or 'the drinking straw is thin', which are propositions in the 'drinking straw domain'.

The most important distinction in such a representation is between two types of predicates, namely, between attributes (that is, 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 relation as arguments. Thus, for example, the predicates 'tubular' and 'thin' in the propositions 'the drinking straw is tubular' and 'the drinking straw is thin' are attributes as they take only one object, namely, 'the drinking straw', as an argument. By contrast, the predicate 'being used by the user for drawing liquid from some receptacle' is a relation since it is a predicate which takes at least three objects in the domain in question as arguments, namely, the user, the liquid, and the receptacle.

A further distinction is made between two types of relations, namely 'systematic' versus 'isolated' relations. Systematic relations are relations which enter into a system of relations, typically via their being 'causally' related to other relations (according to our 'folk theory' of the concept in question). For example, in the 'solar system domain' the relation: 'the sun attracts the planet' is a systematic relation, since it is causally related to other (systematic) relations in the domain in question (such as 'the sun is more massive than the planet' and 'the planet revolves around the sun'). On the other hand, the relation 'the sun is hotter than the planet' is an 'isolated' relation since it does not connect up with other properties in this domain (see Gentner, 1983).

2.1.2. Principles of mappability: The connectivity principle

Given the above representational notation, the implications regarding metaphor interpretation follow directly, and are summarized under the heading of the 'connectivity principle'. According to that principle, it is relations rather than attributes which are more likely to get mapped; among relations it is 'systematic' rather than 'isolated' relations that are more likely to get mapped (Gentner, 1983; Clement and Gentner, 1991, label the latter principle, 'the systematicity principle'). For example, in 'Stems are like drinking straws', the relation of 'being used for drawing liquid' is preferred over attributes such as 'tubular' or 'thin'.

The rationale behind this hierarchy of mappability is as follows: the higher the number of elements (within the domain) connected via a certain predicate, the higher its probability to get mapped. Relations outrank attributes since they connect at least

two objects in the domain whereas attributes connects only one object; 'systematic' relations outrank 'isolated' ones because, unlike the latter, they are connected to other relations in the domain in question.

Thus, it should be emphasized that there is a strong logical connection between the representational assumptions of the domain-as-schema theory, and the principles determining mapping preferences from source to target domains. In other words, the conception of domain-as-schema yields the distinction between attributes and relations; in turn, this distinction allows for the introduction of the connectivity principle.

2.1.3. Cases unaccounted for by the schematic paradigm

Let me now briefly consider two representative metaphorical comparisons which are left unaccounted for by the schematic paradigm. Consider the metaphor 'Lectures are like lullabies', which appears in example (1) in Table 2.

Table 2

Representative examples of Set 1 and 2

Set 1: the two interpretations (A and B) consist of properties differing only in their diagnosticity value: the first property (A) is lower in diagnosticity than the second one (B).

- (1) Lectures are lullabies.
 - A. Cause drowsiness
 - B. Are orally transmitted
- (2) Family albums are museums.
 - A. People usually look at the things exhibited in both
 - B. Used to keep record of the past
- (3) Roosters are clocks.
 - 1st. Are useful for people
 - 2nd. Wake up people

Set 2: the two interpretations consist of properties differing only in connectivity: the first property (A) is a relation, while the second (B) is an attribute.

- (4) Stems are drinking straws.
 - A. Being used for drawing liquids
 - B. Tubular
- (5) A cloud is a sponge.
 - A. Hold water
 - B. Fluffy
- (6) A tire is a shoe.
 - A. Protects what is in it
 - B. Consists of rubber

Arguably, in this case it is the relation 'causing drowsiness' which is preferred over another relation, say, 'is orally transmitted from an utterer to a listener'. This judgment, as well as the other preference judgments which will be discussed in the remainder of this section (and which are illustrated in Table 2), is based on experimental findings which will be discussed in detail in section 4.

Gentner's connectivity principle is, clearly, insufficient to explain the preference of 'causing drowsiness' over 'is orally transmitted', since both properties are relations in the 'lullaby domain' (hence, the relation/attribute distinction cannot account for the former being preferred over the latter). Moreover, the systematicity principle (according to which systematic relations are preferred over isolated ones) also fails to account for the above preference. Note that neither of these properties is an isolated one, since both are 'causally' related to one another: 'being orally transmitted' is the precondition for the utterer of the lullaby to achieve his/her goal of 'causing drowsiness'. Thus, according to the criteria proposed in Clement and Gentner (1991), both are systematic relations.

In such cases, then, no mechanism internal to the theory exists to determine which of two equally systematic relations will be preferred as the more adequate interpretation. Arguably, an additional principle is needed here, which will account for the preference of certain relations over others in case all the latter meet the connectivity principle to an equal degree.

