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Why are Motions Effective in Describing Emotions?

Abstract: *The domain of motion events is widely used to metaphorically describe abstract concepts, particularly emotional states. Why motion events are effective for describing abstract concepts is the question that this article intends to answer. In the literature of the field, several reasons have been suggested to be behind the suitability of motion events for describing these concepts, such as high concreteness of motion events, their high imageability, and the ability of comprehender to simultaneously imagine components of motion events. This article suggests that motion events are particularly effective for metaphorical description of those domains which have the feature of dynamic change over a period of time. This is particularly the case with emotional states. Since changes in emotions take place throughout a period of time, they could best be described by motion events which have the same feature. In other words, the continuous change in emotions is understood in terms of continuous change in the location of a moving object in the 3D space. Based on the arguments of embodied theories of cognition, it would be no surprise to see the involvement of similar areas of the brain in understanding emotions and motions.*

Keywords: *motion events, emotions, abstract concepts, imageability*

Introduction

Metaphor, the ubiquitous feature of language, is an effective tool for communication. It is very difficult to find an area of language in which metaphor plays no role. The nature of metaphor itself and the processes through which it is understood have been widely discussed by researchers in recent decades. In every discussion about metaphors, perhaps the first question that comes to mind is the essence of metaphor. Lakoff and Johnson (2003) say that metaphor understanding is essentially a process in which a domain is understood in terms of another domain. That is, one domain (target) is described or represented by another domain (source). This process can be seen as a kind of transformation through which the target domain is transformed into source domain (Khatin-Zadeh, Banaruee, Khoshsima, & Marmolejo-Ramos, 2017). This transformation is the key to facilitating the understanding of target domain. In fact, a more-difficult-to-understand domain is represented by a less-difficult-to-understand domain. This is the main argument of Ortony's (1979) salience imbalance model, according to which metaphors are used to understand less familiar domains in terms of more familiar domains.

A question that is raised here is the characteristics and the nature of source domains. Among various types of domains that are used as the source domains of metaphors, 3D space is especially interesting. A large number of metaphors use 3D space to describe various types of concepts. This is particularly the case with those metaphors that describe abstract concepts in terms of 3D space. Another group of metaphors that might be more complex are those that describe concepts in terms of motion events in the 3D space. These metaphors are more complex because they add the element of motion to 3D space. In fact, all tools in 3D space in addition to elements of motion events are employed to describe the target domain. In the following two sections, metaphors that use 3D space as the source domain and metaphors that use motion events in the 3D space as the source domain are discussed.

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Using 3D space as the source domain

As was mentioned, in many metaphors, 3D space is used as the source domain. The metaphor *I'm feeling up today* describes the state of happiness as being in a high point in the space. In fact, in many metaphorical descriptions, good things tend to be understood as *up*, whereas bad things tend to be understood as *down* (Mier & Robinson, 2004; Schnall & Clore, 2004). The findings of a number of behavioral studies have indicated that spatial representations contribute to our conceptualization of number (Dehaene, Bossini, & Giraux, 1993; Fisher, 2003) and time (Boroditsky, 2001; Casasanto & Boroditsky, 2003; Casasanto, Boroditsky, Philips, Greene, Goswarmi, Bocanegra-Thiel, Santiago-Diaz, Fotokopoulo, Pita, & Gil, 2004; Núñez & Sweetser, 2006; Torralbo, Santiago, & Lupiáñez, 2006). According to Boroditsky (2000), the domains of space and time share the same conceptual structure. However, the findings of a recent study indicated that although the description of time in terms of space has many universal features, there are some cross-cultural and cross-individual differences (Leone, Salles, Pulver, Golombek, & Sigman, 2018).

The role of 3D space in describing abstract concepts such as affect, goodness, power, rank, and value (Casasanto & Lozano, 2006; Meier & Robinson, 2004; Schubert, 2005) has particularly attracted a lot of attention among researchers. It has been shown that emotion-related words are placed in different areas of 3D space depending on their valence (Marmolejo-Ramos, Elosúa, Yamada, Hamm, & Noguchi, 2013; Montoro, Contreras, Elosúa, & Marmolejo-Ramos, 2015). The idea of an association between vertical plane and emotionally valenced concepts has been supported by the findings of several studies (For example, Sasaki, Yamada, & Miura, 2015; Xie, Huang, Wang, & Liu, 2015). In another study, it was found that while positive valenced words are placed apically, negative valenced words are placed basally (Marmolejo-Ramos, Correa, Sakakar, Ngo, Ruiz-Fernández, Butcher, & Yamada, 2017). Results of this study indicated that the concepts of joy, sadness, and surprise are associated with high, low, and intermediate vertical locations, respectively. Meier and Robinson (2004) found that understanding positive words facilitates the detection of upper stimuli, and understanding of negative words facilitates the detection of lower stimuli. Similarly, Xie, Wang, and Chang (2014) reported that positive words promote the discrimination of upper arrows, while negative words promote the discrimination of lower arrows. Based on these results, they concluded that affective words might activate spatial information and cause comprehenders to draw their attention to corresponding locations in the space.

