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A cognitive perspective on basic generic metaphors and their specific-level realizations

Abstract: By conducting an examination of the mapping process in metaphor comprehension, this article suggests that a set of superficially different metaphors can be considered to be isomorphic to an underlying generic metaphor. In other words, a set of seemingly different metaphors with different domains can be categorized under a single generic metaphor. The generic metaphor is in the general form of *X is in some kind of semantic relationship with Y*. When this generic metaphor is realized in specific-level forms, a number of metaphors are produced which are isomorphic to each other, although their domains could be completely different in appearance. In other words, there is a deep homogeneity among a set of concretely different metaphors. A generic metaphor can be seen as a semantic frame for all specific metaphors that are isomorphic to it. Since base and target domains of a given metaphor can be very different in terms of concrete features, the mapping of the base into the target must be mediated by the domain of its underlying generic metaphor.

Keywords: *Mapping; Metaphor comprehension; Generic metaphor; Isomorphic, Base domain; Target domain*

1. INTRODUCTION

The term “isomorphism” has been used with different meanings across various disciplines. In this paper, isomorphism is defined as a kind of structural similarity between two concretely different constructs; that is, while two constructs are superficially different in terms of concrete features, they are structurally homogenous at an abstract level. When looked at in terms of concrete and easily-observable properties, the two constructs appear dissimilar; however, when viewed in terms of skeleton, their abstract structural similarities become clear. Two isomorphic constructs are homogeneous in terms of the way that their components combine together to create a construct. However, these constructs could be completely different in terms of their concrete, superficial, and readily-perceptible features. If a comprehender is going to reveal the isomorphic relationship between two constructs, s/he has to go beyond the surface features of these constructs and discover the abstract or hidden structure that lies behind these easily-perceptible features. The hidden structure can be discovered by a filtering process whereby the concrete features of the construct are discarded. After the filtering of concrete properties, what remains is an abstract structure

based on which the components of the construct are connected to each other. This abstract structure is somewhat similar to what Fauconnier and Turner (1998) call *generic space*. They define *generic space* as a structure that belongs to two (or more) input spaces. In their blending theory, Fauconnier and Turner argue that the structure of two mental spaces can be projected to a third space, which is referred to as a blend space.

Presenting four simple examples, Khatin-Zadeh and Vahdat (2015) suggest that any analogy made between two isomorphic constructs is mediated by an abstract structure rather than by a direct comparison between the two constructs. In fact, the abstract construct is a barren structure extracted from a number of concrete structures to show how these apparently dissimilar concrete structures are similar to one another on an abstract level. In other words, an abstract structure is the representation of all concrete structures at the abstract level. Jamrozik, McQuire, Cardillo, and Chatterjee (2016) propose that repeated metaphoric use drawing on concrete experience may result in the development of abstract representations. They add that these abstract representations can be utilized to understand new situations. In the ensuing sections, the embodied theory of cognition and its key concepts are

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reviewed. Following which we will proceed with the discussion to show how the concept of isomorphism can be connected to or even incorporated into this theory.

2. EMBODIED THEORY OF COGNITION

Embodied simulation has been one of the most widely discussed theories in cognitive science over the past two decades. One of the principal ideas in this theory is that our cognition and linguistic performance are mainly directed by embodied simulation processes (Gibbs & Colston 2012). In the words of Barsalou (2008, p. 618), embodiment is the “reenactment of perceptual, motor, and introspective states acquired during interactions with world, body, and mind.” According to this theory, understanding or retrieving a concept is guided and supported by some degree of sensory-motor simulation of the concept (Binder & Desai 2011). The theory of embodied semantics says that the same sensory-motor circuitries are involved in both understanding a concept and its enactment (Aziz-Zadeh & Damasio 2008). For example, the same sensory regions are involved in both the understanding of the concept of *running* and the actual action of *running*. According to this theory, verbs such as *kick* and *pick* are represented in those areas of the brain that are used to perform these actions (Hauk, Johnsrude, & Pulvermüller 2004). Hearing a verb involves the activation of those regions of the brain that control those body parts performing the action (Fischer & Zwaan 2008; Watson, Cardillo, Ianni, & Chatterjee 2013).

