



## Tender food, tender hearts: The metaphorical mapping of hard-soft orosensory signals to interpersonal trust and prosocial tendencies

Bobby K. Cheon<sup>a,b,\*</sup>, Kah Min Tan<sup>a</sup>, Li Ling Lee<sup>b</sup>

<sup>a</sup> Division of Psychology, Nanyang Technological University, Singapore

<sup>b</sup> Clinical Nutrition Research Centre, Singapore Institute for Clinical Sciences (A\*Star), Singapore



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### ABSTRACT

Prior research has revealed that flavors (sweetness) may metaphorically influence social judgements and behaviors (interpersonal 'sweetness'). Given the inherently social nature of eating, other food related sensory signals beyond flavor may be conceptually mapped to social cognition and behavior. Here we tested the hypothesis that oral processing of foods with soft (vs. hard) textures may metaphorically facilitate (vs. inhibit) social behaviors conceptually associated with 'tenderness' or 'soft-heartedness'. Two studies examined the influence of imagined (Study 1) and actual (Study 2) oral processing of soft (vs. hard foods) on prosocial tendencies. Study 1 revealed that greater magnitude of sensory characteristics associated with imagined consumption of a hard food (i.e., dryness) was predictive of decreased interpersonal trust. Using actual food consumption in an interpersonal context, Study 2 demonstrated increased interpersonal trust and charitable donation of time after oral processing of soft (vs. hard) food and suggested that this effect is a result of enhanced trust following consumption of soft food rather than suppression of trust following consumption of hard food. Although effects were modest, these findings provide initial suggestions that orosensory metaphors that shape social cognition are not limited to flavors (e.g., sweetness, spiciness), and that diverse properties of food may influence patterns of sociality.

### 1. Introduction

Eating is a fundamental social activity among humans. In addition to providing nutrients and energy to function in our everyday life, eating also plays a significant role in other aspects of human life such as demarcating cultural boundaries and serving as a source of identity (Fu, Morris, & Hong, 2015; Hackel, Coppin, Wohl, & Van Bavel, 2018; Rozin, 1996). As a socially-embedded activity, numerous studies have demonstrated the powerful role that social factors and socialization exerts on food preferences and eating behaviors (Cruwys, Bevelander, & Hermans, 2015; De Castro, 1994). Yet, despite prior research suggesting that food choices (Fawcett & Markson, 2010) and food sharing (Woolley & Fishbach, 2016) can also influence social relations, there has been limited investigations into how *what* is eaten with others influences subsequent patterns of sociality. The objective of the present study is to examine how the texture and associated mouthfeel of foods consumed (soft or hard) may facilitate prosocial tendencies.

#### 1.1. Conceptual metaphor in social judgment and behavior

Metaphorical expressions are embedded in our everyday language. Metaphors define one aspect of subjective experience (e.g., emotions, intuitions) based on aspects of other concrete experiences (e.g., physical and bodily sensations) (Lakoff & Johnson, 1980). As such, conceptual metaphors may function as cognitive tools that allow users to efficiently represent and experience abstract social phenomena as more concrete experiences encountered in non-social domains (e.g., bodily sensations). Incidental sensorimotor and tactile experiences (e.g., texture, temperature) can serve as inputs that may unconsciously be assimilated or associated with information processing in non-relevant domains through metaphoric transfer, producing metaphor-consistent shifts in judgments and behaviors (Landau, Meier, & Keefer, 2010; Lee & Schwarz, 2012). Consistent with this notion, conceptual metaphors based upon bodily experiences (e.g. "cold person") may be laden with associative cues and are more commonly used than their literal semantic equivalents (e.g. "unfriendly person") given that they may be remembered and retrieved more easily (Akpınar & Berger, 2015).

One domain that metaphoric expressions are prevalently used is in

\* Corresponding author at: Division of Psychology, Nanyang Technological University, 14 Nanyang Drive, HSS-04-01, 637332 Singapore, Singapore.  
E-mail address: [bkcheon@ntu.edu.sg](mailto:bkcheon@ntu.edu.sg) (B.K. Cheon).

judgments and behaviors within social and interpersonal contexts. Impressions or traits inferred from others may be ambiguously defined and difficult to articulate (Uleman, 2005); thus are well-suited for representations through conceptual metaphors of much more concrete tactile, sensory, and bodily experiences in non-social domains (Landau et al., 2010). For instance, the sensory experience of physical temperature can serve as a basis for judgments in person perception. When holding a warm object, people may subconsciously assimilate concrete tactile sensations of physical warmth to more abstract experiences of interpersonal warmth, leading to perceptions of others as having a warmer personality (Williams & Bargh, 2008; Lynott et al., 2014) and greater feelings of closeness to others (Ijzerman & Semin, 2009).

Texture can also serve as a source of metaphoric transfer during interpersonal judgments. The tactile sensation of roughness was associated with greater likelihood of interpreting ambiguous social interactions as being tougher and harder (Schaefer, Denke, Heinze, & Rotte, 2013), such that the physical roughness experienced by touching a rough surface was transferred metaphorically to individuals construing uncertain social exchanges as one with more interpersonal difficulties. However, sensory inputs of physical roughness may also enhance empathy and prosociality through increasing one's attention to others in need (Wang, Zhu, & Handy, 2016).