Example (2) in Table 2, 'Family albums are like museums', is an additional example illustrating the same point. Without going into a detailed description of the 'family album schema' and the 'museum schema' involved, I would like to point out that preference in this case is given to the relation 'used to keep records of the past' over other schematic relational properties of the 'museum schema' such as 'people usually look at the things exhibited in museums'. Again, as in the former, 'lullabies' case, Gentner's theory does not specify any mechanism for determining such a preference in cases where two systematic – not isolated – relations are involved. The argument I will develop later on will hold that this kind of additional mechanism in the form of a principle of mappability is provided by the alternative – categorical – paradigm in metaphor comprehension.

It should also be noticed that, in some cases, not only is one relation preferred over others, but object-attributes are preferred over relations. A case in point is the metaphorical comparison 'Tom is like a tortoise'. Without going into a detailed description of the 'tortoise domain schema' and the 'human domain schema' involved, the immediate property which gets mapped 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 principle as the 'slowness' of the tortoise is an attribute, rather than a relation, and it is preferred even over a property of a relational type (e.g., 'crawls on the ground'). What this and many similar examples show is that in order for a predicate to get mapped, it does not have to be a relation. Moreover, there are cases where attributes are even preferred over relations. I will not pursue this point in the present paper.

To summarize, the cases falling beyond the explanatory scope of the domain-as-schema view suggest that its representational assumptions, as well as the connectiv-

ity principle it entails, must be supplemented by additional representational assumptions and by additional principle(s) of mappability.

2.2. The categorical paradigm

2.2.1. Representational assumption: A domain is a category

Having presented the schematic paradigm, let me turn now to the categorical paradigm, as manifested in leading theories of metaphor comprehension such as Tourangeau and Sternberg's domain-interaction theory (Tourangeau and Sternberg, 1981, 1982), Kelly and Keil's theory (1987), and others. In its simplest form, a domain is taken here as a (taxonomic) category. Thus, in a metaphor such as '*USA Today* is the hamburger of American newspapers' the two domains compared are the domain of 'American newspapers' (of which *USA Today* is a member) and the domain of 'kinds of foods' of which 'hamburger' is a member. As already explained, a category differs from a schema in two respects. Firstly, unlike the part-whole relation holding between the components and its respective schema, the relation between a category and its components is a 'member-set' relation. Secondly, the relation holding between the members of a category themselves is that of 'taxonomic similarity', which differs radically from the 'contiguity relations' holding between the components of a schema.

Note, further, that these differences in the notion of domain yield a different conceptualization of the relational position of a concept within its domain, which, as previously argued, plays a central role in the interpretation of metaphors. According to the categorical paradigm, the relation of a given member to other members within the same category is represented by the position in the category it occupies relative to the other members. Unlike the contiguity relations which play a central role in determining that position within the schematic paradigm, here, within the categorical paradigm, it is a given member's properties which distinguish the member in question from other members belonging to the same natural superordinate category to determine its relative position. In the example previously mentioned, the property 'a popular mass product' is a highly diagnostic property of hamburgers relative to other kinds of food. Thus, the main point to note here is that the relative position of a given member within a category is determined by the properties which distinguish it from the other members in the same category.

2.2.2. Principles of mappability: The diagnosticity principle

Given the categorical paradigm's representational framework, the issue of mappability follows directly. The domain-as-category view postulates the 'diagnosticity principle' (which is formulated in the second row of Table 1). In its simplest form (e.g., Tourangeau and Rips, 1991), this principle states that highly diagnostic properties of a given concept within its category are preferred over low-diagnostic ones, all other things being equal. This principle, then, offers us a mechanism for the selection of the preferable properties for mapping from source to target domain. (This interpretative principle underlies various theories of metaphor, e.g., Tourangeau and Rips, 1991, Tourangeau and Sternberg's theory, 1982, and Ortony's

salience imbalance theory (Ortony et al., 1985), all of which have provided some empirical support for it.

However, formulating this principle within the categorical paradigm forecloses its use within the rival – schematic – paradigm. Furthermore, it provides us with the mechanism needed to account for the metaphors which previously fell beyond the scope of Gentner's schematic theory. Consider, for example, the metaphor 'Lectures are like lullabies'. Recall that the connectivity principle failed to account for the fact that 'inducing drowsiness' is more likely to get mapped than, say, 'uttering an utterance (speaker, listener)', since both predicates equally meet the connectivity principle. However they differ with respect to the diagnosticity principle: 'inducing drowsiness' has a high diagnostic value, because it is one of the most distinguishing properties of lullabies relative to other members of the category 'songs' (which is the natural category of lullabies), 'Uttering utterances', on the other hand, does not distinguish lullabies from other kinds of songs, since this is a property they all share. The diagnosticity principle thus accounts for the preference of 'inducing drowsiness' over 'uttering utterances'.