The findings of several lines of research have supported embodied simulation theory. The results of one study showed how appropriate bodily actions improve semantic judgments for action phrases (Klatzky, Pelligrino, McCloskey, & Doherty 1989). The findings of another study conducted by Stanfield and Zwaan (2001) demonstrated how comprehenders mentally represent the orientation of a referent object when understanding a sentence such as *Put the pencil in the cup*. Some works in cognitive linguistics have demonstrated that at least some abstract concepts are understood through embodied metaphorical terms (Gibbs 2006; Lakoff & Johnson 1999). As Gibbs and Colston (2012) say, many abstract ideas (such as *justice*) are metaphorically structured in terms of concrete domains that are deeply rooted in recurring aspects of embodied experiences (for example, justice is a physical balance between two entities). Describing an abstract domain in terms of a concrete domain facilitates the process of understanding. Results of two studies (Gibbs, Gould, & Andric 2006; Wilson & Gibbs 2007) showed how people’s comprehension of metaphorical phrases (such as *grasp a concept*) is accelerated when they first make a grasping movement or even imagine the action of grasping.

3. MAPPING OF DOMAINS IN METAPHORS

Metaphors are understood on the basis of describing one domain (target) in terms of another domain (base or source). In other words, one domain stands for or

symbolizes another domain. In the process of comparison between two domains, a one-to-one correspondence is created between elements in the base domain versus elements in the target domain. For example, when the metaphor *Discipline is fertilizer* is used for a school student, a set of mappings or one-to-one correspondences is built between components in the *discipline* domain versus components in the fertilizer domain. Gentner (1983) argues that metaphors are understood on the basis of relationships between various elements in the base and target domains; that is, relations between elements in the base domain are mapped onto relations between elements in the target domain. The process of mapping has been extensively discussed in the literature of cognitive science (for example, Turner 1987; Lakoff & Turner 1989; Sweetser 1990; Turner 1991; Forbus, Gentner, & Law 1994; Fauconnier 1997; Wolff & Gentner 2011). Nie and Chen (2008) illustrated how the concept of *water* can metonymically and metaphorically be extended to six super-domains. In any metaphorical mapping between base and target domains, we can distinguish between two types of mapping: the mapping of single elements from the base domain onto elements in the target domain and the mapping of relations from the base domain onto relations in the target domain. This distinction has been shown in Figure 1.

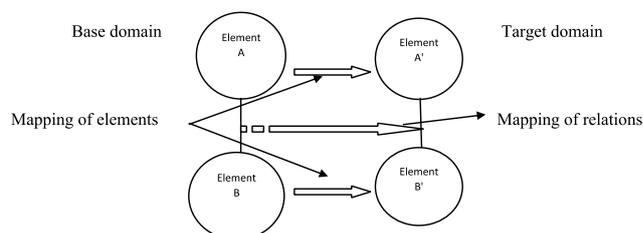


Figure 1. Mapping of elements and relations

In the case of the metaphor *Discipline is fertilizer*, the following mappings can be conceived between the two domains:

Discipline \longleftrightarrow Fertilizer

Student \rightarrow Plant

Progress in knowledge \rightarrow Growth of the plant

Acquiring knowledge \rightarrow Acquiring nutrients

Success as a result of acquiring knowledge \rightarrow Fruits (crops) produced by the plant

Knowledge \rightarrow Nutrients

The metaphors *Books are foods* and *Goals are engines* are similar to the aforementioned metaphor. In all these metaphors, one thing is the cause of a positive change (some kind of growth) in another thing. As *fertilizer* is the cause of physical growth in plants, *discipline* is the cause of progress in studying for a school student; as *engine* is the cause of movement of a car, our *goal* motivates us to be active and to work harder. In all such metaphors, base and target domains can be considered as the specific-level realizations of a high-level generic domain in which *X is the cause of a positive*

change (some kind of growth) in *Y*. When this generic domain is realized in specific forms, the following sentences are produced:

