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Cognitive processes involved in metaphor aptness

Abstract: This article looks at metaphor aptness from the perspective of the class-inclusion model of metaphor comprehension and those models that assume a componential nature for the meanings of concepts. When the metaphor *X is a Y* is processed, the concept of *X* is included in a metaphorical class that is represented by *Y*, which is usually the most typical member of the metaphorical class. Degree of saliency of the defining feature in the vehicle and the extent to which this feature matches a relevant dimension of topic is the key factor in the degree of aptness of the metaphor. Degree of aptness becomes more complex in those metaphors that describe an abstract concept in terms of another concept. These metaphors include *X* into a metaphorical class through the mediation of those concepts that are associated to the abstract concept. If the associated concepts have a high degree of typicality in the metaphorical class, they could be better mediators for including the abstract concept into the metaphorical class. The variations of abstract concepts across individuals and their dependency on contexts and cultures could explain why such metaphors may have different degrees of aptness for different people.

Keywords: *Metaphor aptness; Class-inclusion model; Metaphorical class; Abstract concepts; Typicality*

1. INTRODUCTION

Metaphor aptness is a concept that has been widely discussed in the literature of metaphor comprehension. In the metaphor *X is a Y*, degree of aptness refers to the degree of fitness between vehicle (*Y*) and topic (*X*). When a salient feature of the vehicle of a metaphor is attributed to a relevant dimension of topic, that metaphor has a high degree of aptness (Jones & Estes, 2005). Blasko and Connine (1993) define aptness as the extent to which the metaphor expresses its specific nonliteral meaning. Aptness of a metaphorical statement has also been defined as how well that statement captures important features of the topic (Chiappe, Kennedy, & Smykowski, 2003). From the perspective of the class-inclusion model of metaphor comprehension (Glucksberg, 2001, 2008; Glucksberg & Haught, 2006a, 2006b; Glucksberg & Keysar, 1990; Glucksberg, McGlone, & Manfredi, 1997; Honeck, Kibler, & Firment, 1987), vehicle of a metaphor (*Y*) is a typical member of a category in which topic (*X*) is included, and the extent to which the topic matches this category is aptness of the metaphor. According to this model, the metaphor *X is a Y* is understood as a class-inclusion statement that places *X* and *Y* into a common class of entities. In this metaphorical statement, *Y* is the

most typical member or one of the most typical members of this metaphorical class. How well *X* fits this class determines aptness of this metaphor. In other words, aptness of a metaphor can be seen as the degree to which *X* is a member of the metaphorical class represented by the typical member *Y*. For example, in the metaphor *my lawyer is a shark*, both *my lawyer* and *shark* are included into a common class of entities that are vicious, aggressive, and tenacious (Glucksberg, 2001; Glucksberg & Keysar, 1990, 1993; Glucksberg, McGlone, & Manfredi, 1997; Glucksberg, Manfredi, & McGlone, 1997; Glucksberg, Newsome, & Goldvarg, 2001). Here, *shark* is a typical member of a metaphorical class that may include a large number of members. Aptness of this metaphor is the extent to which *my lawyer* fits this metaphorical class. It must be noted that the term *shark* may represent several metaphorical classes, depending on the topic of the metaphor and the context in which the metaphor is used. When the metaphor *my lawyer is a shark* is used, it represents a metaphorical class that includes all vicious, aggressive, and tenacious people and animals. When the metaphor *that swimmer is a shark* is used, it represents a metaphorical class that includes all good swimmers. In fact, it is the topic that determines which metaphorical class of *shark* is intended.

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The findings of a number of studies have suggested that aptness of a metaphor is the key factor that determines speed of metaphor processing (Blasko & Connine, 1993; Chiappe & Kennedy, 1999; Chiappe, Kennedy, & Chiappe, 2003; Glucksberg & McGlone, 1999; Jones & Estes, 2005, 2006). In another study, Thibodeau and Durgin (2011) found that rating of a metaphor aptness is affected by the presence of salient features that do not apply to the topic of the metaphor. Such findings indicate that aptness of a metaphor is dependent on an interaction between semantic features of topic and vehicle. Since distributed models of conceptual representation assume a componential nature for the meanings of concepts, they may help us to obtain a clearer understanding of the factors that are involved in metaphor aptness. In the following section, these models are reviewed briefly. Then, the discussion is extended to metaphor aptness in order to present a picture of what happens when a highly-apt metaphor is processed in the mind of a comprehender.