The same argument applies equally well to the second example left unaccounted for by Gentner's proposal, namely, 'Family albums are like museums'. Here, preference was given to one relation, namely, 'used to keep records of the past' over another relation, namely, 'people usually look at the things exhibited in them'. Whereas Gentner's schematic theory is incapable of handling such cases, they are easily accounted for within the categorical paradigm. According to the domain-as-category paradigm, the former property ('used to keep records of the past') is of a high diagnostic value when compared to the latter.

2.2.3. Cases unaccounted for by the categorical paradigm

Having described the categorical paradigm, let me briefly point out the main shortcoming of this proposal. The main weakness of the diagnosticity principle as a selection mechanism is that it is incapable of handling cases in which mapping favors a certain highly diagnostic property over another, equally highly diagnostic one. In other words, this paradigm lacks a mechanism for selecting a certain property out of a set of equally highly diagnostic ones.

A case in point which illustrates my claim is the metaphorical comparison 'Stems are like drinking straws' (see Table 2). As previously mentioned, there is a clear preference for the property 'used to draw in liquid' over properties such as 'tubular'. However, this preference cannot be accounted for by the categorical paradigm, since all these properties are considered equally highly diagnostic properties of drinking straws with regard to its category of 'eating utensils'. Thus, the theory requires an additional mechanism in order to account for the preference of the former property over the latter. I would like to suggest that such a mechanism is to be found within the schematic paradigm, according to which a relation such as 'used to draw in liquid' is preferred over object-attributes such as 'tubular' or 'thin'. Let me also emphasize that, unlike Gentner's proposal, I am not suggesting that object-attributes are entirely excluded from the interpretation of such metaphors. Rather, my proposal focuses on a certain aspect of the interpretative process, namely, the preference of

certain interpretations over others. It is proposed here that relations are preferred over attributes even though both properties can, in principle, be mapped onto the target domain, and even though both are highly diagnostic properties of the source domain concept. What this analysis suggests is that the diagnosticity principle must be supplemented with the additional connectivity principle proposed by the schema paradigm.

Yet another example which illustrates the same point is the metaphor 'A cloud is like a sponge' (see Table 2). As in the former case, of all the relatively highly diagnostic properties of the concept 'sponge' within its superordinate natural category, it is the relation 'can hold water' which is preferred over the attribute 'fluffy'. As in the previous case, the mechanism absent from the categorical paradigm which could be responsible for selecting the former property over the latter, can be supplemented by the schematic paradigm which provides us with the connectivity principle.

Table 3 summarizes the main observations that have been made so far, all of which can be accounted for by the hybrid framework, which will be discussed shortly.

Table 3
Four observations regarding metaphor interpretation

1. In cases where two properties differ in their 'connectivity value' preference is given to the one with the higher connectivity value.
2. In cases where the two properties in question are equally high in connectivity value (i.e., both are relational), yet one of them outranks the other with respect to diagnosticity, preference is given to the one with the higher diagnosticity.
3. In cases where the two properties in question differ in diagnosticity, preference is given to the property with the higher diagnosticity value.
4. In cases where the two properties in question are equally high in diagnosticity, yet one of them outranks the other with respect to connectivity, preference is given to the property with the higher connectivity.

Note that the first and third observations are those made by the schematic and the categorical paradigms, respectively. The second and fourth are drawn directly from the counter cases which were introduced in order to show the respective limitations of the schematic and the categorical paradigms.

In what follows, I will outline the general characteristics of a hybrid framework within which these observations can be accounted for. Let me emphasize here that this is merely a partial framework, which attempts to address only those observations that have been made throughout the paper, while disregarding other aspects of the complex phenomenon of metaphor interpretation.

3.1. Representational assumptions

Having criticized the two paradigms above, let me now outline the proposed hybrid model (HM) which I have started to develop elsewhere (see Shen, 1991a,b). As this model is based on components of the two paradigms, and since the main arguments supporting it have already been presented, it will be introduced briefly with respect to its major characteristics. It consists of representational assumptions accompanied by principles of mappability. I shall discuss each one in turn.

The major assumption of the HM is that knowledge-representation of concepts includes both schematic and categorical aspects of the domain to which these concepts belong. This hybrid framework takes Gentner's propositional notational system as its basis, with one major modification. Thus, knowledge about a given concept consists of a set of propositions capturing the knowledge regarding the schema to which that concept belongs. Each proposition consists of a predicate and one or more arguments, where the predicate can be either an attribute or a relation. So far, the framework is identical to Gentner's model. The major addition to this representational notation is that each property is assigned a special marking or 'tag' indicating its (high/low) diagnostic value with respect to the natural superordinate category of which the concept in question is a member.

Thus, for example, the knowledge-representation of a concept such as 'a drinking straw' may include a set of objects (the drinking straw, its user, the receptacle from which the liquid is being drawn, and so on) as well as a set of properties such as 'being long', 'being thin', 'being used by the user for drawing liquid from some receptacle', and so on. In addition, the knowledge-representation is assumed to include knowledge about the drinking straw's relative position within its superordinate category, namely, 'eating utensils'. Consequently, a property such as 'tubular', or 'used to draw in liquid' would be tagged as a highly diagnostic property of 'drinking straws' with respect to their superordinate category, whereas a property such as 'used by a person as an eating utensil' would be marked as relatively low with respect to its diagnostic value.

