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**The Effect of Sweet Taste  
Metaphor Optimistic Thinking**

by

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## The Effect of Sweet Taste Metaphor Optimistic Thinking

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### Abstract

We investigated the impact of real (Experiment 1) and imagined sweet tastes (Experiments 2–4) on various measures of situational optimism to explore how the sweetness metaphor extends to predictions about the future. We found that priming sweetness improved both self-reported and real-life situational optimism, regardless of whether the sweet taste was actually sensed or whether it was imagined. Specifically, in Experiment 1, participants who experienced actual sweet tastes indicated higher self-reported optimism than did participants who did not experience this taste. In Experiments 2 and 3, imagining sweetness led to greater self-reported optimism and optimism for a real-life situation (e.g., solving simple math problems), respectively. Finally, in Experiment 4, imagining a sweet taste led to higher optimism about another person's situation (e.g., a recipient of the national basic livelihood guarantee). This study provides preliminary understanding of how the sweetness metaphor influences optimism.

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People draw on knowledge from specific examples and prior experiences in attempting to understand of information. The knowledge used in such sense-making is formed within the stage of abstraction, which involves understanding the abstract concept based on prior learning of a physical concept (Piaget, 1969). A key aspect of the abstraction stage is the metaphor, which is a figure of speech where one or more words for a concept are used outside of its conventional meaning to express a similar concept (Lackoff, 1993). Metaphors are helpful in facilitating fluent high-level cognitive information processing such as language comprehension, categorization, and retrieval, among individuals engaged in conceptualization. However, recent studies have shown that metaphors, beyond their use in philosophy and linguistics, serve as expressions of the multimodal nature of mental representations (Krishna, 2012).

From childhood, people begin their reasoning through sensorimotor experiences such as tasting, touching, hearing, seeing, and smelling. Metaphors can help individuals in developing the ability to abstract sensorimotor experiences via sensorimotor representations (Meier, 2005). Krishna (2014) insisted that bodily states that are metaphorically related to a target induce abstract thought that is grounded in sensory processing in a manner consistent with the metaphor. In this way, metaphor connects sensory experience and thought, and its role may be highly related to that of embodied cognition, which similarly links sensory experience with thought by using the physical experience as a device in the representation, processing, and memory of information (Barsalou, 1999). The essence of embodied cognition concept is that certain sensory and motor systems of the human body influence our thoughts and emotions in daily life (Davis, 2012). More specifically, actual bodily states and simulations of experience influence perception, behavior, and introspection through modality-specific systems in the brain (Niedenthal, 2005). In general, previous research on embodied cognition has focused on how bodily perceptions can

influence the human mind and cognitive processes such as judgment and choice (Barsalou, 2008). Furthermore, people activate both the simulation of prior experience and actual body states in the brain in order to process information. For example, Larson (2013) investigated how physical sensations related to balance metaphorically are linked to the abstract concept of parity. In such situations, metaphor is critical for processing (also, Anderson, 2010).

Recently, researchers have become interested in exploring sensation-rich metaphor in relation to the five basic senses. For example, for vision, Cian (2015) showed that metaphor governs the processing of physical vertical distance, with higher and lower positions being metaphorically inked with emotion and rationality, respectively, in the human mind. In other words, people interpreted the abstract concepts of rationality and emotion using knowledge of a more concrete concept—the vertical location difference between the head and heart. Interestingly, although the people studied knew that “love” was the result of changes in hormone levels, they believed that such emotion was located in the heart. Vertical distance can also serve as a metaphor for power (Schubert, 2005), valence (Meier, 2004) and morality (Meier, 2007). Vision is related not only to distance but also to color. Zarkadi (2013) investigated whether the color white was related to moral judgments. Specifically, participants who were primed with a black and white checkered background (vs. only grey background) made more polarized moral judgments when considering a moral dilemma.

Besides vision, haptic metaphors have been investigated as well, mostly in consumer research. Hong (2012) demonstrated a link between romantic and physical warmth: Physical coldness activated a need for psychological warmth, which in turn led subjects to report an increased liking of romance movies. Furthermore, physically carrying a load has been shown to influence processing of importance (Zhang, 2012).

Experimental research on metaphors related to audition and olfaction remains relatively elusive. Ambient sound (e.g., music heard in hotels or restaurants) can influence consumer mood, actual time spent in a location, perception of time spent, and actual spending (Krishna, 2012), while low-pitched (vs. high-pitched) voices are evaluated more favorably (Brown, 1973) and people who speak more quickly are evaluated as having greater competence and credibility (Stewart, 1982). Regarding olfaction, Laird (1932) infused women's silk stockings with floral smells and measured housewives' preferences for the items. Interestingly, the floral-smelling stockings were preferred over six times more than were the unscented stockings. Recently, Krishna (2014) showed that an imagined cookie scent increases salivation.

Gustatory (i.e., taste) metaphors appear to be highly useful in daily life, and can influence a variety of phenomena, including cognition (Ren, 2014), motivation (Chen, 2012), moral judgment (Eskine, 2012), personality (Ji, 2013), prosocial behavior (Meier, 2012), and phenomenological experience (Chan, 2013). For instance, there is a metaphorical link between spicy taste and anger, with people evaluating strangers who liked spicy foods as more easily angered and people with higher trait anger as more likely to prefer spicy foods (Ji, 2013). Eskine (2011) pointed out that physical disgust generated via bitter taste also generated feelings of moral disgust. The authors interpreted this result as embodying a survival motivation because both types of disgust are adaptations to a harsh environment (Chen, 2012).