2. DISTRIBUTED MODELS OF CONCEPTUAL REPRESENTATION

Distributed models of conceptual representation are a group of models that assume the whole meaning of a concept consists of smaller units of meaning; that is, meaning of every concept is a combination of smaller units of meaning which are called features, properties, or attributes (Taylor, Devereux, & Tyler, 2011). According to these models, every feature of a concept is represented by a node in a connectionist network, and the processing of that concept involves the coactivation of those nodes that represent features of that concept (Caramazza, Hillis, Rapp, & Romani, 1990; Masson, 1995; McRae, de Sa, & Seidenberg, 1997; Moss, Tyler, & Taylor, 2007; Tyler & Moss, 2001; Tyler, Moss, Durrant-Peatfield, & Levy, 2000; Vigliocco, Vinson, Lewis, & Garrett, 2004). In other words, from the perspective of these models, semantic space of a concept consists of small constituents that are connected to each other in a complex network. When a concept is processed in the mind of a comprehender, features of that concept or nodes that represent features of that concept in the neural network are activated.

Here, we are faced with a question: Is it possible for some features of a concept (or the term that represents that concept) to be activated while other features are inhibited? If that happens, we can assume that meaning of that concept depends on what features are activated and what features are inhibited. In other words, a given term *X* may have a variety of meanings depending on what features of the concept are activated and what features are inhibited. Glucksberg, Newsome, and Goldvarg (2001) suggest that when a term is interpreted in its metaphorical sense, those features which are metaphorically- or contextually-irrelevant are inhibited throughout processing. For example, when the metaphor *my lawyer is a shark* is processed, some features of shark such as “the ability to swim” and “having fins”, which are metaphorically-irrelevant, are inhibited (Glucksberg et al., 2001; Onifer & Swinny,

1981). Gernsbacher, Keysar, and Robertson (1995) propose that the understanding of a metaphor involves attenuating or suppressing those features of metaphor’s vehicle which are metaphorically- or contextually-irrelevant. Keysar (1994) uses the term “elimination” to describe a similar process through which contextually-inappropriate alternatives of meaning are suppressed.

Drawing on these proposals and the class-inclusion model of metaphor comprehension, Khatin-Zadeh and Vahdat (2015) suggest that metaphorical class of a given term is defined by one or at most several salient semantic features. They add that when the metaphor *X is a Y* is processed, *X* is included in a metaphorical class represented by *Y*. In fact, this metaphorical class is exemplified by the typical member *Y*. According to Glucksberg (2003), a given term may have a dual-reference function: literal and metaphorical. For example, in the literal sense, the term *jail* refers to a building that is used to keep criminals; in the metaphorical sense, this term refers to all confining and restrictive situations. In the sentence *the president spent two years in the jail*, the term *jail* is used in its literal sense. On the other hand, in the sentence *my job is a jail*, this term is used in its metaphorical sense. Khatin-Zadeh and Vahdat (2015) propose that the metaphorical sense of *jail* is defined by the single semantic feature of “being restrictive and confining”. The other features of *jail* such as “having walls” and “having guards” do not have any role in this metaphorical class. Therefore, these features are suppressed when this term is used in its metaphorical sense. Now we are in the point to discuss the main questions of the article: What makes a metaphor highly-apt? How do topic and vehicle interact and create a highly-apt metaphor? The following section looks at these questions on the basis of assumptions of distributed models of conceptual representation and class-inclusion model of metaphor comprehension.

3. METAPHOR APTNESS

As mentioned, degree of aptness of the metaphor *X is a Y* depends on the extent to which topic matches the vehicle. In other words, metaphor aptness depends on the extent to which topic matches the category or the class that is represented by the typical member *Y*. From the perspective of the proposal suggested by Khatin-Zadeh and Vahdat (2015), it can be said that the feature that defines the metaphorical class of *Y* plays a key role in metaphor aptness. This feature is highly salient in *Y*. It defines a metaphorical class which has a set of members. All members share this feature. However, degree of saliency of this feature is not the same for all members. In some members, this feature has a higher degree of saliency. These members of metaphorical class have a higher degree of typicality in the metaphorical class. If these members are placed in the topic position of the metaphor, the metaphor will have a high degree of aptness. In other words, in the metaphor *X is a Y*, the concept of *X* is included in a metaphorical class represented by *Y*, which is the most-typical member (or one of the most

