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Research Article

The acuity of vice: Attitude ambivalence improves visual sensitivity to increasing portion sizes☆

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Abstract

A rapid increase in the size of food portions has underlined the importance of understanding consumers' ability to accurately perceive portion sizes. Drawing on research on motivated perception, we posit that attitude ambivalence (simultaneously desiring a food and perceiving it as unhealthy) enhances visual sensitivity to increasing portion sizes. We manipulate or measure attitude ambivalence in three experimental studies conducted among children and adults and find that visual sensitivity is driven not simply by desire but by the coexistence of desire and perceived unhealthiness of the food (e.g., for hedonic food and among restrained eaters). Our findings suggest that framing foods as vices improves the estimation of portion sizes among health-conscious people.

Keywords: Visual perception; Volume estimation; Food; Packaging; Attitude ambivalence

Introduction

Food portions have grown dramatically over recent decades and now frequently exceed the serving sizes recommended by the United States Department of Agriculture (Nestle, 2003; Schwartz & Byrd-Bredbenner, 2006). The trend has affected not only the meals served at fast food restaurants but also the food sold at supermarkets and the meals prepared at home (Nielsen & Popkin, 2003). It has been suggested that people's inability to accurately perceive portion size may be one of the drivers of the obesity epidemic (Rozin, Kabnick, Pete, Fischler, & Shields, 2003; Young & Nestle, 2002).

In this research, we study people's perceptions of large portion sizes when they are presented alongside a smaller known portion size, where the estimation is purely visual. This happens, for example, when people are evaluating a new large portion of fries at a fast food restaurant (or a new large container of popcorn at the cinema) presented alongside familiar standard sizes. We refer to people's ability to accurately estimate the size of increasing portions simply by looking at them as their "visual sensitivity to increasing sizes" or, for simplicity, as their "visual acuity".

Prior research has established that people systematically underestimate the size of objects as they grow larger (the well-documented underestimation bias; Stevens, 1971). Thus, supersized meal portions and packages tend to be underestimated because people (and even professional dieticians) exhibit a diminishing visual sensitivity to the increasing size of meals and of individual portions (Chandon & Ordabayeva, 2009; Chandon & Wansink, 2007b). This bias is particularly problematic because shoppers rarely read the size information displayed on packages, relying instead on their visual impression of a package or a portion

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to estimate its size (Lennard, Mitchell, McGoldrick, & Betts, 2001; Viswanathan, Rosa, & Harris, 2005). The physical characteristics of packaging can accentuate this underestimation bias. For instance, people underestimate an increase in the size of food packages more strongly when all three dimensions are changed simultaneously (Chandon & Ordabayeva, 2009; Krider, Raghubir, & Krishna, 2001). Even subtle changes in the shape, design and esthetics of food packaging and containers can strongly affect people's size impressions (Deng & Kahn, 2009; Folkes & Matta, 2004; Krishna, 2006; Raghubir & Krishna, 1999; Wansink & Van Ittersum, 2003; Zaichkowsky, Neuhaus, Bender, & Weber, 2010).

In comparison we know little about how non-design-based factors influence visual sensitivity to increasing portion size. This is surprising given that prior research (e.g. Fig. 1 in Wansink & Chandon, 2006) has revealed considerable intra- and inter-personal variations in the underestimation of increasing portion sizes. Research on motivated perception has shown that goals and attitudes can influence the perceived size of a single object (Bruner & Goodman, 1947; Dunning & Balcetis, 2013). However, it has not examined visual sensitivity to increasing size when multiple sizes are shown simultaneously and when the size of a referent smaller portion is known. This is an important distinction because size estimations are reference-dependent (Hu & Goodale, 2000) and because reference-free estimates of single sizes do not adequately capture the task confronting consumers when they evaluate multiple food portions.

