

## The Metaphorical Representation of Affect

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Philosophers and psycholinguists have argued that abstract concepts like affect are represented via the mechanism of metaphor. This review investigates this contention, specifically within the context of social-cognition and clinical psychology research that has studied the link between affect and brightness, vertical position, and distance between the self and an object. The review will be particularly concerned with automatic and incidental linkages between affect and perception and their relevance for a variety of affective phenomena related to evaluation, mood, and emotional behavior. The cumulative data reveal that the metaphorical representation of affect has considerable merit. For this reason, the review suggests an expanded research agenda including (a) other perceptual experiences (such as those related to taste and temperature), (b) potential cultural variations, (c) neuroimaging research, and (d) the elucidation of “real world” consequences.

Popular slang and common metaphors often pair affect with perceptual experiences (Gibbs, 1994; Kövecses, 2000). Such associations appear to be prevalent regardless of whether one examines evaluations, moods, or emotional behavior. For example, considering evaluation and brightness, the epitome of evil, Satan, is known as the “prince of darkness,” whereas Jesus, the essence of goodness, is known as the “light of the world.” Regarding mood states, a day filled with happiness or elation is referred to as a “bright day,” whereas an extended bout of sadness or depression is characterized as a “dark time.”

There are also many examples that pertain to affect and vertical position. Considering evaluation, good movies are typically given a “thumbs up,” whereas bad movies are typically given a “thumbs down.” Extending this analysis to mood states, happy people are said to feel “up,” whereas sad people are said to feel “down.” Indeed, it is somewhat telling that “depression” refers both to an extended period of negative mood states as well as a lower vertical position within physical space (Webster’s, 1996).

Affect can also be explained in terms of the distance between oneself and an object. For example, a “close” relationship is one that is beneficial, whereas a “distant” relationship is one that is not. Extending this analysis to emotion, feeling “close” is marked by emotions related to love, friendship, and compassion. By contrast, feeling “distant” is marked by an absence of such feelings. The ubiquity of distance metaphor suggests that people frequently conceptualize their affective states in terms of physical distance.

## METAPHOR AND REPRESENTATION

Why would the abstract concept of affect so often be associated with perceptual experiences? One view of the association between perceptual experience and connotation is based on developmental research. Piaget and Inhelder (1969) have suggested that cognitive development begins with sensorimotor experiences. Children learn to think about things that they can see, hear, feel, taste, and smell. As children age, they develop the ability to think in more abstract terms. Such abstract thoughts appear to be built on prior sensorimotor experiences.

From a developmental standpoint, more generally, three factors make it likely that affect and perception will be linked through metaphors. One, as suggested in the previous paragraph, early information processing is concrete and later cognitive developments use such scaffolding. Two, the physical world introduces biased covariations between affect and perception. Related to stimulus brightness, for example, social (e.g., interaction) and physical (e.g., food) rewards are more prevalent during the daytime. By contrast, humans are not well equipped to deal with potential dangers in the darkness. Therefore, it is not surprising that bright perceptual input becomes linked with positive affect, whereas dark perceptual input becomes linked with negative affect. Three, we grow up in a culture in which metaphor is pervasive, especially in connection with affect (Kövecses, 2000). Repeated communications linking affect and perceptual attributes can reinforce and strengthen prior linkages and generally shape social reasoning in profound but subtle ways.

According to Lakoff and Johnson (1980, 1999), metaphors are more than simply convenient for understanding abstract concepts. They argue that conceptual thought is almost always grounded in physical metaphor in a manner that is relatively implicit (for related views, see also Allbritton, 1995; Gibbs, 1992, 1994;

Katz, Blasko, & Kazmerski, 2004; Kövecses, 2000). Indeed, they contend that the neurological processes that are responsible for abstract thought are intimately bound with the neurological processes that are responsible for representing perceptual experiences. In this sense, it may be that our ability to represent abstract experiences (e.g., affect) is, in part, built on our ability to represent perceptual experiences (e.g., brightness, vertical position, distance). This pairing of affect with perceptual experiences allows one to conceptualize affect in terms (physical) that are more easily understood by perceiving organisms. Although Lakoff and Johnson's (1999) ideas are controversial (e.g., Murphy, 1997), other psycholinguists do seem to agree that physical metaphors are at least useful in the representation of abstract concepts (e.g., Glucksberg, 2001).

The metaphorical basis of abstract thought is intuitive, which probably lends to its increasing popularity (e.g., Wilson, 2002). However, an empirically informed psychological science requires more than compiling a list of metaphors, quotes, or poetic expressions (as we have done above). Behavioral studies can determine, with some precision, the scope and automaticity of metaphor–affect linkages (Gibbs, 1994; Rohrer, 2001).