In this manner, 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 (relating its 'schematic relations' with other concepts within the 'schematic domain'), and 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 as a very partial and preliminary framework for constructing such a model whose details will be worked out at a later stage.

3.2. Processing assumptions: Principles of mappability

The second part of this hybrid framework consists of principles of mappability. These principles are introduced in the lower row of Table 1. The first principle is, in fact, an

implicit constraint, taken for granted by all three paradigms, that selects only those properties from the source domain which have some corresponding property in the target domain. The other two principles are preference principles which apply to those properties which are selected by means of the first principle. These principles follow directly from what has been said so far, and therefore I will discuss them only briefly.

The second principle, i.e., the diagnosticity principle, accounts for the second and the third observations, namely, for the observations made by the categorical paradigm, and for the counter-examples to the schematic paradigm, respectively. The third principle, i.e. the connectivity principle, accounts for all the cases summarized by the first and fourth observations previously introduced in Table 3. Recall that the first observation is the one made within the schematic paradigm, namely, that, in general, properties higher in connectivity will be preferred over ones having lower connectivity value. The fourth observation summarizes the cases which remain unaccounted for by the diagnosticity principle as proposed by the categorical paradigm. We can see, then, that this hybrid framework is capable of preserving the explanatory power of each of the two paradigms, while handling those cases which are left unaccounted for by them.

Let me briefly illustrate the use of these principles in interpreting two of the metaphors that have been discussed earlier. Consider, for example, the metaphor 'Stems are like drinking straws'. According to the hybrid framework, knowledge about the domain, namely, the set of objects and properties of the entire 'drinking straw domain', has first to be activated. Applying the first interpretative principle to this knowledge-representation results in selecting out those relational and non-relational properties which are compatible with the stem domain, namely, such properties as 'being used for drawing liquid', 'hollow', and 'tubular', while leaving aside those which do not have any match in the target domain, such as the color, or even the material of drinking straws. Given that the properties selected, are equally highly diagnostic, we apply the third interpretative principle. According to this principle the relation 'being used for drawing liquid' is the preferred interpretation, because it ranks higher in connectivity than the other properties mentioned.

By the same token, the application of the first and second principles to the metaphor 'Lectures are like lullabies' yields the preference of the relation 'causing drowsiness' over the less diagnostic relation: 'is orally transmitted from an utterer to a listener', as shown in Table 2.

4. Empirical evidence

Having outlined the major characteristics of the hybrid model, let me turn now to an empirical examination of this model. I will introduce some initial findings obtained in a multiple-stage experiment which attempted to test two specific predictions:

- a. For any two equally diagnostic properties which differ with respect to their connectivity value, preference will be given to the property which is higher in connectivity (i.e., relations will be preferred over attributes).

b. Given any two properties which differ with respect to their diagnosticity value, but share the same connectivity value (e.g., both are relations, or both are attributes), comprehenders will prefer the property higher in diagnosticity as a more adequate basis for interpreting the metaphor in question.

To test these predictions, a straightforward method was used. Subjects were presented with two sets of metaphors, each metaphor being accompanied by two possible interpretations. In one of the sets, the two interpretations consisted of properties with equal connectivity value but with different diagnosticity value; this will be called Set 1 (see Table 2). In the other set, namely Set 2 (see Table 2), the two interpretations accompanying each metaphor consisted of properties which were equally diagnostic but differed with respect to their connectivity value (i.e., one of the properties was an attribute while the other was a relation).

The subjects' task was to judge which of the two interpretations seemed more appropriate and reasonable. The prediction was that for Set 1, preference should be given to the interpretation higher in diagnosticity. As for Set 2, it was predicted that the preferred property should be the one higher in connectivity (in other words, it was assumed that a relational property would be preferred over an attributive one).

Note that prior to the direct testing of the main predictions (which have to do with the interpretative preference of metaphors), the key factors involved needed to be measured. That is to say, the properties comprising the concepts in question had to be established first; then, their diagnosticity, as well as the superordinate category with respect to the diagnosticity of the property in question and the connectivity value of the given property, had to be evaluated. In order to measure these factors a multiple-stage questionnaire was devised. The questionnaire consisted of four parts: i. Relevance of property-to-concept judgments, ii. Category identification judgments, iii. Diagnosticity judgments, and iv. Connectivity judgments.