Fertilizer is the cause of physical growth (Base domain)
 Discipline is the cause of progress in studying (Target domain)

Food is the cause of physical growth in humans (Base domain)
 Book is the cause of increase in knowledge (Target domain)

Engine is the cause of movement of cars (Base domain)
 Goal is the cause of motivation and progress for humans (Target domain)

Each pair of the sentences can be considered as the basis for the creation of a metaphor. Therefore, it can be said that the base and target domains in metaphors are the specific-level realizations of a high-level generic domain. This high-level underlying domain is realized in various specific-level domains. In the previously addressed examples, the high-level generic domain has been realized in six specific-level domains. Every pair of specific-level domains (one playing the role of the base domain and another one playing the role of the target domain) produces a metaphor. These metaphors and many other metaphors can be regarded as the realizations of a single generic domain or a single high-level generic metaphor. The generic metaphor functions as a frame for the low-level specific metaphors. A question that may be raised here is that not all metaphors are in the general form of *X is a Y*. How can this proposal explain metaphors that are not in the general form of *X is a Y*? To answer this question, it should be noted that some high-level generic metaphors have a variety of linguistic realizations that have different forms. For example, the specific-level metaphor *The lovers passed a difficult long road together* is not in the general form of *X is a Y* in appearance and at a linguistic level. But, at a conceptual level, this metaphor is one realization of the basic generic metaphor *Life is a journey*. Similarly, the metaphor *He attacked my argument* is not in the general form of *X is a Y* in appearance and at a linguistic level. But, at a conceptual level, this metaphor is one realization of the basic generic metaphor *Argument is a war*. In fact, every metaphor can be expressed as *X is a Y* at a deep or conceptual level, although it may have a variety of forms at a surface linguistic level.

To further illustrate this, another example might be helpful. Suppose there is a company whose existence, income, and growth are dependent on acquiring information about the behaviors and interests of its customers. When we use the metaphor *Information is blood* to refer to the activities of this company, we mean that as blood is essential for humans and carries food and oxygen to the cells of the body, information is necessary for the expansion and growth of the company. Here, the blood domain plays the role of the base domain and the information domain plays the role of the target domain.

As the *blood* is the carrier of food and oxygen for the cells and the cause of a positive change in the body (growth and development in the base domain), *information* is critical for a positive change in company (growth and developments in the target domain). Again, we see the same high-level generic domain of the previous examples has been realized in two low-level specific domains. The mapping of the base onto the target has generated the metaphor *Information is blood*. It must be noted that one specific-level realization of a basic generic metaphor may be a conventional metaphor, while another specific-level realization of that generic metaphor may be novel. Although it has been argued that the processes involved in the understanding of conventional and novel metaphors are different (Giora, 1997), one can argue that the conventional specific-level metaphor of a basic generic metaphor may help in the process of understanding a novel specific-level metaphor of that basic generic metaphor. In other words, when a novel metaphor and a conventional metaphor are the specific-level realizations of a single basic generic metaphor, the conventional metaphor may facilitate the process of understanding the novel metaphor.

4. DEEP HOMOGENEITY OF SPECIFIC-LEVEL DOMAINS

As already discussed, metaphors are understood by the creation of some kind of similarity between two domains. In most cases, these two domains are concretely very different from each other. In the metaphor *Information is blood*, elements of two domains and the nature of relationship between elements in the domains are concretely or superficially different. In appearance and in terms of easily perceptible features, it is hard to find any similarity between two domains. The base domain includes human body, cells, vitamins, foods, etc.; the target domain includes customers, companies, employees, buying, selling, advertisement, etc. The question raised here is how these two apparently different domains can be considered to be homogenous in the mind of a comprehender. Understanding one domain in terms of another involves the simultaneous understanding of both domains and bridging the gap between them. According to the embodiment theory, understanding different domains involves the activation of different areas of the brain. Every metaphor can be understood on the basis of a cross-domain bridge between the base and the target. The bridge that connects two superficially different domains (or different patterns of neural activity in the brain) might be an abstract domain that is isomorphic to both domains (khatin-Zadeh & Vahdat 2015). The existence of this abstract domain is supported by the facilitation of metaphor processing after a period of repeated encountering with isomorphic domains. In fact, when a comprehender is repeatedly faced with a set of isomorphic domains, s/he has less difficulty in discovering the same abstract structure in new or un-encountered domains. The generic domain is the generator of a single generic metaphor. When the generic domain is realized in various specific domains, a set of