The representational view offered by Lakoff and Johnson (1999) is positioned within the sciences of linguistics and philosophy rather than within a psychologically testable model. However, our reading of this literature allowed us to identify at least three testable propositions emanating from this view. The first testable proposition concerns the underlying theme that affect is structured on the basis of metaphors. If this proposition is accurate, then the manner in which people encode or represent affective stimuli should be biased by the metaphor-consistent physical aspects of those stimuli (e.g., positive stimulus should be encoded faster if they are white rather than black). The second testable proposition concerns the activation of perceptual processes. If affect is represented on the basis of metaphors, then an affective experience should activate the sensory or perceptual processes linked to the metaphor (e.g., a negative evaluation should activate the theme of “downwardness,” which should shift visual attention). The third proposition stems from Lakoff's (1993) view that metaphoric representation is automatic or obligatory rather than voluntary (e.g., the link between a negative evaluation and perceptions of stimulus darkness should occur within automatic perceptual paradigms).

To investigate these three propositions, we turn to research within the area of social-cognitive and clinical psychology. This research is not typically mentioned by supporters or detractors of the metaphor representation view. Although this research does not involve tasks that require participants to process metaphorical utterances, it does investigate affect and sensations–perceptions that are linked via common metaphors. These investigations should be ideal for determining the scope of metaphor representation within the affective domain. Although there are many metaphors that relate affect and perceptual experiences, a survey of the available literature reveals that at least three perceptual dimensions are frequently investigated. These associa-

tions pertain to brightness, vertical position, and distance. We review each of these three associations separately and will attempt to determine how well the evidence supports the three propositions mentioned previously. Before commencing, it is worth noting that metaphor was not the central theoretical construct or concern in much of the reviewed research. Nonetheless, we believe that it can be readily applied to the ideas related to metaphor representation.

### AFFECT AND BRIGHTNESS

The association of brightness with affect is common in popular culture. American film characters are often dressed in black if they are evil and white if they are good (e.g., *Star Wars*). In a broad sense, being in a dark place is and has been depicted as undesirable. This contention seems to be true to a certain extent throughout the history of Western and Eastern thought. The Bible, Buddhist writings, and the Hindu Upanishad often pair evil with darkness and good with light (Eliade, 1987).

If multiple distinct religions pair goodness with brightness, it seems possible that such associations are culturally universal. Indeed, empirical evidence does seem to support this point. In a study by Adams and Osgood (1973), participants from 20 countries (e.g., Japan, Germany, Afghanistan, or Thailand) were asked to evaluate a number of colors (black, gray, red, yellow, blue, green, or white). In all 20 countries, white was evaluated positively whereas black was evaluated negatively. In evolutionary psychology, such cross-cultural convergence would be taken as an indication of an evolutionary process.

Developmental research has revealed a similar association between evaluation and brightness. In a study by Stabler and Johnson (1972), African American and Caucasian preschool children were asked to evaluate desirable (e.g., a lollipop) and nondesirable (e.g., plastic vomit) objects. Following these evaluations, the objects were supposedly placed within either a white box or a black box. Children were asked to point to the box likely containing each object. Regardless of the race of the child, children tended to guess that positive objects were in the white box and that negative objects were in the black box. The fact that this association occurred regardless of race suggests that a preference for white objects is not specific to the Caucasian ancestry.

In a related study, Stabler, Johnson, and Jordan (1971) used prerecorded positive (e.g., "I am smart") and negative (e.g., "I am scared") self-statements that were played with equal intensity to two speakers: one painted white and one painted black. African American and Caucasian children were told that each statement was only being played over one speaker. Their task was to point to the speaker through which each statement was broadcast. Overall, the children had a tendency to indicate they heard the positive statements coming from the white speaker and the negative statements coming from the black speaker. In sum, there is evidence that

young children associate evaluation with brightness in a manner that is consistent with the aforementioned religious texts.

Another revealing study was conducted by Frank and Gilovich (1988). They asked participants to evaluate lighter and darker professional football and hockey uniforms. The researchers found that teams in dark uniforms were rated as more malevolent than teams in light uniforms. Frank and Gilovich (1988) reasoned that such an association might influence the likelihood of receiving a penalty within actual sporting contests. To determine if this was true, the authors studied penalties within a 17-year period (1970–1986). As expected, teams with darker uniforms received more penalties; also, the penalties often involved prohibited aggressive actions (e.g., slashing another player with the hockey stick). Interestingly, during the 1979–1980 season, the Pittsburgh Penguins wore blue uniforms in the first 44 games but changed to black uniforms in the final 35 games. Penalties in the first 44 games averaged 8 min, whereas penalties in the final 35 games averaged 12 min, a significant difference.