typical members) of metaphorical class. If X has a high degree of typicality in this metaphorical class, the metaphor will be highly apt. Degree of typicality depends on the extent to which the defining feature of metaphorical class is salient in X . If the defining feature of metaphorical class is not salient in X , the metaphor X is a Y will not have a high degree of aptness. In such a case, X does not match the metaphorical class. It must be noted that matching or fitness between topic and vehicle does not mean similarity between topic and vehicle. In fact, as Trick and Katz (1986) found, metaphors were rated as most apt when there was high dissimilarity between the higher order categories of topic and vehicle, but the topic and vehicle had similar characteristics within those categories. This would make sense for a metaphor such as *my lawyer is a shark*, because the higher-order categories, “occupation” and “animal”, are dissimilar, but lawyers are vicious relative to other occupations and sharks are vicious relative to other animals. In this way, lawyer still matches the metaphorical class of “vicious things” exemplified by shark.

An example could make the point clearer. In the metaphor *rumor is a virus*, the metaphorical class is defined by the single semantic feature of “rapid spread”. This metaphorical class is represented by *virus*. Other features of *virus* such as “being the cause of diseases” and “being very small” have an important role in this metaphorical class. When this metaphor is processed, those nodes that represent metaphorically-irrelevant features are not activated in the neural network of the comprehender. Since the feature of “rapid spread” is salient in *rumor*, this term has a high degree of typicality in the metaphorical class. In fact, when the metaphor X is a Y is processed, both X and Y are included in a single metaphorical class. The term Y is a highly-typical member of the metaphorical class. According to Ortony’s (1979) saliency imbalance model, the metaphor X is a Y attributes a highly-salient feature of Y to X . He adds that this feature is very salient in Y but less salient in X . Although the high saliency of this feature is the key factor, degree of saliency of this feature in X is also important in the aptness of the metaphor. In the metaphor *rumor is virus*, the feature of “rapid spread” is also salient in *rumor*. Therefore, this metaphor is highly apt. One question that may be raised here is how class-inclusion model can account for emergent semantic dimensions or features in metaphor. Several works have indicated that semantic dimensions or features that are intended in a metaphor may not be characteristic of either the topic or the vehicle (e.g., Becker, 1997; Gineste, Indurkya, & Scart, 2000; Utsumi, 2005). For example, the metaphor *his lectures are sleeping pills* indicates that the lectures are boring. In fact, the intended semantic dimension of this metaphor is the feature of “boring”. But, the salient feature of *sleeping pills* is that it makes people sleepy. How can the class-inclusion model explain this? In order to answer this question, it must be noted that the two states of “being sleepy” and “being bored” share many physical and psychological similarities. It is this similarity and topic-

-vehicle interaction that help us to identify the intended semantic feature and to interpret the metaphor.

Since every concept has a set of semantic features, the nature of relationship among these features may play an important role in metaphor aptness. Among distributed models of conceptual representation, the connectionist attractor network model gives us a picture of semantic space of concepts, and the ways that semantic features of concepts interact with each other. The following section looks at metaphor aptness from the perspective of this model.

4. THE CONNECTIONIST ATTRACTOR NETWORK MODEL

The connectionist attractor network model holds that the strength of correlation among features is a critical factor in the semantic space of every concept (Cree, McNorgan, & McRae, 2006; McRae & Cree, 2002; McRae, Cree, Westmaccot, & de Sa, 1999; McRae et al., 1997). The findings of the study conducted by Cree et al. (2006) provided strong support for this model. They found a privileged status for highly distinctive features when a concept is processed in the mind of a comprehender. Based on their findings, they conclude that highly-distinctive features of a concept are activated before weakly-distinctive ones when that concept is processed. It has been suggested that the activation of a salient distinctive feature of a metaphor’s vehicle forms a metaphorical class and functions as a filter that prevents the activation of metaphorically-irrelevant features (Banaruee, Khoshshima, Khatin-Zadeh, & Askari, 2017; Khatin-Zadeh, Eskandari, Banaruee, & Marmolejo-Ramos, 2019; Khatin-Zadeh, Khoshshima, & Yarahmadzahi, 2018). In fact, the activation of that node that represents the salient distinctive feature is so strong that suppresses the activation of metaphorically-irrelevant features (weakly-distinctive features).