The findings of studies on handedness have suggested that right-handed people place positive and negative items rightwards and leftwards, respectively (Casasanto, 2008; 2009; Casasanto & Chrysikou, 2011). On the other hand, left-handed participants of this study were found to reverse this pattern. According to Casasanto (2009), specific features of our bodies might have some degree of influence on our mental representations of objects and actions. For example, actions (such as hitting a ball) that are performed with our dominant hand might have different neurocognitive representations in right-handed and left-handed individuals (Longcamp, Anton, Roth, & Velay, 2005).

Using motion events as the source domain

In many metaphors, motion events are used to describe non-motion concepts, particularly abstract concepts. Describing static situations through motion events has been seen as evidence that language and cognition are geared toward dynamism and change (Talmy, 2000; Langacker, 1990). To take an example, the abstract concept of life is understood as a journey in the metaphor *Life is a journey*. The concept of journey is essentially a motion event. The starting point of this journey is birth, the ending point is death, the travelers are human beings living in this world, ups and downs are happy and sad moments of life, and hurdles of this journey are difficulties of life (Khatin-Zadeh et al., 2017). Discussing the concept of non-actual motion, Blomberg and Zlatev (2014) suggest that the three different features of human consciousness – enactive perception, visual scanning and imagination – are the main motivations behind using non-actual motion sentences. In non-actual motion sentences such as "*The road goes through the forest*" and "*He was uplifted by her smile*", a situation lacking actual motion is understood through motion events or dynamic terms (Zlatev & Blomberg, 2016). They add that this concept is more compatible with the situated cognition approach (Blomberg & Zlatev, 2015) than explanations such as mental simulation.

Among various types of concepts that are described by motion events, emotions have a special place. The close relationship between the domains of motion and emotion is shown by the presence of many metaphorical expressions (for example, *My heart dropped*) across languages denoting affective processes through expressions referring to physical motion (Zlatev, Blomberg, & Magnusson, 2012). Since emotions are associated with human psychological state, they have a highly abstract nature. The relationship between emotions and other abstract concepts has been the subject of a number of works in the literature of the field. It has been suggested that abstract concepts are predominantly grounded in affective experiences (Vigliocco, Kousta, Della Rosa, Vinson, Tettamanti, Delvin, & Cappa, 2014). This is consistent with Lakoff's (2015) view about the reasons behind the prevalence of metaphors in describing affective states. In the metaphor *He hit the roof*, the changes that take place in human psychological state are understood as an upward movement. In Persian, the metaphor *He went up and came down* is used to describe the emotional state of angriness. In this metaphor, a combination of upward and downward movements is used to describe angriness. In many languages of the world, the emotional changes that take place during angriness are metaphorically describes as an explosion. For example, in Persian,

the metaphor *He exploded* means that 'He suddenly became very angry'. In this metaphorical description, several elements are involved. One of these elements is the movements of particles in all directions when explosion happens. Therefore, angriness is described by a variety of movements. It could be described by an upward movement, a combination of upward and downward movements, or even a combination of movements in all directions. However, in the case of explosion metaphor, there are some other elements that are involved in the metaphorical description, such as the sound of explosion and the heat that is produced when explosion happens. This is perhaps one of complex metaphors in which a set of elements are used to describe a concept. Such metaphors are more descriptive because a single domain is simultaneously described in terms of several concepts. This could make the metaphor more powerful and more effective.

Pragmatics and function of emotion metaphors

The pragmatics and function of emotion metaphors is a subject that has been widely discussed throughout the past two decades. Why we use emotion metaphor and what function these metaphor have in our daily lives are two important questions that have attracted a lot of attention. Wood, Lupyan, and Niedenthal (2015) propose that emotion metaphors and emotion words primarily serve a regulatory function. That is, labeling emotions through metaphors and emotion words helps people reduce the intensity of their emotions. In fact, we widely use non-emotion concepts in metaphorical descriptions of emotions in order to regulate or control our emotional states. This can explain why most languages have a larger number of negative than positive emotion words (Schrauf & Snachez, 2004). We use more negative than positive emotion words because it is generally more desirable for us to regulate and control our negative emotions (Wood et al., 2015). According to Fainsilber and Ortony (1987), people use more metaphors to talk about intense emotions than about mild emotions. Gibbs, Leggit, and Turner (2002) propose that emotion metaphors are particularly useful for describing nuances of emotional states. It has been argued that metaphors are effective for describing emotions because they can present a vivid picture of actual physical experiences that accompany emotional states (Ortony, 1975). That is why emotion metaphors are widely used across various languages. The following section discussed several examples of such metaphors.