4.1. The questionnaire

4.1.1. Relevance of property-to-concept judgments

The properties used in the experiment were established using the following methodology. Subjects were presented with 48 concepts (24 pairs of concepts which constituted 24 metaphorical comparisons). Most of these metaphorical comparisons were extracted from materials used in Ortony et al. (1985), and Gentner and Clement (forthcoming ???), while some were composed for the purpose of the present study. For example, given the metaphor 'Lectures are lullabies', we extracted the target and source concepts, namely, 'lectures', and 'lullaby' in order to find out whether a property such as 'is orally transmitted from an utterer to a listener' is a property of both concepts. The most natural way to establish this would be to ask subjects to generate the properties of a given concept, and to select the properties from the list produced. However, this methodology may not fit our experimental design for the following reason. Recall that part of the experimental design had to include non-diagnostic properties (e.g., non-diagnostic relations). However, in a property

generation task, subjects hardly come up with non-diagnostic properties of the concept in question. Rather, they tend to produce its most salient properties.

We therefore used another methodology (similar to one used in Ortony et al., 1985). We constructed a set of two properties for each concept, which we assumed to be indeed properties of that concept. We then asked 10 informants to judge whether or not they agreed that the property in question is a possible property of the concept in question. For example, they had to decide whether 'is orally transmitted from an utterer to a listener' is a property of the concept 'lullaby' or not. The order of the properties and concepts was randomized. Only properties which were judged by at least 8 subjects as comprising the respective concept were included in the subsequent stages of the experiment.

4.1.2. Category identification judgments

Ten subjects were presented with 24 concepts (the 'vehicles' of the 24 metaphorical comparisons we have used). For example, in the metaphor 'Lectures are lullabies' the concept 'lullaby' was used. For each concept, the subjects were asked to generate the natural category to which they thought it most likely belonged. This was preceded by two examples of a concept and its superordinate category (i.e., 'furniture' for 'chair and sofa', and 'fruit' for 'an apple' and 'an orange').

At this stage, the responses were not decisive (in some of the cases the responses did not agree on any category label). For some concepts, the responses oscillated between various levels of abstraction (e.g., 'art institutions' vs. 'social institutions' for the concept 'museum'). In other cases, some of the responses involved associated concepts rather than the taxonomic category to which the concept belonged: e.g., 'winter' for 'snow', rather than '(a form of) precipitation'.

In order to decisively establish the taxonomic category, we extracted the two most frequent responses from the generated responses for each concept. At this point, we conducted a multiple choice experiment. Ten (new) subjects were presented with the 24 concepts, and were asked to choose one of two possibilities which represented the most immediate (i.e., least abstract) natural taxonomic category to which they thought the concepts most likely belonged. The subjects' responses were analyzed for agreement on category identification. Only categories which were agreed upon by at least 80% of the subjects were included in the main experiment.

4.1.3. Diagnosticity

In order to establish the diagnosticity of a given property relative to a given concept, the following experiment was conducted. Ten subjects were presented with a list of 24 triads, each consisting of a concept (e.g., 'lullaby'), its superordinate category (e.g., 'songs'), and a property of that concept (such as 'causing drowsiness'). The superordinate categories used in this experiment were those previously established as the natural categories of the concept in question.

The subjects' task was to decide whether the property in question constituted a high or low diagnostic property of the concept relative to its superordinate category. Thus, for example, given the concept 'lullabies', its respective superordinate category 'songs', and the property 'causing drowsiness', the subjects were asked to

assess the extent to which the property 'causing drowsiness' distinguishes 'lullabies' from other types of songs.

The subjects' responses were analyzed for agreement on diagnosticity judgments. Properties which were judged as high-diagnostic or low-diagnostic by at least 80% of the subjects were included in the subsequent experiment. Properties which failed to reach this cut-off point were discarded. In most cases, the decisions were straightforward with a robust agreement (of at least 90%) between the judges.

4.1.4. Connectivity judgments

The decision as to the connectivity value of a given property was established in two stages. First, the 'relationality' (as opposed to the 'attributionality') of a property was established, using a procedure similar to the previous one. Ten subjects received some training in the use of the distinction between relationality and attributionality. They were then randomly presented, in a random order, with the 48 properties (to be used in the main experiment as possible interpretations of the metaphors in question). They had to determine whether the property in question was relatively highly relational or attributional. Relationality was defined as the degree to which the property in question expresses relations between some objects. Attributionality was defined as the degree to which the property in question expresses some characteristics of an object, rather than a relation between objects. The judges were given examples of prototypical instances of relations (e.g., 'attracts' and 'hits') and of attributional properties (e.g., 'fat' and 'short').

Properties which were judged as either highly relational or highly attributional by at least 80% of the subjects were included in the subsequent experiment. Properties which failed to reach this cut-off point were discarded. In most cases, the decisions were straightforward with a robust agreement between the judges.