Frank and Gilovich (1988) contended that there are two reasons why teams in black uniforms are penalized more often. One, referees judge players in black uniforms more harshly. This is consistent with the first study in that players in darker uniforms are seen as more malevolent regardless of actual behavior. Two, however, the authors also suggested that players donning darker uniforms may actually act more aggressively due to implicit associations between a dark uniform and malevolent intent. Some support for this idea was found in Study 4 of Frank and Gilovich (1988), in which undergraduates donned white or black uniforms prior to selecting competitive games that they would supposedly play with another participant. The undergraduates donning black uniforms chose more aggressive forms of competition.

These prior studies are consistent with metaphors linking affect and brightness. They support the first proposition noted earlier, namely that affect is structured via physical metaphor, which biases judgments in a metaphor-consistent manner. However, the preceding studies have little to say about the second and third propositions. The second proposition contends that affect activates perceptual processes whereas the third proposition contends that the pairing of affect and brightness is automatic or obligatory. An obligatory association is one that is built into the knowledge retrieval functions of the brain so that thinking necessarily means activating metaphor-based associations. Gibbs (1992) has suggested that metaphor does indeed bias elementary mental operations related to retrieving and using stored knowledge. Others, however, have suggested that metaphor may be a postretrieval phenomenon (Glucksberg, 1998). To test these competing accounts, it is necessary to use cognitive reaction time paradigms such as those related to semantic priming or compatibility manipulations.

Meier, Robinson, and Clore (2004) set out to test if the associations between affect and brightness are obligatory or voluntary (i.e., the third proposition). In a series of six studies, these researchers asked participants to evaluate 100 words pre-

sented on a computer screen. The stimuli consisted of 50 positive (e.g., hero) and 50 negative (e.g., criminal) words. The words were randomly presented one at a time in either a black or white font. Meier et al. (2004) found that negative words were evaluated faster and more accurately when presented in a black (vs. white) font, whereas positive words were evaluated faster and more accurately when presented in a white (vs. black) font.

The results of the Meier et al. (2004) studies suggest that affective evaluations activate perceptions of stimulus brightness. Thus, when the stimulus color is consistent with prevalent metaphors (i.e., good–white; bad–black), evaluations are facilitated. By contrast, when the stimulus color is inconsistent with prevalent metaphors (i.e., good–black; bad–white), evaluations are delayed. Because the manipulation of font color was completely uninformative in the particular context and the font color was irrelevant to the task at hand, the Valence  $\times$  Font Color interactions are informative in suggesting that metaphors linking affect and brightness are obligatory rather than voluntary.

Evidence for the second proposition (i.e., the metaphor-consistent activation of perception following an affective experience) was found by Meier, Robinson, and Ahlvers (2005). In a series of five studies, Meier et al. (2005) found that the explicit evaluation of positive and negative words led to a metaphor-consistent bias in brightness judgments. These researchers had participants evaluate positive or negative words presented in varying shades of grayscale. After each evaluation, participants were asked to match the brightness of the word to one of five squares that varied in shading (one of which was a direct match). Even though the shading of the words randomly varied (i.e., there was no systematic bias), participants tended to report that positive words were brighter than negative words. In other words, affective evaluation led to a metaphor-consistent bias in brightness judgments.

In summarizing the work on affect and brightness, behavioral studies with young children establish that there is an early appearing tendency to link positive evaluations to white objects regardless of race. Metaphor can have “real world” consequences as suggested by the finding that sports teams with dark uniforms are penalized more for aggressive behavior. Cross-cultural evidence suggests that affect and brightness are linked in a relatively universal fashion. Reaction time studies highlight the obligatory nature of affect–brightness associations. Finally, brightness judgment studies reveal the activation of metaphor-consistent perception following affective experience. The metaphorical representation of affect appears to be supported within the brightness domain.

#### AFFECT AND VERTICAL POSITION

In addition to brightness, common metaphors also pair affect with vertical position. For example, in the Bible, the righteous go up to Heaven whereas sinners

go down to Hell. Affective states, too, are commonly associated with verticality. Generally, one is “up” when in a happy or buoyant mood state. By contrast, one is “down” when in a sad or depressed mood state. Empirical studies corroborate the relationship between affect and verticality. In an early study, Lundholm (1921) asked participants to draw lines to express the affective tone of several adjectives. Participants were given the freedom to visually depict affective words however they felt appropriate. In the study, there were five words with a negative meaning (*sad, melancholy, mournful, doleful, and sorrowful*) as well as five words with a positive meaning (*merry, cheerful, gay, jolly, and joyous*). Lundholm found that 84% of the lines pertaining to negative feelings displayed a downward directional tendency. By contrast, 58% of the lines pertaining to positive feelings displayed an upward directional tendency. It is quite interesting that the lines seemed to be biased by metaphor representation (up = good; down = bad) even though neither the author nor the participants thought of the task in primarily metaphoric terms.