specific-level metaphors are produced. In the generic domain of the discussed examples, we have the single generic metaphor *X is the cause of a positive change (some kind of growth) in Y*. Here, nothing is said about *X* and *Y* and their domains. This is the generic form of a metaphor in which nothing is said about the concrete properties of *X* and *Y*. When *X* and *Y* receive concrete features, a set of specific metaphors are generated (*Discipline is fertilizer, Books are food, Goals are engines, Information is blood, etc.*). Therefore, the generic form of a metaphor can be viewed as a leading metaphor from which a set of specific metaphors originate. All these specific-level metaphors can be grouped under their leading or underlying generic metaphor. Results of two studies have suggested that when one specific-level of a generic metaphor is primed with another specific level of the same metaphor, the process of understanding that metaphor is facilitated (Khatin-Zadeh & Khoshsima 2021; Khatin-Zadeh, Khoshsima, Yarahmadzahi, & Marmolejo-Ramos 2019).

The critical question is the representation of a generic domain in the neural system. If this generic domain is going to mediate between various concrete domains, it must be represented somewhere in the neural system. Discovering the deep homogeneity between two concretely different domains must involve something beyond the activation of those neural networks which represent base and target domains. Base and target domains have their own representation within the neural system. A connection or a comparison between these representations must be mediated by the representation of the generic domain. When facing a new metaphor not heard before such as *I live with football* (referring to a crazy football lover), the abstract form of the metaphor (*X is the cause of a positive change in Y*) is activated. Therefore, the process of understanding a new metaphor might involve the activation of a pre-existing basic generic metaphor. The idea of generic metaphor activation is supported by the findings of several metaphor prime studies (for example, Gernsbacher, Keysar & Robertson 1995; Galinsky & Glucksberg 2000; Glucksberg, Newsome & Goldvarg 2001). The results of these studies suggest that the metaphorical use of a given word (or domain) activates metaphor-relevant information of that word (or domain), including those parts of information which are related to the nature of relationship among components of that domain. In fact, metaphor-relevant information and generic domains are activated when a word (domain) is used in its metaphorical sense, while metaphor-irrelevant information is inhibited (Glucksberg et al 2001). The formation of a basic generic metaphor is a gradual bottom-up process. When a comprehender is faced with a set of similar metaphors, their generic form (and its generic domain) is derived through an inductive process. This basic generic metaphor and its generic domain are the base for understanding new metaphors within the same category. After the formation of basic generic metaphor in the mind, metaphor comprehension becomes a top-down process. In this top-down or deductive process, specific metaphors are derived from a single underlying generic metaphor. In other words,

specific domains are derived from a single underlying generic domain (Figure 2). Similarly, the concrete metaphors *Faith is fortress, Father is umbrella, Alcohol is a crutch, and Law is a shelter* can be conceived as the specific forms of the generic metaphor *X is the protector (some kind of reliance) of Y*. It must be noted that in the generic form of metaphor, *X* and *Y* belong to the same generic domain. The base and the target are the concrete realizations of this domain. The mapping of the base onto the target leads to the comprehension of the specific metaphor.