Using motion events to describe emotions across cultures

There are some other emotional states that could be described by motion events in a variety of directions. The metaphor *My heart dropped* is one of such metaphors that uses a downward movement to metaphorically describe a sudden change in emotional state. The metaphor *I'm running out of patience* uses a horizontal movement to describe the emotional state of someone who is losing his/her patience. In this metaphor, the state of 'being patient' is described as an area in the space, and the individual moves out of this area along the horizontal direction. In some metaphorical descriptions by motion events, the direction of movement is not explicitly encoded in the motion verb or other words that are used in the metaphor. When we use the metaphor *My heart dropped*, the direction of movement is encoded in the main verb. When we use the metaphor *He hit the roof*, the direction of movement is not encoded in the verb; however, the word *roof* indicates that this movement is in upward direction.

In some metaphors, the direction of movement is not mentioned. For example, the Persian metaphor *He went into another world* describes a profound change in the emotional state. In this metaphor, the direction of movement is mentioned neither in verb nor in the adverbs. Therefore, the important point is movement from a starting point (before emotional change) to an ending point (after emotional change). The direction of movement has no role in this metaphor. The English metaphor *He entered into a state on unconsciousness* describes a change in the psychological state in terms of a motion event. This metaphor encodes the direction of movement in the verb *enter*. This verb indicates that the direction of movement is from an outside area into an inside area. Similar universal or near-universal metaphorical descriptions have been found across unrelated languages (Emanatian, 1995; Kövecses, 2000; Yu, 1995). To take another example, the Hungarian metaphor *The time for action has arrived* uses a motion verb that encodes the goal of movement (Kövecses, 2005). The verb *arrive* indicates the goal of a moving object, although there is no mention of direction. In the metaphor *The angry person is a pressurized container*, the emotional state of angriness is described in terms of a concrete non-motion concept. This metaphor has been studied in English (Kövecses, 1986; Lakoff, 1987; Lakoff & Kövecses, 1987), Chinese (Yu, 1998), and Polish (Micholajczuk, 1998). The English metaphors *You make my blood boil*, *Simmer down*, and *Let him stew* are some realizations of this conceptual metaphor.

Features of motion events

An important question that might be raised about the metaphorical descriptions of abstract concepts in terms of motion events is that why motion events are suitable domains for such descriptions. Khatin-Zadeh et al. (2017) suggest three features that make motion events suitable domains for this type of description: 1) motion events are highly concrete; 2) they are highly imageable; 3) their components can be imagined simultaneously in a 3D space. They suggest that these three features of motion events help us to transform highly abstract concepts into domains which have a higher degree of concreteness. In this way, we can obtain a better understanding of abstract concepts. However, there might be other features that make motion events effective domains for understanding unfamiliar domains. A review of the components involved in any motion event might help us to identify these potential

features. Every motion event includes a moving object, a starting point, an ending point, a path of movement, and a cause of movement. In addition to these, manner and time of movement can also be considered as the features of any motion event. This article specifically focuses on time of movement as a key feature of motion events for metaphorical description of abstract concepts.

Every motion event take place over a period of time. Throughout this time, the location of moving object changes continuously. In other words, every motion event is a dynamic system of elements. At any moment, the position of moving object is different from its position at other moments. However, there are some elements that do not change throughout the course of movement. The starting point, the ending point, and the path of movement are elements that do not change during the period of movement. Manner of movement might or might not change. In other words, any motion event is a system consisting of dynamic and inert elements. These special features of motion events make them suitable for describing those domains which have the same features. This is particularly the case with emotional states. Since changes in emotions take place along a period of time, they could effectively be described by motion events which have the same features. In fact, human emotional state is a dynamic domain that could have dramatic fluctuations over a certain course of time. For example, the metaphor *He hit the roof* describes the process of 'becoming angry' as a rapid movement from the ground to the roof. When the individual is on the ground, s/he is not angry. When s/he has hit the roof, s/he is on the peak of angriness. The process of becoming angry takes place over a period of time. This period of time is metaphorically set in correspondence with the time that the individual moves from the ground to the roof. In this metaphorical description, the process of becoming angry is understood as a dynamic event. That is, over a period of time, the individual becomes increasingly angry until the time that s/he is on the peak of angriness. This dynamic increasing process is metaphorically set in correspondence with the dynamic process of an upward movement, in which the place of moving object at any moment is higher than its place at previous moments.

