



Through the eyes of dieters: Biased size perception of food following tempting food primes

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ARTICLE INFO

Article history:

Received 14 October 2009

Revised 16 August 2010

Available online 19 October 2010

Keywords:

Self-control

Temptation

Functional size perception

Restrained eating

Dieting

Goal conflict

ABSTRACT

Why do some dieters succeed in controlling their diet while others do not? This research focused on a perceptual process—size perception of food objects—that may moderate the success of dieters in self-control dilemmas. We assessed successful and unsuccessful dieters' size perception of palatable food (Study 1) and diet-food (Study 2) after pre-exposing them to tempting food primes. Dieters perceived palatable food as bigger when primed with tempting food (vs. control prime), regardless of self-regulatory success in dieting (Study 1). Palatable food thus looms larger for both unsuccessful and successful dieters when in a “hot” state. In contrast, the perceived size of diet-food was increased by a tempting food prime only for successful dieters, but decreased for unsuccessful dieters (Study 2). These results are interpreted in terms of differences in the mental accessibility of competing goals (eating enjoyment vs. dieting) in successful vs. unsuccessful dieters. Indeed, when the dieting goal was made accessible for all dieters by a diet prime, even unsuccessful dieters perceived diet-food as bigger (Study 2). This research provides insight into a perceptual process that may be detrimental or beneficial in resolving self-control conflicts in the domain of eating and dieting behavior—and probably other domains of self-control as well.

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Tempting alternatives promising immediate satisfaction often challenge people's striving for higher-order goals that offer long-term benefits. Resolving this conflict in favor of the long-term goal requires self-control (e.g., Baumeister & Heatherton, 1996; Metcalfe & Mischel, 1999). This is often difficult as the long-term goal must be sufficiently attractive and accessible to win the competition with the short-term temptation (Logan, 1988). An area in which temptations seem particularly likely to interfere with people's self-control is the domain of eating and dieting behavior.

Although many people try to control their body weight by restricting food intake, most fail in the long term (Mann et al., 2007). One group, which seems especially unsuccessful in controlling their food intake are chronic dieters (i.e., restrained eaters; Herman & Polivy, 1980). Chronic dieters are people who continuously monitor their food intake, but are highly responsive to external food cues which easily disrupt their eating regulation (Herman & Polivy, 1980). For instance, they are more likely to overeat after exposure to tempting food cues such as the sight, smell, or taste of palatable food (e.g., Fedoroff, Polivy, & Herman, 1997; Jansen & Van den Hout, 1991). However, not all dieters fail in their attempts to resist temptations (Fishbach, Friedman, & Kruglanski, 2003; Papiés, Stroebe, & Aarts, 2008b).

At this point, little is known about why some dieters are more successful than others. Therefore, the aim of this paper is to advance our knowledge about the self-control of successful and unsuccessful dieters by focusing on a process that has so far not been investigated, namely size perception of food objects. As will become clear later, size perception reflects the perceived instrumentality of goal-relevant objects, and thereby offers insight on how basic perceptual processes may moderate the success of dieters in regulating food intake in the context of a self-control dilemma. Objects that are perceived to be larger are more easily detected in the environment, and as such facilitate goal attainment. Therefore, goals and size perception of instrumental objects are supposed to be associated. Before elaborating on this issue, we first address how food temptations influence dieters' self-control.

Food temptations and dieters' goal pursuit

Recent explanations of self-regulatory failures of dieters increasingly acknowledge that eating in food-rich environments is predominantly driven by anticipated pleasure rather than people's need for calories (e.g., Lowe & Butryn, 2007). According to the goal conflict model of eating (Stroebe, 2008; Stroebe, Mensink, Aarts, Schut, & Kruglanski, 2008), dieters' difficulty in resisting food temptations results from a conflict between two incompatible goals, namely the goal of eating enjoyment and the goal of dieting. The dieting goal normally helps them to restrain their eating behavior. However, environmental cues signaling palatable food have a strong positive

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incentive value for dieters and prime the eating enjoyment goal. As a result of continued priming, the eating enjoyment goal becomes the focal goal and the mental representation of the (conflicting) dieting goal is inhibited (Shah, Friedman, & Kruglanski, 2002), making dieters vulnerable to self-regulatory failure. Research confirms that for dieters exposure to tempting food cues triggers hedonic thoughts and affective responses to palatable food rendering the eating enjoyment goal highly accessible (Hofmann, Van Koningsbruggen, Stroebe, Ramanathan, & Aarts, 2010; Papies, Stroebe, & Aarts, 2007), inhibits the mental representation of the dieting goal (Stroebe et al., 2008), and elicits an attentional bias for palatable food (Papies, Stroebe, & Aarts, 2008a).

However, a subgroup of dieters appears successful in regulating their food intake. Current research on temptations and goal pursuit suggests that for some people temptations increase the cognitive accessibility of long-term goals typically undermined by these temptations (Fishbach et al., 2003). According to this theory of temptation-elicited goal activation, such a facilitative link between temptation and goal develops when people repeatedly and *successfully* exert self-control in tempting situations (e.g., saying no when offered a piece of cake at a birthday party). Indeed, research has shown that whereas tempting food cues inhibit the dieting goal in unsuccessful dieters, they activate this long-term goal in successful dieters (Papies et al., 2008b).