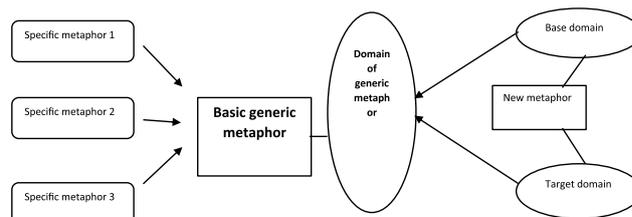


Figure 2. Formation of basic generic metaphor and mediation of its domain between new domains

5. UNIVERSAL METAPHORS AND GENERIC FORM OF METAPHORS

The final point that must be addressed is that the generic form of metaphors discussed here are different from universal metaphors. Every universal metaphor includes a specific base and target. However, it can appear in various forms in a given language and even across languages. These metaphors have been extensively discussed by Lakoff and Johnson (2003) and Kövecses (2005). One of such metaphors is *The angry person is a pressurized container*. This universal metaphor has been studied in various languages, including English (Kövecses 1986; Lakoff & Kövecses 1987), Chinese (King 1989; Yu 1998), Japanese (Matsuki 1995), Zulu (Taylor & Mbense 1998), and Polish (Micholajczuk 1998). In this metaphor, the base (*pressurized container*) and the target (*angry person*) are fixed. However, these metaphors can be realized in various forms, such as:

Results of election made his blood *boil*

He *blew his top*

The president *blew off steam*

When he heard the results, he *exploded*

On the other hand, every generic metaphor has a unique generic domain that is realized in various specific forms. In other words, specific domains derived from a single generic metaphor can appear in a variety of forms. While these domains can change in terms of concrete features, the nature of semantic relationship between two elements in each domain remains consistent. For example, when the generic metaphor *X is the cause of a positive change (some kind of growth) in Y* is realized in concrete forms, a number of specific domains are produced, several of which have been shown in Table 1.

Table 1. Concrete domains

Target domain	Base domain
<i>Discipline</i>	<i>Fertilizer</i>
<i>Book</i>	<i>Food</i>
<i>Goal</i>	<i>Engine</i>
<i>Information</i>	<i>Blood</i>

In each domain, one entity is the cause of a positive change in another entity; *discipline* is the cause of progress in school work, *fertilizer* is the cause of growth in plants, *book* is the cause of increase in knowledge, *food* is the cause of physical growth in the human body, etc. It can be seen that the semantic relationship between two elements in every domain is the same. Therefore, metaphors produced by each pair of corresponding domains can be considered to be isomorphic to (or to have originated from) the generic form of the metaphor.

6. CONCLUSION

This article suggested that a set of superficially different metaphors can be considered to be isomorphic to an underlying generic metaphor. Four examples were discussed, all of which were isomorphic to the generic metaphor *X is the cause of a positive change (some kind of growth) in Y*. Target and base domains of these specific metaphors can be viewed as the concrete forms of this metaphor's generic domain. The generic domain functions as a conceptual or semantic frame. Every specific metaphor is understood by the activation of its generic metaphor; that is, any comparison between two specific domains (base and target of specific metaphor) is mediated by the activation of their underlying generic domain. Therefore, a set of concretely different metaphors with different domains can be categorized under a single generic metaphor with a generic domain. The basic generic metaphor is in the general form of *X is in some kind of relationship with Y*. The concrete realization of this generic metaphor produces a set of specific metaphors, all of which are isomorphic to their underlying generic metaphor. In other words, although specific metaphors have different domains, they are isomorphic or homogenous at an abstract level. Every basic generic metaphor can be regarded as the origin of a set of metaphors with different domains. This proposal, which can be regarded as an extension of the conceptual metaphor theory, predicts that when two metaphors are the specific-level realizations of a certain basic generic metaphor, understanding one of them could facilitate the understanding of the other in a priming context. Results of a recent study have provided evidence that confirms this prediction (Khatin-Zadeh & Khoshshima, 2021). From the perspective of the embodiment theory, the representations of base and target domains in the neural system must be mediated by the representation of generic domains, because patterns of neural activities that represent base and target domains are often completely different. *Goal* is

a static concept; on the other hand, an engine is a concept associated with movement and power. However, the metaphor *Goals are engines* is easily comprehended, because these two superficially different domains are bridged by the activation of a generic domain in which one entity is the cause of a positive change (in this case, movement) in another entity. A full description of the mechanisms through which generic metaphors are formed is the question that remains to be answered.

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