Motion events and emotions

If it is assumed that similar domains are understood through similar modes of processing, it can be predicted that the processes that are involved in the understanding of motion events and emotions would share some similarities. This is particularly the case with metaphor understanding. Gallese (2003) and Gallese and Lakoff (2005) argue that the same neural patterns that are involved in the understanding of the concept *Y* are also involved in the metaphorical understanding of *X* in terms of *Y* in the metaphor *X is a Y*. They even claim that the understanding of metaphorical expressions such as *Kick off the year* and *Grasp the idea* involve the activation of motor areas that are used in actual actions of kicking and grasping (Gallese & Lakoff, 2005). According to Lakoff (2016) and Aziz-Zadeh and Gamez-Djokic (2016), there is a link between linguistic metaphors and emotions. For example, when the concept of disgust is metaphorically related to a situation, patterns of neural activities have been found to be similar to those that take place during a physical response to disgust (Gamez-Djokic, Narayanan, Bergen, Davis, Sheng, & Aziz-Zadeh, 2013). Commenting on this proposal, Robertson and Whitaker (2016) say that the suggestion that some emotions are embodied via an association between neural networks of sensations and neural circuitry dedicated to linguistic metaphor is questionable.

Since emotions and motion events could be considered as corresponding or isomorphic in several ways, the processes that are involved in their understanding could share some similarities. This is in agreement with the findings of a number of empirical studies. The results of an fMRI study conducted by Moseley, Carota, Hauk, Mohr, and Pulvermüller (2012) indicated that motor areas are activated during the processing of abstract-emotional nouns. Based on their findings, they concluded that the activation of frontocentral motor systems in the dorsal stream reflects the semantic binding of sign and meaning of emotion-related words. Results of another study revealed the functional necessity of primary/pre- and supplementary motor areas for the processing of abstract-emotional nouns (Dreyer, Frey, Arana, von Saldern, Picht, Vajkoczy, & Pulvermüller, 2015). Similar views have been discussed in a number of other works (For example, Barsalou & Wiemer-Hastings, 2005; Moseley et al., 2012; Pulvermüller, 2013).

As was mentioned, in a metaphorical description, the target domain is represented and understood by source domain. In order to be an effective describing domain, the source domain must share some kind of similarity with the target domain. In addition to this, the source domain must be familiar to the comprehender, and its understanding must be easy for her/him. If these conditions are not met, the metaphorical description would not be effective, and the understanding of metaphor would be difficult for the comprehender. Three-dimensional space is one of the most familiar domains for all of us. This domain has a high degree of concreteness and imageability. Since every motion event in 3D space reflects a change in location, motion events could be good options for representing those domains which include some kind of change. For example, in the domain of emotional states, the changes in emotions could best be described by the changes in the locations of a moving object in the 3D space. From one perspective, all domains that involve some kind of change could be considered as isomorphic domains. All of these domains could metaphorically be understood through the mediation of motion events in the 3D space. In addition to having a high degree of concreteness and imageability, motion events are highly familiar for all of us. They could effectively represent those domains which involve some kind of change. Therefore, it would be no surprise to see the involvement of the same area of the brain

in the understanding of change-based domains (such as emotional states) and motion events.

Summary

This article discussed those features of motion events that make them effective for describing abstract domains. It was suggested that those domains in which a dynamic process occurs throughout a period of time could effectively be described by motion events. Motion events are good options for metaphorical description of such domains because they share some critical features. Motion events are essentially dynamic systems in which the position of a moving object changes continuously over a period of time, although that period might be very short. Therefore, the state of every motion system is different from its state at any other moment over that period of time. This dynamism is the critical feature of motion events that is set in correspondence with the changes that take place in some abstract domains such as emotional states. Motion events and body movements are two types of domains that share a lot of similarities. Both groups involve the movement of an object along a path over a period of time. Therefore, similar areas of brain could be involved in the movement of body parts and in the processing of motion events. This is a claim that is supported by embodied theories of cognition. When an abstract concept is metaphorically understood in terms of a motion event, the sensorimotor areas of brain are activated. This is particularly the case with emotions. Body movement, motion events, and emotions share a lot of similarities. In fact, they could be considered as the realization of a single domain in which an entity is in a dynamic state over a period of time.

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