From a conceptual standpoint, prior studies on motivated size perceptions have focused on the role of desire. For example, van Koningsbruggen, Stroebe, and Aarts (2011) found that chocolate muffins appeared larger to dieters than to non-dieters after both groups had been exposed to tempting food primes. This research has largely overlooked the role of the motivation to avoid negative health consequences, which often conflicts with the desire to consume palatable foods (Stroebe, Van Koningsbruggen, Papies, & Aarts, 2013). Yet the trade-off between desire and a perceived health threat has been shown to strongly influence consumer judgments and food choices (Shiv & Fedorikhin, 1999). The present research goes beyond the study of desire to examine the role of attitude ambivalence created by the tension between desire and a perceived health threat.

Our work contributes to the literature on visual sensitivity to increasing portion size by studying the role of attitudinal rather than design-based factors. It also contributes to the literature on motivated perception by examining estimations of increasing size in the presence of a smaller benchmark, and by showing that visual sensitivity is not driven by desire and threat individually but by the tension between the two. Specifically, we show that attitude ambivalence explains visual sensitivity to increasing portion size better than desire alone, or than what a simple interaction of desire and threat would predict. Our results also have implications for research on self-control by showing that goal conflict has perceptual as well as motivational consequences. Finally, our results have implications for public health. Given that people systematically underestimate size as objects grow larger (Stevens, 1971), ambivalence-driven improvements in visual sensitivity should lead to more accurate estimates of increasing portion size. Indeed, we find that increasing the hedonic appeal of food makes restrained adult eaters as well as health conscious children and adults more (rather than less) accurate in their estimations of portion size.

Attitudes and portion size estimation

Motivated perception: The perceptual effects of desire and fear

The idea that motivation may impact visual perception was introduced in the 1940s and 50s; perception was viewed as a constructive process influenced by desires, needs and values (Bruner & Minturn, 1955). In their pioneering study, Bruner and Goodman (1947) found that children from more modest backgrounds overestimated the size of coins, seemingly because they had a stronger desire for money than wealthier children. Although these early findings were criticized on methodological grounds (e.g., socially-desirable responding and familiarity biases), the basic effects have recently been replicated with different stimuli and approach motivations in better controlled settings (Dubois, Rucker, & Galinsky, 2010; Dunning & Balcetis, 2013). For example, cigarettes appear longer to smokers with high (vs. low) craving (Brendl, Markman, & Messner, 2003) and bottles of water look closer to thirsty (vs. non-thirsty) people (Balcetis & Dunning, 2010a). Thus, desirable objects look bigger and closer.

Such results also suggest that undesirable objects will appear smaller or more distant, as has been confirmed for clearly repulsive objects (e.g. Van Ulzen, Semin, Oudejans, & Beek, 2008). However, other studies inspired by research on perceptual vigilance (Erdelyi, 1974) have found different effects. In these studies threatening or harmful objects, such as a snake in the grass (Ohman, Flykt, & Esteves, 2001), an aggressive person (Cole, Balcetis, & Dunning, 2012), or a pointed gun (Van Ulzen et al., 2008) were perceived to be larger and closer than non-threatening stimuli. Although this hypothesis has not been formally tested, Balcetis and Dunning (2010b) posit that a threatening object may not need to be as dangerous as a snake or a gun in order to be perceived as larger, and that perceptual vigilance may be triggered by pitfalls, temptations, or objects which are detrimental to a particular goal.

Overall, some literature suggests that desiring food or fearing that it may be harmful to health may increase its perceived size. However, studies on visual perception have until now ignored the fact that some objects — such as hedonic foods — are simultaneously desired and perceived as a health threat, and that the tension between the two attitudes (rather than their individual effects) could shape perceptions (Shiv & Fedorikhin, 1999; Stroebe et al., 2013).

Ambivalent attitudes towards food

Ambivalent attitudes arise when individuals hold simultaneous positive and negative reactions to an object, for example, because they have conflicting goals (Kaplan, 1972; Ramanathan & Williams, 2007; Thompson, Zanna, & Griffin, 1995). In the context of food, many people experience a conflict between the goal of enjoying food and the goal of staying healthy, hence food is often both desired and considered unhealthy (Shiv &