The Lundholm (1921) study involved stimulus words rather than feeling states. Would similar findings occur in response to a quasi-manipulation of mood states? A study by Wapner, Werner, and Krus (1957) suggests that the answer is yes. In this study, participants were asked to horizontally bisect a luminous square by adjusting a rod. If the rod was placed lower on the square, this would indicate disproportional attention to lower regions of the square. Participants performed the task twice, once before and once after they received midterm feedback. Wapner et al. (1957) made the reasonable assumption that an A on the midterm would produce happiness, whereas an F on the midterm would produce sadness. This assumption appeared to be correct as participants receiving an A were more likely to exhibit signs of happiness, whereas participants receiving an F were more likely to exhibit signs of sadness. Wapner et al. (1957) compared pre-and postfeedback performance and found an upward perceptual shift (on the rod adjustment task) among those who received an A, but a downward perceptual shift among those who received an F.

In a similar study, Fisher (1964) assessed participants’ mood states by having them describe the expressions on a series of facial masks. Participants’ scores ranged from 0 to 8 depending on the number of sadness-related terms they used to describe the masks (*sad, depressed, unhappy, tragic, crying, grieving, worried, and suffering*). Participants next completed two tasks. The first task involved the autokinetic effect. Participants were told to trace the movement of a pinpoint of light in a dark room. The pinpoint of light did not actually move, but observers have a tendency to perceive motion in this paradigm. The second task was very similar to the one used by Wapner et al. (1957) in that it involved adjusting a horizontal luminous rod so that it appeared to bisect an area of visual space. Sad participants, in comparison to a group that did not appear to be particularly sad, exhibited a more downward tracing path in the autokinetic paradigm and adjusted the luminous rod so that it was lower

within visual space. In total, the results provide converging evidence for the idea that mood states bias attention toward regions of visual space that are consistent with prevalent metaphors (i.e., happy = up; sad = down).

In a series of studies, Waxer (1974a, 1974b, 1976) had naive observers watch videotaped interviews involving depressed and nondepressed participants. The observers' task was to rate the level of the interviewees' depression based on nonverbal cues. One of these cues was the vertical angle of their head tilt. In all studies, observers judged that depressed participants had a more declined (i.e., lowered) head tilt in comparison with nondepressed participants. Because the studies involved social interactions, it is possible that the results implicate social avoidance rather than metaphor. However, this would not explain why depressed individuals tilted down rather than up (or right or left).

In an attempt to determine if affect and vertical position are associated in an obligatory manner (i.e., proposition three), Meier and Robinson (2004) conducted two studies. In the first study, participants evaluated the same 100 positive and negative words used in the studies by Meier et al. (2004). The words were presented one at a time in a randomly chosen vertical position either higher (top) or lower (bottom) on a computer screen. Meier and Robinson (2004) found that positive words were evaluated faster when presented at the top (vs. bottom) of the screen, whereas negative words were evaluated faster when presented at the bottom (vs. top) of the screen. In this study, there was no systematic manipulation of the valence of words presented up or down, nor was vertical position relevant to the task at hand. Therefore, the findings point to a relatively obligatory activation of vertical metaphor when evaluating words.

In a second study, the same 100 words were presented one at a time. However, in this study, all of the words appeared in the center of the screen. Meier and Robinson (2004) were interested in the question of whether simply making an evaluation of the centered word would shift attention upward or downward in visual space. To examine this hypothesis, participants evaluated the words by saying "positive" or "negative." Subsequent to making an evaluation, the letter *q* or *p* appeared. The location of the letter was either on the top or bottom of the computer screen, with position chosen at random. As hypothesized, *q/p* discriminations were faster in the top vertical position if a positive word had been presented as a prime. By contrast, *q/p* discriminations were faster in the bottom vertical position if a negative word had been presented as the prime. Such a crossover interaction indicates that simply making an evaluation shifts spatial attention upward or downward in a metaphor-consistent (i.e., proposition two; up = good; down = bad) manner.