Once certain properties were established as relations to the same concept, their 'systematicity' had to be established during the second stage of the experiment, i.e., they had to be evaluated as to whether they constitute 'systematically related' properties. This was done on the basis of judgments provided by two independent judges, who received some training in distinguishing between 'systematically related' vs. 'isolated' properties of a given concept. The judges were then presented with two relational properties (which had been established as such at the previous stage) for each of the set of the relevant concepts, and were asked to decide whether they could establish a causal relation between the properties in question. Cases where two relations were judged as causally related could be considered 'systematic' relations. To illustrate a causal relation holding between two properties, examples such as 'having wings' and 'being able to fly' in the case of the concept 'bird' were given: having wings enables the bird to fly (see Murphy and Medin, 1985; Medin et al., 1987, for a discussion of the role of causal relations holding between properties of concepts). As a prototypical example of two properties which are not causally related in any reasonable sense, they were given examples such as: 'having a brown color' and 'having wings', as two properties of a (specific) bird.

Only those cases where the two judges agreed (either prior to, or after, a discussion) that a causal relation holds between the two relations were included in the sub-

sequent experiment. Pairs of relations which failed to meet this criterion were discarded. The disagreements between the judges were few, and almost all of them were resolved through discussion.

4.2. The preference judgment experiment

Having described the measurement of the three key factors (the superordinate category, the diagnosticity, and the connectivity of the properties in question), we may now turn to the main experiment, namely preferences in metaphor interpretation.

The previous procedure left us with 18 triads (the other 6 were discarded during the previous stages), each consisting of a pair of concepts comprising a metaphorical comparison and two properties, each representing a possible interpretation of the former. These were used as materials in the preference judgment experiment (see below).

4.2.1. Method

4.2.1.1. *Subjects*: 41 graduate students (35 females and 5 males) at the School of Education at Tel Aviv University voluntarily participated in the experiments (mean age: 28.4).

4.2.1.2. *Materials*: Each subject read 18 (nominal) metaphors which were each accompanied by two possible interpretations. All metaphors were of the following form: 'metaphorically speaking, A is B' (where A and B stand for nominal expressions representing a concept). The hedge 'metaphorically speaking' was added after a previous small scale pilot revealed that, in some cases, a number of the informants expressed inconvenience with the form 'A is B'; this inconvenience disappeared after the addition of the hedge.

Each interpretation consisted of a property of the source domain concept. Thus, for example, the metaphor 'Stems are drinking straws' was followed by two possible interpretations, e.g., 'both are tubular' and 'both are used for drawing liquid'. Each interpretation consisted of a property of the source domain concept whose connectivity and whose diagnosticity (whether high or low) were previously established, as explained earlier.

The 18 metaphors consisted of two sets. Set 1 consisted of 9 metaphors whose two possible interpretations represented properties which were equally high diagnostic properties of the source domain concept but differed in connectivity. Set 2 consisted of 9 metaphors whose two interpretations differed in diagnosticity, but were equal with respect to their connectivity. The comparisons in Table 2 illustrate each of the two sets. All 18 metaphors appeared in each questionnaire; their order of presentation was randomized.

4.2.1.3. *Procedure*: Each subject read each of the metaphorical comparisons and their accompanying possible interpretations. They were then asked to mark the interpretation which they considered a more adequate and reasonable one.

The hypothesis was that in cases where the two interpretations differ in diagnosticity but have equal connectivity, preference will be given to the interpretation higher in diagnosticity. Typical cases which conform to this hypothesis are (1) (2) and (3) in Table 2. By the same token, in those cases where the interpretations differ in connectivity but not in diagnosticity, preference will be given to the interpretation higher in connectivity. Items (3) (4) and (5) in Table 2 conform to this hypothesis.

4.2.2. Results

Against Tourangeau and Sternberg's theory: The hypothesis stated above predicts that when given two interpretations that differ in their 'relationality' (in Gentner's terms), but are equal in their distinctiveness, subjects will prefer the 'relational interpretation' to the 'non-relational interpretation', was tested separately in each of the 9 relevant metaphors presented to the subjects. A binomial test carried out for each metaphor revealed that 8 out of the 9 metaphors indeed showed the above preference (all p 's < 0.003). Another binomial test revealed that the distribution 8:1 differs significantly from chance ($p < 0.001$); i.e., subjects did significantly prefer the 'relational' interpretations to the 'non-relational' ones. Thus, the first prediction was strongly supported by the results.

Against Gentner's theory: The hypothesis above stated that when given two interpretations that differ in their 'distinctiveness', but are equal in their 'relationality', subjects will prefer the interpretation which relies on the distinctive properties to the one based on the non-distinctive properties. This hypothesis was tested in each of the 9 relevant metaphors presented to the subjects. A binomial test, carried out for each metaphor, revealed that two out of the 9 metaphors significantly showed the above preference (p 's < 0.03). In four other metaphors, 24 out of the 41 subjects preferred the 'distinctive interpretation', in two, 21 preferred the 'distinctive interpretation' and only in one metaphor a little less than half the subjects preferred the non-distinctive interpretation (21 out of 41). A binomial test conducted on subjects' answers as a whole, i.e., calculating the number of choices that conform to the hypothesis versus the number of choices that do not conform to the hypothesis, revealed that subjects preferred the distinctive interpretations (209:369, $p < 0.02$), thus lending support to the hypothesis.