A question that may be raised is why the activation of the highly-distinctive feature does not prevent the activation of weakly-distinctive features when a term is understood in its literal sense. Here, the interaction between topic and vehicle of the metaphor is critical. In fact, if the defining feature has a high degree of saliency in both topic and vehicle (the saliency is higher in the vehicle compared to topic), other features, which are less distinctive and less salient, are suppressed. In fact, the saliency of a distinctive feature in the topic and vehicle could explain why metaphors are understood through a suppressive-oriented mode of processing. When a metaphor is processed, a large set of features and their corresponding nodes in the neural network are suppressed (Banaruee et al., 2017). On the other hand, when a term is understood in its literal sense, all of its semantic features and their corresponding nodes in the neural network are activated. In other words, the literal interpretation of a term involves a highly receptive mechanism of processing. The key factor that makes the metaphorical interpretation a suppressive-oriented mechanism of processing is the co-occurrence of topic and

vehicle. When a semantic feature is salient and distinctive in two co-occurring terms, the other features of these terms tend to be suppressed. In this situation, the metaphorical meaning is activated in the mind of comprehender, and other features that collectively define the literal meaning are suppressed. Another question that may be raised is the metaphorical description of abstract concepts. According to Lakoff and Johnson (2003), metaphors are usually used to describe abstract concepts in terms of concrete ones. Next section deals with this question that how an abstract concept could be included in a metaphorical class that is represented by a concrete concept.

5. METAPHORICAL DESCRIPTION OF ABSTRACT CONCEPTS

Abstract concepts are those concepts that do not have bounded, clearly perceivable, or easily identifiable referents (Borghi, Binkofski, Castelfranchi, Cimatti, Scorolli & Tummolini, 2017). On the other hand, concrete concepts such as chair and bag have easily identifiable referents that can be perceived through our senses. A chair can be seen and touched. Concrete concepts can easily be perceived through visual, audio, taste, haptic, and olfactory channels. Compared to concrete concepts, abstract ones are more detached by our sensorial experience (Fernandino, Humphries, Seidenberg, Gross, Conant, & Binder, 2015). Distributed models have been very successful in explaining how abstract concepts are represented (Andrews, Frank, & Vigliocco, 2014). Based on these models, meaning of a concept is derived from the relationships between associated words (see Louwerse & Jeuniaux, 2010). Since distributed models assume that meaning is captured by associations between concepts, they do not posit any significant difference between abstract and concrete concepts (Borghi et al., 2017). But, how can we present a clear picture of the processes through which abstract concepts are metaphorically understood in terms of concrete ones?

In the metaphor *X is a Y* that describes an abstract concept (*X*) in terms of a concrete concept (*Y*), those concepts that are associated with the abstract concept could play a mediatory role in the understanding of the metaphor. In fact, the semantic features of associated concepts could play a mediatory role between the abstract concept and the metaphorical class that is represented by the concrete concept. When such a metaphor is processed, a metaphorical class is created on the basis of a semantic feature of *Y*. The associated concepts function as a bridge between the abstract concept and the metaphorical class. For example, the metaphor *memory is a warehouse* describes the abstract concept of memory in terms of the concrete concept of warehouse. Here, the concept of warehouse is associated with a large number of things. In fact, all things that are stored could be considered as associated concepts. These concepts function as a mediatory bridge between the abstract concept of memory and the concrete concept of warehouse. During the processing of this metaphor, the semantic features of “storing

something” and “retrieval of something” define a metaphorical class. The abstract concept of memory is included in this metaphorical class. This inclusion is done through the mediation of a large number of concepts that can be stored in a warehouse.

This proposal is consistent with the Context Availability Theory, according to which abstract concepts are weakly associated to a wide range of contexts and concepts (Schwanenflugel, Harnishfeger, & Stowe, 1988; Schwanenflugel, Akin, & Luh, 1992). This theory holds that concrete concepts, in contrast to abstract concepts, are strongly associated to a smaller range of contexts (Schwanenflugel et al., 1988). When the metaphor *memory is a warehouse* is processed, the concept of *memory* is understood through the mediation of a wide range of concepts that can be stored in a warehouse. Therefore, the processing of this metaphor may involve partial or weak activation of a large number of contexts. In fact, this can explain why abstract concepts are weakly associated to a large number of contexts and concepts. The activation of a large number of contexts and concepts makes the understanding of abstract concepts a pretty loose mechanism of processing. This process is loose because the abstract concept is understood through the mediation of a potentially large number of associated concepts and contexts. The following section looks at degree of aptness of those metaphors that describe an abstract concept in terms of a concrete one.