Crawford, Ochsner, Drake, and Murphy (in press) revealed that a similar encoding effect occurs with memory in the affect-verticity domain. In their Study 1, these researchers first presented participants with several positive and negative images from the International Affective Picture System (Lang, Bradley, & Cuthbert, 1995). The images appeared on a computer screen in a randomly varied vertical lo-

cation. Each image appeared for 1 sec followed by a 3-sec pattern mask. At this point, each image reappeared. Participants were instructed to place the image on the screen where it had originally appeared. Crawford et al. (in press) found an effect for valence such that participants recalled the positive images as appearing higher on the screen than negative images.

The vertical attention studies of Meier and Robinson (2004) and the memory studies of Crawford et al. (in press) involved word or picture affect and therefore it is an open question whether more dispositional forms of affect also bias covert vertical attention in a metaphor-consistent manner. To investigate this issue, Meier and Robinson (in press) conducted two studies using a selective vertical attention task very similar to the one mentioned earlier. In addition, participants completed a measure of the personality trait of neuroticism and also a depression inventory. These researchers found that participants high in neuroticism and depression were faster to discriminate letters presented toward the bottom of the computer screen, whereas participants low in neuroticism and depression were faster to discriminate letters presented toward the top of the computer screen. Expressed as a correlation, the association between vertical selective attention (i.e., top speed minus bottom speed) and depression was  $r = .56$ . Feeling down, the results suggest, is simply not very compatible with attending up.

In summary, the preceding studies reveal that affect and vertical position are related in a manner that is often surprising, but nevertheless consistent with affective-metaphor representation. These studies support all three propositions noted earlier. Whereas Lundholm's (1921) early study suggests that people represent affect on the basis of verticality (i.e., proposition one), the studies by Crawford et al. (in press), Fisher (1964), Wapner et al. (1957), Meier and Robinson (in press; Study 2, 2004), and Waxer (1974a, 1974b, 1976) reveal that affective experience activates metaphor-consistent perceptual experiences (i.e., proposition two). Finally, Meier and Robinson (2004) revealed that the affect-verticality link is obligatory in nature (i.e., proposition three). The experimental studies enable one to rule out third-variable accounts of the findings whereas the correlational studies suggest that a metaphor-based approach to affect may provide an understanding of relatively chronic forms of affect. The metaphorical representation of affect appears to be supported not only within the brightness domain, but also with the vertical domain.

## AFFECT AND DISTANCE

In addition to brightness and vertical position, there appears to be evidence for the idea that distance between the self and an object pervades common metaphors for affect. A person that we like and know fairly well is depicted as a "close" friend. Similarly, it is common to discuss intimate relationships in terms of the distance between the two partners. For example, regarding a particularly intimate romantic

relationship, we might say a couple is “attached at the hip.” By contrast, a relationship characterized by low intimacy or relationship problems is a “distant” one.

Although many metaphors linking affect and distance seem particular to interpersonal relationships, there is a broader principle here. We seek to minimize the distance between the self and desirable objects, whereas we seek to maximize the distance between the self and undesirable objects. Indeed, approach- and avoidance-related goal activities are often explicitly conceptualized in spatial terms (Miller, 1944), even when the goal itself does not concern spatial relationships at all (Carver & Scheier, 1999). For example, seeking a PhD degree is very dissimilar from seeking a beer from the refrigerator. There is no obvious “movement” involved and yet self-regulation still operates through discrepancy-reducing loops that are conceptualized in terms of physical motions through space (Carver & Scheier, 1999). Approach and avoidance have also been conceptualized as the fundamental axes of emotion (Lang, 1995; Watson, 2000) and emotion-related traits (Carver, Sutton, & Scheier, 2000).

To what extent do metaphors related to movement through space influence affective behavior? This question was the focus of a seminal study by Solarz (1960). Solarz (1960) mounted cards with words printed on them in a frame and then placed this frame in front of participants. The words were positive (e.g., sweet) or negative (e.g., sour) in meaning. Participants were asked to evaluate the words by performing a particular movement of a lever, either forward or backward. Consistent with metaphors related to affect and distance, Solarz (1960) found that participants were faster at initiating movements toward themselves when the words were positive (vs. negative), whereas participants were faster at initiating movements away from themselves when the words were negative (vs. positive). This study suggests that people have an automatic tendency to assume that close objects are positive and that distant objects are negative.

Chen and Bargh (Study 2, 1999) found a similar effect using a task with even more implications for the automaticity of the distance metaphor. In this study, participants were shown positive and negative words, as well as nonwords, one at a time on a computer screen. Depending on the lexical status of the word string (i.e., word vs. nonword), participants were asked to move the joystick either forward or backward. The statistical design involved four cells: positive–forward, positive–backward, negative–forward, and negative–backward. Chen and Bargh (1999) found that participants were faster to pull the lever toward themselves when words were positive, but that they were faster to push the level away from themselves when words were negative. Again, these findings occurred even though the task did not explicitly involve evaluation. These results are relatively strong in suggesting that metaphors related to affect and distance from the self have obligatory consequences for physical movements through space.