4.2.3. Discussion

The major findings of the multiple-stage experiment reported above generally support two of the predictions of the HM. It was found that when two possible interpretations are equally relational or equally diagnostic, preference is given to the highly diagnostic, or highly relational property, respectively. Neither of these predictions has been directly tested within either the schematic or the categorical paradigm. As already explained, this is not merely a coincidence, but rather a result of the fact that metaphor theorists working within the categorical and/or schematic paradigms have not, thus far, recognized the importance of this distinction with regard to metaphor interpretation. Thus, these theories have never explicitly pointed out the two, totally different, views of metaphor interpretation resulting from the ambiguous use of the notion 'domain' (domain as 'category' vs. domain as 'schema') (cf. there-

fore comes as no surprise that no empirical testing has been conducted regarding these conflicting views of metaphor interpretation.

A closer look at the findings reveals some difference between the support provided for the two predictions: basically, both predictions were given support. However, the first one was robustly supported, while the support for the second prediction was less robust. These findings suggest that various factors may contribute differentially to the mappability of a given property, though, for specific contexts, the dominance of the contribution may vary. In our case, it turns out that while both factors (connectivity and diagnosticity) do play an important role in determining property selection (at least when the other factor is neutralized), connectivity is more dominant than diagnosticity.

It is not fully clear how to account for this difference. A possible direction, however, may be found in the 'metaphor form' in which the metaphors were presented, namely, the 'A is B' form. Note that a distinction can be drawn between 'metaphor form' ('A is B') and 'non-metaphor' forms (such as the 'simile form', 'A is like B', and the 'analogy form', 'A is B among A's class', as in 'Reagan is the shark among political leaders'). With respect to this distinction, it has been widely accepted (see, e.g., Carich, 1989; Verbrugge and McCarel, 1980) that the 'A is B' form (e.g., 'plant stems are drinking straws') calls for a transformation or change of our knowledge of the target concept ('plant stems'), in that it makes the comprehender think of plant stems *as if* they were drinking straws, or to *see* stems *as* drinking straws (see, e.g., Verbrugge and McCarel, 1980). In this respect, so the argument goes, relational properties (such as functions, or causal relations) play a more central role, in that they represent properties which are 'essential' to the concept itself, rather than its attributes (which, typically, refer to properties such as color, shape, size). Such an argument is derived from Gentner's (1983) account for the privileged status of relations over attributes.

The proposal, then, is that the 'metaphor form' biases the reader in favor of relational properties, and, by implication, underestimates diagnosticity as a principle of property selection. Some support for this line of reasoning comes from a study conducted by Aisenman (1996). In this study, subjects were presented with pairs of concepts, and were asked to judge whether the appropriate linguistic form for each pair is the 'simile form' or the 'metaphor form'. The dependent variable was the type of features that are mapped in each comparison, namely, attributes vs. relations. Thus, for example, subjects were presented with the pair 'sun' and 'orange' (for which the properties to be mapped are attributes, such as the orange's color, or shape), and then had to decide whether the more appropriate form to represent these two concepts is either 'The sun is like an orange' (simile form) or 'The sun is an orange' (a metaphor form). (For an example of a relational pair for which there are no salient attribute matches, cf. 'a rooster' and 'a clock'.) In general, it was found that there is a strong correlation between the type of features that are mapped and the type of linguistic structure (metaphor or simile) chosen to represent it: the 'simile form' was predominantly used for attributive pairs, while the 'metaphor form' was mainly used for relational pairs. This study suggests that the metaphor form highlights the relational properties more than does the simile form. In other words, the connectivity factor is more dom-

inant for metaphor format than for its simile counterpart. On Aisenman's (1996) account, the relational features are the 'essential' and more 'important' features of the object. Since the 'metaphor form' represents a transformation, or changes our view, of the target concept, such a change would best be represented in language by means of the most 'obliging' form of 'comparison', namely, identity. By contrast, the similarity in attributive features is merely a resemblance of shape or color, which is not considered to be the most substantial features of an object; therefore, a 'less obliging' linguistic form (namely, 'the simile form') is more appropriate for the representation of such a resemblance statement. Aisenman's study, then, may provide an initial explanation for the dominance of the connectivity factor in the present study which used a metaphor form.

A related study (Shen, 1991a) suggesting the adequacy of the above line of reasoning, presents a previous version of the above experiment, which was identical in its design to the current study, but differed only in the use of 'a simile form' ('A is like B') instead of the 'metaphor form' ('A is B'). The results of this previous experiment were generally supportive of the hybrid model. Here, however, the second prediction was robustly supported by the results, while support for the first prediction was less marked: Seven out of the eight metaphors comprising the relevant set lent support to the prediction that when connectivity is neutralized (i.e., in cases where the two possible interpretations consisted of relations), diagnosticity should determine the ground of interpretation. No significant preference was found for any of the interpretations in the remaining case.