Likewise, numerous metaphorical expressions to describe personality traits across cultures are based on descriptions of haptic or tactile sensations associated with handling hard or soft objects. In English, metaphorical expressions such as “soft-hearted,” “hard-hearted,” “soft spot” (for others), “softie,” “hardy,” “hard-headed” and “soft-spoken,” use soft/hard-related concepts of texture to describe personality (Schechter & Broughton, 1991). Such expressions are not only limited to English, with languages such as Chinese also involving similar metaphors of hardness/softness to represent abstract dispositions: 心软 (soft-hearted) and 铁石心肠 (hard-hearted).

In the domain of metaphors of hardness/softness, the haptic sensation of touching hard/soft items may also affect social perceptions and judgments. Specifically, participants who touched a hard item judged an employee as being more inflexible and stringent than did those who touched a soft item, but this did not lead to more positive overall impressions (Ackerman, Nocera, & Bargh, 2010). The haptic sensation along the hard-soft dimension may also be conceptually associated with the subjective experience of uncertainty. Participants who were primed to feel uncertain favored items with soft characteristics which coincided with their need for a “soft reassurance” in times of uncertainty. Correspondingly, participants who held onto items with soft characteristics felt more assured on an ambiguous task and were more tolerant toward uncertainties faced in life (Van Horen & Mussweiler, 2014).

### 1.2. Food as a basis for conceptual metaphors

While tactile sensations may be one critical means of navigating and interacting with the physical environment, rich sensory experiences are also encountered during eating. Eating food not only provides sensory experiences of flavor and texture, but also signals of whether the food may contain contaminants or toxins. Similarly, these signals and experiences are also mapped onto conceptual metaphors that may frame social judgment and behavior.

Sensory cues that may signal contamination and elicit prompt rejection of food may also serve as a conceptual basis for psychological rejection of other offensive non-ingestible stimuli, such as moral violations (Rozin, Haidt, & Fincher, 2009; Tybur, Lieberman, Kurzban, & DeScioli, 2013). Aversive tastes or foul odors, which may signal contamination, may facilitate suspicion or rejection in non-food related social judgments. For instance, exposure to 'fishy' smells (potentially signaling decaying organic matter) was associated with greater suspiciousness and lowered willingness to engage in social risks (Lee & Schwarz, 2012). This metaphoric link between fishy smells and

heightened suspicion within a situation may have emerged from an adaptive tendency to more cautiously scrutinize the edibility of foods that emit chemosignals of contamination. Additionally, individuals who consumed bitter drinks endorsed harsher and more punitive judgments on moral topics such as consensual incest between second cousins and a student stealing library books (Eskine, Kacirik, & Prinz, 2011).

Other taste-related experiences that do not trigger disgust may also influence person perception and social judgments. Individuals instinctively judged people who like spicy food to have a hot-tempered personality (Ji, Ding, Deng, Ma, & Jiang, 2013). Similarly, participants judged people who liked sweet foods to be more agreeable (Meier, Moeller, Riemer-Peltz, & Robinson, 2012). Moreover, metaphors associated with gustatory experiences are not only projected onto perceptions and expectations of others' traits, but can also influence self-perception and behaviors. Consuming a sweet food has been associated with increases in individuals' self-reports of their own level of agreeableness and intentions to donate time to help others (Meier et al., 2012). Importantly, the metaphorical concepts activated by these food-based and gustatory experiences may be constrained by culture and language. For instance, in a culture where 'sweetness' is associated with inauthenticity, consuming sweet foods during impression formation may subsequently activate metaphors of inauthenticity rather than kindness and promote perceptions of insincerity of others (Gilead, Gal, Polak, & Cholow, 2015).

While incidental haptic experiences from manual touch and flavors of food may produce conceptual transfer in social perception and judgment, it remains unknown whether haptic experiences from oral processing of food (e.g., hardness-softness) will also produce conceptual transfer into the social domain. Prior research in ingestive behavior has indeed demonstrated that mouthfeel from hardness/softness of foods may influence judgments in the domain of food and eating behavior. For instance, soft and smooth (compared to hard and rough) foods may signal expectations of higher calorie density (Biswas, Szocs, Krishna, & Lehmann, 2014). Furthermore, consumption of hard foods (compared to soft versions of similar foods) is associated with slower eating rates and lower total caloric intake (Bolhuis, et al., 2014). Prior studies have suggested that hard/soft sensory inputs from touch may metaphorically influence judgments of rigid and stable personality traits (Ackerman et al., 2010). Yet, these hard/soft sensory inputs linked to food and eating may also be especially readily mapped to prosocial tendencies, given the everyday representation and expressions of abstract social concepts of concern, sensitivity and empathy for others through metaphors of softness (vs. hardness) (e.g., 'soft-hearted', 'tender', being 'soft' on others).

## 2. Overview of research

In this paper, we presented two studies conducted as initial exploratory tests of whether the act of orally processing and ingesting (chewing, biting, swallowing) hard or soft foods may influence interpersonal judgment and prosocial behavior. Study 1 was a preliminary study to examine whether the manipulation of perceived softness (vs. hardness) of food may metaphorically transfer to prosocial tendencies. Study 2 assessed the effects of actual hard/soft food consumption with a partner on interpersonal judgments and trust.

### 2.1. Study 1

In Study 1, the texture of an imagined food (hard vs. soft) was manipulated to examine whether these perceived properties may metaphorically transfer to prosocial tendencies. Prior research has suggested that the imagined consumption of food also activates mental and sensory processes associated with actual consumption (Cornil & Chandon, 2016; Krishna & Schwarz, 2014; Morewedge, Huh, & Vosgerau, 2010). We hypothesize that imagined orosensory experience of soft (vs. hard) foods will activate metaphorical concepts (i.e. soft-

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