In a conceptually related study, Cacioppo, Priester, and Bernston (Study 1, 1993) asked participants to press up from

the bottom of a table or press down from the top of the table while viewing Chinese ideographs. Subsequent to this physical action, participants indicated their degree of liking for stimuli. Pressing up on a table is metaphorically consistent with bringing an object toward the self. By contrast, pressing down on a table is metaphorically consistent with pushing an object away from the self. As expected, liking for stimuli was automatically influenced by the movement direction. Participants liked stimuli more if they had been pressing up on the table (i.e., implicit approach) than if they had been pressing down on the table (i.e., implicit avoidance).

In another study that investigated the affect–distance metaphor, Neumann and Strack (Study 2, 2000) used a creative procedure. These researchers presented words (which were always of the same size) on background graphics that created the illusion that a word was moving forward or backward. They achieved this illusion by using concentric circles that spiraled in a direction that suggested a decreasing or increasing distance between the self and the word. The researchers found that participants were faster to evaluate positive words when these words were placed on an approach-illusion spiral; by contrast, they were faster to evaluate negative words when these words were placed on an avoidance–illusion spiral. An additional study indicated that the same interaction pertained to lexical decisions.

In summary, the results within the distance and affect domain are somewhat clear in suggesting that positive items are represented by “closeness,” whereas negative items are represented by “farness.” The studies support propositions one and three, but fail to demonstrate the prediction offered by proposition two (i.e., that affective experience biases distance perception in a metaphor-consistent manner). Therefore, though existing data do suggest that affect is represented in metaphor by the physical aspect of distance, the results are less compelling when comparing them to the data within both the brightness and verticality domains. One reason for the less compelling evidence within the affect–distance domain could be because the association is less conventional than the associations within the brightness and verticality domains. Indeed, recent research has shown that the manner in which a metaphor is processed depends on its conventionality (Bowdle & Gentner, 2005).

#### SOME IMPLICATIONS OF AFFECTIVE-METAPHOR REPRESENTATION

When considering the cumulative message received from the reviewed research, it seems apparent that the metaphor representation viewpoint has merit, at least within the domains discussed. Later, we present some considerations and implications of the metaphorical representation of affect. Within this section, we will be especially concerned with the underlying component of affective-metaphor repre-

sentation, particularly within the domain of embodied cognition. We will also discuss the directionality of the reviewed associations. In addition, we offer the suggestion that affective metaphor has implication for the alteration of mood states. In a final section of this article, we offer some considerations for future research.

### The Underlying Component of Affective Metaphor

At this point, the curious reader may be wondering about the underlying component of affective metaphor. In other words, what leads to the development of affective-metaphor representation? We believe that existing models of embodied cognition provide some direction on this front. Supporters of the idea of embodied cognition contend that much of human thought and experience is grounded in physical experience. Along these lines, Wilson (2002) proposed that “human cognition, rather than being centralized, abstract, and sharply distinct from peripheral input and output modules, may instead have deep roots in sensorimotor processing” (p. 625). According to this model, it is a mistake to believe that abstract thought and experience function independently of more concrete modes of perception and representation.

Barsalou and his colleagues have increased the interest in the study of embodied cognition through the development of the Perceptual Symbol Systems (PSS; Barsalou, 1999; Barsalou, Simmons, Barbey, & Wilson, 2003; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, in press). Barsalou et al. (2003) stated that amodal models of conception suggest that sensorimotor information is transduced into nonperceptual states, which are further processed during subsequent cognitive operations (e.g., abstract processing). Although such amodal representations may be useful in artificial intelligence research, they fail to capture cognition as it occurs among humans. Instead, they propose the PSS, which is an inherently modal processing system. In the PSS, sensorimotor information is acted on directly by higher level cognitive processes (i.e., without being transduced). Barsalou et al. (2003) contended that conjunctive neurons capture sensorimotor information during the online processing of a stimulus (e.g., the motor act of “grasping” when reaching for a handle). Later, during conceptualization of the stimulus in an offline fashion (i.e., in the absence of the handle), these same conjunctive neurons fire and reenact the sensorimotor state (i.e., grasping) during a simulation. Barsalou et al. (2003) contended that selective attention and memory for the experience allow one to reenact the sensorimotor state in a modality-specific (i.e., embodied) manner even in the absence of the original experience.