We studied another taste metaphor, sweetness. Of the five basic tastes (bitterness, saltiness, sourness, spiciness, and sweetness), sweetness is unique in being almost universally palatable (Meier, 2012). A considerable amount of neurobiological research has determined a strong relationship between sweetness and positive biological responses (Berridge, 1991). For instance, Berridge (2003) examined the effect of pleasant sensations, such as sweet tastes, on brain

reactions. That study found that activity in a subcortical network involving portions of the nucleus accumbens shell, the ventral pallidum, and brainstem generated positive reactions to sweet tastes. Furthermore, oral sucrose exposure (i.e., a sweet taste) was found to increase accumbens dopamine levels (Hajnal, 2004), which is a key biological substrate of romantic love (Fisher, 2005). Steiner demonstrated that human infants exhibit positive facial expressions in response to the sensory pleasure brought by sweet tastes. Most human infants have essentially two patterns of facial expressions in response to tastes (i.e., positive and negative), with sweet tastes normally eliciting a positive reaction, including lip smacking or a series of rhythmic tongue protrusions (Steiner, 1983).

Sweetness metaphors are generally invoked in three contexts: as nicknames for romantic partners, to characterize a kind action, and to describe a nice, friendly, or caring person. In Experiment 1 of Meier (2012), participants were exposed to a picture comprising the face of a stranger and a statement (e.g., “I like honey”) located at the bottom of the picture. They then evaluated the stranger’s personality. The results showed that agreeableness ratings were higher than were ratings of extraversion and neuroticism when the stranger stated a preference for sweet items. Sweetness also positively influences individuals’ evaluations of the personalities of both others and themselves. Meier (2012) later (in Experiment 4) found that participants who tasted sweet chocolate rated their own levels of agreeableness higher than did participants who tasted non-sweet candy. Ren (2014) showed that how sweet taste sensations influence romantic perceptions in a hypothetical relationship. The results showed that participants evaluated a hypothetical relationship more favorably when exposed to a sweet taste (e.g., Fanta) compared to a non-sweet taste control (e.g., water). Overall, there is a strong connection between sweetness and positivity in the human mind.

Based on this background, we assumed that sweetness, which has positive connotations, would positively influence predictions about future situations. Specifically, the embodied metaphor of sweetness would be associated with optimism (i.e., “the expectation that good things will happen” (Scheier, 1985, p. 223)). In general, optimists are defined as people who “expect things to go their way and generally believe that good rather than bad things will happen to them” (Scheier, 1985, p. 219). Research has shown that metaphors used in everyday experiences influence optimism (McConnell, 1993). People who tend to use positive metaphors in family relationships, working, or graduation tend to have a more optimistic outlook (greater optimism) than people who use negative metaphors. Therefore, we predicted that sweetness metaphors would increase optimistic thinking.

### **General Discussion**

This study showed that, just as actually experiencing the taste, imagining a sweet taste can lead to a more optimistic outlook. Thus, the positive connotations of sweetness appear to lead to more positive anticipations about future situations, both for individuals themselves and for others. More specifically, we found that the sweetness metaphor can positively influence predictions of future events. This extends previous studies on the sweetness metaphor, which indicated that it influenced interpretations of the present situation or various phenomena, such as personality judgments (Meier, 2012) or evaluations of others’ romantic relationships (Chen, 2012). Future research might examine the effect of the sweetness metaphor on past situations (e.g., retrieval of information about past events). For example, perhaps the positive connotations of sweetness could help alleviate the pain of recalling negative memories.

One limitation is that we investigated only situational optimism. Optimism has both

situational and dispositional dimensions (Scheier, 1994), with the latter being interpreted as a stable personality characteristic (Andersson, 1996). This means that optimism could influence phenomena across the full temporal spectrum (i.e., from the present situation to the whole lifespan). Therefore, further research might investigate how metaphors with positive meanings maintain optimism in the long term. In particular, researchers might measure optimism over certain intervals to understand the time limit of the sweetness metaphor. These results could help devise more efficient applications of the effect of sweetness, such as improving the political climates of cities that have experienced natural disasters, or for use by psychiatrists providing psychological treatment.

Pessimism is considered the opposite of optimism (i.e., a negative outlook). Pessimistic individuals tend to dwell more on their poor performance and ruminate on their failures (Showers, 1990). Among a sample of men undergoing coronary artery bypass surgery, pessimistic men showed less rapid physical recovery after their surgery and reported a lower quality of life 6 months after surgery than the more optimistic men (Scheier, 1989). Similarly, pessimistic women who experience unsuccessful in vitro fertilization tend to have worse responses to the failure than do more optimistic women (Litt, 1992). With regard to metaphor, McConnell (1993) investigated the relationship between negative metaphors and pessimism. For instance, people who tend to use negative metaphors such as “work = hell” or “house = boxing match arena” tend to be more pessimistic than people who do not use these metaphors. Sanna (2010) have contrasted “bitter” and “sweet” metaphors, as the bitter (vs. sweet) taste is more related to the activation of a metaphor with negative meaning (e.g., Eskin, 2011). Future research might investigate whether embodied bitter gustatory experiences or imagining a bitter taste increases pessimistic thinking.



Finally, our results may contribute to prior research on aging. People tend to feel a high degree of mortality salience as they age, as they perceive their death as coming closer (e.g., Maxfield, 2007). Based on our results, the activation of the sweetness metaphor might decrease mortality salience through relieving fear about death, given that our results showed that just imagining sweetness leads to a positive view of the future. Investigating this hypothesis might offer a simple method—imagining sweetness—of relieving the fear of death or its related problems (e.g., depression, anxiety, and fear).

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