The alternative prediction: that when diagnosticity is neutralized (i.e., when the two possible interpretations are equally diagnostic), connectivity selects the relevant ground, gained also some support, though less than the second one. Five out of the eight metaphors in the relevant set indeed showed that relations were preferred over attributes. For two out of the eight metaphors, subjects did not show any significant preference for any interpretation, while only one case showed a preference which contradicted the prediction.

As can be seen, the use of the 'simile form' reduced the robustness of support for the first prediction, while strengthening the robustness of the second one.

Taken together, these two studies suggest that the 'metaphor form' biases the reader in favor of relational properties and against diagnosticity as a principle of property selection. By contrast, 'non-metaphor' forms, (i.e., the 'simile form' and the 'analogy form') bias the reader in favor of diagnosticity, and, by implication, against connectivity as principles of property selection. The major representatives of the categorical paradigm (i.e., Tourangeau and Sternberg's 'domain interaction model', and Ortony's 'imbalance model') have, typically, used non-metaphor forms in their experimental design: Ortony et al. (1985) used a simile form ('A is like B'), while Tourangeau and Sternberg, typically, used the 'analogy form' ('A is the B among A's category', e.g., 'Ronald Reagan is the shark among world leaders'). Under Ortony et al.'s (1985) account the simile form ('A is like B') calls for a comparison between the concepts (rather than transforming the target concept). It seems reasonable to assume that, in a comparison, diagnosticity plays a more central role than connectivity. Although not directly tested, this assumption is compatible with

Ortony et al.'s 'imbalance model', which suggests that the most salient property of the source is more likely to get mapped. Note that a major measure of 'salience' is diagnosticity. Understanding a metaphorical comparison requires a similarity judgment. Unlike the 'seeing as' mechanism, which characterizes the 'metaphor form', it is reasonable to assume that similarity judgments are more sensitive than a 'seeing as' mechanism to diagnostic properties.

By the same token, it seems reasonable to assume that with respect to these two non-metaphor forms, the role played by diagnosticity is more dominant than it is in the 'metaphor form' ('A is B'). The 'analogy form' emphasizes the category to which the 'B' terms belong, and makes the comprehender attentive to those properties of 'B' which distinguish it from other members of its category. Thus, if one interprets the metaphor 'Ronald Reagan is the shark among world leaders', it is more likely that those properties which distinguish sharks from other kinds of fish will play a more dominant role in the interpretation than the features which are essential to sharks, but are of less diagnostic value.

In any event, the two predictions made by the HM are basically supported by the above experiment. What the above findings suggest is that, while both diagnosticity and connectivity contribute to the likelihood of a given property to be mapped from the source to the target domain, the contribution of each of these factors may vary in different contexts.

It is noteworthy that the two predictions which were experimentally tested constitute only partial support for the HM. To round out support for such a model, additional aspects have to be specified and tested. One such issue is the sensitivity of diagnosticity and connectivity to the format in which the metaphor is introduced, as discussed above. Another major issue, which has not been addressed here, has to do with cases in which the two factors compete; here the question, is, naturally, which factor weighs more heavily than the other. Elsewhere (Shen, 1991a,b) I have briefly addressed this question, by arguing that when the two principles conflict, diagnosticity outweighs connectivity. A case in point is the previously mentioned comparison 'Tom is (like) a tortoise'. Recall that in this case, the immediate property which gets mapped is the attribute (i.e., low connectivity property) 'slowness' of the tortoise, which is preferred over other properties of the 'tortoise schema', including relations such as 'eat(tortoise, vegetables)'. The reason for this preference (as argued in Shen, 1991a,b) is that 'slowness' is higher in its diagnostic value (with respect to the category 'animals') than any of the relations mentioned. To the extent that this case is representative of those where the two factors conflict, then, it turns out that the factor of diagnosticity outweighs that of connectivity. However, the difference found between the robustness of support for the two predictions suggests that such a conflict is sensitive to the format of the metaphor (e.g., 'A is B' vs. other possible formats). Clearly, this issue and others raised here require further research.

4.3. General discussion

The main purpose of the present study has been to highlight the importance of principles of mappability to metaphor interpretation. This aspect of metaphor com-

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, and literary studies of metaphor comprehension. Specifically, the present study emphasizes 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 works 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 for 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 earlier suggest that the likelihood of a property to be mapped is related to its relative salience within its own domain. Thus, for example, the fact that 'slowness' is more likely to get mapped in the metaphor 'Tom is (like) a tortoise', is related to its high salience in the 'tortoise' domain (this relation has been extensively discussed in Shen, 1991a). To the extent that this relation holds, then, one may conclude that diagnosticity and connectivity, as the factors which determine mappability, are those governing the salience of properties.

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