A study by Stanfield and Zwaan (2001) provides an example of how the PSS (Barsalou et al., 2003) might function. These researchers asked participants to read sentences about objects in particular spatial orientations. After each sentence, participants had to decide if a subsequent picture included the object mentioned in the previous sentence. Participants were faster at determining if an object was in the

picture if the orientation of the object was the same in the sentence and picture. For example, participants were faster at determining that a vertically drawn pencil was in the preceding sentence if the sentence read “John put the pencil in the cup” rather than “John put the pencil in the drawer.” Reading a sentence about an object caused participants to enact a modal simulation of the object, which later speeded the identification of that object when it was presented in a matched visual format.

The affective-metaphor representation view is consistent with a PSS account (Barsalou et al., 2003). It appears that affective experience might activate conjunctive neurons associated with the sensory or perceptual representation of that experience. One consequence of this activation would be metaphor-consistent behavior. In other words, affective experience (e.g., evaluation, mood states) could activate metaphor-consistent behavior through the neural framework provided by the PSS. Affective-metaphor representation may function because of the use of PSS (Barsalou, 1999).

#### Direction of the Associations

People use metaphor because it is capable of lending some concreteness to experiences that would otherwise be quite difficult to conceptualize (Gibbs, 1994). Central to metaphor theory is the notion that the concrete is useful in representing the abstract, but the abstract is not particularly useful in representing the concrete (Katz, 1992; Lakoff & Johnson, 1999). This analysis suggests that the relation between affect and metaphor is asymmetrical: We need metaphor to conceptualize affect, but we do not need metaphor to conceptualize concrete perceptual experiences. In other words, “*love is a rose*,” but “*a rose is a rose*” (not love).

In many of the studies reviewed, physical variables (e.g., font color) and affective variables (e.g., word valence) were manipulated simultaneously. The interaction of these variables indicates a role for metaphor in online processing. However, such interactions are not necessarily informative concerning the direction of metaphor-consistent behavior. To investigate this issue, Meier et al. (2004) performed two studies. In one study, participants were asked to categorize stimuli as positive or negative; here, a white or black font color served as the irrelevant distractor. In another study, participants were asked to categorize stimuli in terms of white or black font color; here, the word valence served as the irrelevant distractor. The results were asymmetrical in that font color affected evaluation times, but word valence did not affect color categorization times. Conceptually related results were reported in Meier and Robinson (2004), this time involving evaluations and judgments of verticality. These asymmetrical findings suggest that metaphor-consistent priming spreads from perception to affect rather than from affect to perception.

The preceding directional findings pertain to affective evaluations rather than longer lasting affective experiences (e.g., depression). It might be the case that metaphor-consistent associations operate differently when the affect is of a relatively longer temporal duration. For example, mood states or individual differences in depression could bias physical perceptions in a metaphor-consistent manner, precisely because such affective states are consistently present rather than temporally constrained (Clore & Colcombe, 2003). Evidence in favor of this point was found in a study in which individual differences in depression biased attention downward within visual space (Meier & Robinson, in press). Here, the flow of activation appears to be from mood states to visual perception rather than, or in addition to, a flow of activation from visual perception to mood states.

It seems likely that future research will be critical in determining whether metaphor-consistent associations flow in one direction (i.e., from affect to physicality), the other direction (i.e., from physicality to affect), or both. Such research should be sensitive to the duration of affective states as it appears that temporally isolated evaluations (e.g., Meier & Robinson, 2004) operate differently from more extended episodes related to mood states (e.g., Meier & Robinson, in press).

### Can Metaphor-Representation Alter Mood States?

The reviewed research tentatively suggests that manipulations related to perceptual input might be effective in altering mood states. In a prior study (Meier & Robinson, in press), depressed participants were fast to categorize lower vertical stimuli, whereas nondepressed participants were fast to categorize higher vertical stimuli. Although speculative, it seems plausible that selective attention toward lower areas of visual space might reinforce depressive experiences. In part, such an association would be driven by metaphor-representation that consistently links affect and the vertical dimension of perception (e.g., "I feel *down*").

If the preceding points are correct, psychological interventions might reasonably target perceptual inputs. Our lab is investigating whether manipulations requiring one to attend to higher areas of visual space may be effective in combating depressive symptoms. Although this manipulation might on the surface appear to be slightly ridiculous, we note that other authors have emphasized the importance of perceptual input to depressive symptoms. James (1890) concluded that perceptual input played a major role in depressive symptomology. In his words, if one seeks to be depressed, one should "sit all day in a moping posture, sigh, and reply to everything with a dismal voice" (p. 463). Similarly, Teasdale (1993) and Thayer (2003) contended that sensorimotor states that are incompatible with depression, such as vigorous activity, may be effective ingredients to emotion regulation.