6. APTNESS OF ABSTRACT/CONCRETE METAPHORS

As mentioned, in the metaphor *X is a Y* that describes an abstract concept in terms of a concrete one, the abstract concept of *X* is included in a metaphorical class that is represented by the concrete concept of *Y*. This metaphorical class is defined by a salient feature of *Y*. For example, the metaphor *rumor is virus* includes the abstract concept of *rumor* into a metaphorical class represented by the concrete concept of *virus*. Although *virus* cannot be seen without microscope, it is a concrete concept and it has a lot of concrete associations. It can spread rapidly in the three-dimensional space. The feature of “rapid spread in the three-dimensional space” defines a metaphorical class in which the concept of *rumor* is included. There are a large number of concepts that have this feature. All of them could be included in this metaphorical class. The associated concepts could play a mediatory role in the process of including *rumor* into the metaphorical class. Several studies have investigated abstractness/concreteness of topic and vehicle of metaphors (e.g., Al-Azary & Buchanan, 2017; Kintsch, 2000; Xu, 2010). Results of an experiment conducted by Al-Azary and Buchanan (2017) indicated that concreteness of topic of a metaphor could affect the online processing of that metaphor. Xu (2010) found that comprehenders assessed a larger number of topic-vehicle similarities for metaphors with abstract topics than for metaphors with concrete topics.

A critical question is the list of associated concepts may be different for different comprehenders. This list

depends on the past experiences of the individual. As Barsalou (1987) says, abstract concepts are more shaped and are more dependent on past experiences, situations, and cultures compared with concrete concepts. This could particularly be the case with the metaphorical description of abstract concepts in terms of concrete concepts. This could explain why degree of aptness of a metaphor may be different for different individuals. In fact, depending on past experiences of the individual and the contexts in which that concept has been understood, the list of associated concepts may be different. If the associated concepts have a high degree of typicality in the metaphorical class, they could be better mediators for including the abstract concept into the metaphorical class. Borghi et al. (2017) emphasize that abstract concepts are more variable than concrete ones; that is, there is more disagreement among people when they are asked to produce associations and characteristics of abstract concepts. This could make the aptness of abstract/concrete metaphors more variable compared with those metaphors that describe a concrete concept in terms of another concrete concept. To summarize, degrees of aptness of those metaphors that describe an abstract concept in terms of a concrete one could be variable across individuals and cultures.

7. CONCLUSION

This article looked at factors that are involved in the aptness of metaphors. When a salient feature of the vehicle, which is the defining feature of the metaphorical class, is attributed to a relevant dimension of topic of the metaphor, that metaphor has a high degree of aptness. Therefore, aptness of a metaphor is dependent on an interaction between semantic features of topic and vehicle. In fact, vehicle of the metaphor is usually the most typical member of the metaphorical class, and the defining feature of the metaphorical class has the highest degree of saliency in the vehicle compared with other members of the metaphorical class. But, degree of saliency of the defining feature in the vehicle and the extent to which this feature matches a relevant dimension of topic play an important role in the degree of aptness of the metaphor. The discussion was extended into the nature of metaphor processing. Metaphorical interpretation, in contrast to literal interpretation, is a mainly suppressive-oriented mechanism of processing. It was suggested that the saliency of a certain feature could explain why metaphors are understood through the inhibition of metaphorically-irrelevant features. In fact, the saliency of this feature in both topic and vehicle and the way that they connect to each other through this salient feature could be the reason behind the suppression of metaphorically-irrelevant features.

Finally, the process of understanding an abstract concept in terms of a concrete concept was discussed. It was suggested that the concepts that have some kind of association with the abstract concept could play a mediatory role in such metaphorical descriptions. When these metaphorical statements are processed, the semantic features of associated concepts could play a mediatory role between the abstract concept and the metaphorical

class that is represented by the concrete concept. The associated concepts function as a bridge between the abstract concept and the metaphorical class. Degree of aptness of a metaphor that describes an abstract concept in terms of a concrete one may be different for different individuals. Since abstract concepts are largely dependent on the past experiences of individuals, contexts, and cultures, the list of concepts that are associated to an abstract concept may be different for different individuals. This is particularly the case with metaphorical descriptions of abstract concepts. In the metaphorical description of abstract concepts, if the associated concepts have a high degree of typicality in the metaphorical class, they could be better mediators for including the abstract concept into the metaphorical class. The variability of abstract concepts across individuals and their dependability on contexts and cultures could explain why those metaphors that describe an abstract concept in terms of another concept may have different degrees of aptness for different individuals.

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