It would have been plausible to assume that successful dieters also suppress the eating enjoyment goal triggered by tempting food cues. However, successful and unsuccessful dieters do not differ in the extent to which exposure to tempting food cues triggers hedonic thoughts (Van Koningsbruggen, Stroebe, & Aarts, 2009). Paradoxically, successful dieters are not successful because they suppress eating enjoyment, but because the activation of eating enjoyment also activates their dieting goal (Papies et al., 2008b). Thus, successful dieters are no less tempted by palatable food than are unsuccessful dieters. But in contrast to unsuccessful dieters, they resist the temptation by keeping their super-ordinate goal of dieting in mind.

In terms of action control theories (e.g., Logan, 1988, 1989; Norman & Shallice, 1986), the goal conflict model of eating can be conceptualized as a “battle” between the eating enjoyment goal and dieting goal in determining action in dieters. The goal representation which receives the highest level of mental accessibility guides subsequent perception and behavior. Whereas for unsuccessful dieters the representation of eating enjoyment is most accessible and guides behavior, the dieting goal is most accessible for successful dieters. In this article, we examine the implications of this battle on dieters' size perception of food.

Goal pursuit and functional size perception

Research on functional perception (Bruner, 1957) suggests that tempting food cues that trigger the eating enjoyment goal in dieters may not only result in biased allocation of attention to palatable food (Papies et al., 2008a), but may also affect dieters' size perception of food. Although size perception of objects is determined by objective factors, such as retinal image size, distance, angle, and contextual cues (Kaufman & Rock, 2001; Rookes & Willson, 2000), people also perceive objects that are functional in attaining their goals (i.e., means) as bigger when motivated to attain these goals (Bruner, 1957). To perceive objects that are means for reaching important goals as larger in size is highly functional, because it facilitates the ease with which such objects can be identified in the environment thereby increasing the likelihood of using the object for attaining one's goals.

Consistent with the functional size perception hypothesis, several studies established the basic link between people's motivation to attain desired goals and increased size perception of goal-relevant objects (Aarts, Custers, & Veltkamp, 2008; Brendl, Markman, & Messner, 2003; Bruner & Goodman, 1947; Bruner & Postman, 1948;

Veling & Aarts, 2009; Veltkamp, Aarts, & Custers, 2008). It has been shown that increased size perception of goal-relevant objects is the result of a top-down process that requires a goal to be accessible. For instance, Veltkamp et al. (2008, Study 1) asked participants to estimate the size of an object as displayed on a picture: Participants were then shown the picture of a glass of water. Results indicated that participants, who were motivated to drink, perceived the glass of water as bigger in size, but only when primed with the goal of drinking. For most people, a glass of water is not a very valued commodity. However, as Lewin (1935) emphasized, objects are perceived as positive or negative to the extent that they support or hinder active goals. Thus, by making the goal of drinking highly accessible to thirsty people, the glass of water became a valued means towards the goal of reducing thirst.

Although perceived instrumentality and perceived value are typically correlated, we would argue that size perception is influenced by the perceived instrumentality of an object for reaching an accessible goal rather than its perceived value. We propose that when a goal becomes highly accessible, people will automatically attend to objects instrumental in attaining their goal and scan their environment for potential means to reach that goal. Their attention will become attached to objects that on the basis of past experience can be considered as potential means and these objects will loom larger. As long as there are suitable objects in memory and/or their proximal environment, this whole sequence is likely to unfold automatically (Aarts, Custers, & Marien, 2008). Although objects which serve as means for reaching an important goal are likely to be valued, it is important to note that it is their value as *instruments* of goal achievement rather than value per se which is responsible for size accentuation. Thus, Veltkamp et al. (2008, Study 2) manipulated the value of *goals* by classically conditioning previously neutral goals either positively or negatively, while keeping goal accessibility constant. They then tested effects on size perception of objects that were instrumental for reaching a specific goal. They showed that, whereas the size of objects that were instrumental for reaching goals associated with positive affect (i.e., positive value) was increased, the size perception of objects instrumental for reaching goals associated with negative affect (i.e., negative value) remained unaffected (compared to a neutral control condition). It was not the perceived value of goal-instrumental objects but their *perceived instrumentality* for reaching *valued* goals that affected size perception.

Because for dieters, tempting food cues activate the eating enjoyment goal (Hofmann et al., 2010; Papies et al., 2007), palatable food should be highly functional in the service of their goal pursuit (cf. Bruner, 1957). Accordingly, in Study 1 we tested the idea that dieters may differently perceive the size of palatable food depending on whether the eating enjoyment goal has been activated by pre-exposure to tempting food cues. Participants estimated the size of a muffin because a pilot study confirmed that a muffin was perceived as food functional in attaining the eating enjoyment goal.

However, even though such pre-exposure elicits the eating enjoyment goal in *all* dieters, it has a differential impact on the accessibility of the dieting goal (e.g., Fishbach et al., 2003): Pre-exposure *decreases* the accessibility of dieting thoughts in unsuccessful dieters but *increases* their accessibility in successful dieters. Thus, for successful dieters, diet-food should be highly functional in the service of their goal pursuit. Accordingly, tempting food cues may perceptually accentuate food objects that are functional in attaining the goal of dieting—leading to increased size perception of diet-food—depending on self-regulatory success. In Study 2, we put this idea to the test by letting participants estimate the size of an apple—food perceived as functional in attaining the dieting goal according to our pilot study.

According to the goal conflict model of eating (e.g., Stroebe, 2008), eating enjoyment is not an important goal for normal eaters. Consistent with this assumption, there is empirical evidence that pre-

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