The idea that one might bias negative affect by manipulating attention is not entirely novel. MacLeod, Rutherford, Campbell, Ebsworthy, and Holker (2002) con-

ducted a study involving a manipulation of attention either toward or away from threatening objects. These investigators used a spatial probe task with nonthreatening versus threatening word pairs to train attention. One group was trained toward threatening objects by placing spatial discrimination probes regularly in the location of the threatening word. The other group was trained away from threatening objects by placing the same spatial discrimination probes regularly in the location of the nonthreatening word. Although the manipulation did not alter mood, it did alter reactivity to a laboratory stressor, so that training toward threatening words led to more intense negative affect in response to the stressor.

Manipulations of brightness exposure have proven useful in combating depression. One form of depression appears to be driven by seasonal affective disorder. This disorder is associated with depressed affect during fall and winter and, in many cases, hypomania during spring and summer. In treating this disorder, investigators have found that phototherapy is effective (Lee et al., 1998). Phototherapy involves daily exposures to bright light. The treatments appear to be effective in relieving the depressive symptoms associated with seasonal affective disorder (Terman, Terman, & Ross, 1998), antepartum depression (Oren et al., 2002), and depression in general (Kripke, 1998). Although researchers have typically attributed treatment effects to biological factors (e.g., melatonin production or serotonin levels), the research is consistent with metaphor linking positive affect with brightness. A purpose of the present review is to suggest that metaphor might be underappreciated when it comes to affect and emotional experiences.

## FUTURE CONSIDERATIONS

Although the studies reviewed in this article provide support for the metaphorical representation of affect, there is plenty of room for future work. For example, other metaphors for affect that involve taste (i.e., sweet or sour) or temperature (i.e., warm or cold) have not been the subject of much empirical investigation. In determining the influence of metaphor on evaluative processing, we could recommend the procedures of Meier et al. (2004) and Meier and Robinson (2004). Such procedures involve evaluating words with a concurrent manipulation of physical experience. For example, Meier and Robinson (2004) simply presented positive and negative words within lower or higher areas of visual space and found that vertical position influenced evaluation times.

Future research may also seek cross-cultural verification. We reported evidence that affect and stimulus brightness seem to be universally linked (Adams & Osgood, 1973). In addition, there is anthropological, but not cognitive, evidence to suggest that affect and vertical position seem to be universally linked (Schwartz, 1981). To the extent that metaphor and affect are associated similarly across cultures, we gain insight into possible evolutionary mechanisms that might be in-

volved. By contrast, to the extent that metaphor and affect are associated in divergent manners across cultures, we gain insight into the cultural influences on metaphor and affect (Kövecses, 2000).

The affective-metaphor representation view could be further tested within the neuroscience domain. The PSS (Barsalou, 1999) is often put to the test by the use of neuroimaging studies (e.g., Simmons, Martin, & Barsalou, *in press*). This type of research provides results that judgment studies cannot. Within the affective-metaphor domain, neuroimaging studies could definitively support or discount the three propositions mentioned earlier. For example, one type of study could have participants evaluate valenced stimuli during event-related fMRI. Researchers could determine with some precision whether neural regions responsible for brightness or verticality perception are activated during evaluation (i.e., proposition two). Although neuroimaging studies are not crucial to the metaphor-representation account, they would uncover impressive supporting or refuting evidence that judgment and reaction time studies simply cannot provide.

A final basis for future consideration is the investigation of “real world” implications of affective-metaphor representation. This relation appears consistent in the laboratory. However, how does this relation affect behavior, sensation, or perception in naturalistic settings? For example, does brightness, vertical position, or distance affect one’s willingness to interact with specific objects or participate in certain activities? Considering the brightness domain, numerous studies have shown that people have an automatic tendency to associate African Americans with negative evaluations and Caucasians with positive evaluations (e.g., Dasgupta, McGhee, Greenwald, & Banaji, 2000; Greenwald, McGhee, & Schwartz, 1998; Wittenbrink, Judd, & Park, 2001). This review suggests that such associations may be secondary to metaphor that associates darkness with a negative connotation. However, empirical research will be necessary to validate this point.

## CONCLUSION

This review has highlighted congruency effects involving affect and metaphor. Along the way, we have argued that metaphor representation has implications for affect. However, we believe that this empirical research has only begun to “scratch the surface” concerning affective-metaphor representation. We have tried to go beyond anecdotal evidence for such relations and instead have emphasized experimental work. The experimental work in question has examined affect and physical experience in tandem. It is our hope that this article will spur other affect and metaphor research similar to the reviewed studies. Although most of the studies in this article were not conducted to test the metaphorical representation of affect, the studies nevertheless suggest an important role for metaphor representation in affective experience.

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