The Effect of Package Shape on Consumer’S Calorie Estimation

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We show the findings contradicting to the common belief that calorie estimation is a positive function of volume estimation. Food in an elongated (vs. shorter) package, although perceived to have a greater volume, was judged to contain lesser calories. This difference stems from different psychological mechanisms underlying the two judgments.

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EXTENDED ABSTRACT

People are becoming more conscious about health and weight control and as a consequence, calorie intake is an important concern for many consumers. However, people’s calorie estimation is shown to be vulnerable to various biases associated with the influence of nutrition labels (e.g., low fat) and package sizes (Chandon and Wansink 2007; Scott et al. 2008). This research investigates another source of bias in calorie estimation, namely, the shape of the package containing food.

According to the well-known elongation bias, container shape affects perception of spatial volume. People perceive the volume of a taller container as larger than that of a shorter and wider container (Raghubir and Krishna 1999). Extant research has also shown that the shape of the container affects perceived consumption and product choice (Chandon and Ordbayeva 2009; Folkes and Matta 2004; Krishna 2006; Raghubir and Krishna 1999; Wansink and Van Ittersum 2003). However, little attention has been directed to the influence of container shape on calorie estimation, which may be partially caused by the common belief that calorie is a direct function of volume. This lay belief would suggest that when the two containers are equal in their actual volume, foods will be estimated to have more calories when they are contained in a taller container than a wider container due to the elongation bias.

We propose the idea contradictory to this belief. Specifically, we hypothesize that food is perceived to have lesser calories when it is contained in a taller than in a wider container. This counterintuitive effect is assumed to arise from different psychological processes underlying the estimation of spatial volume and that of calories. Volume estimation is based on perceptual judgment and a taller container is perceived to be more voluminous because human perception emphasizes height as the most salient dimension (visual prominence effect) (Kridiger, Raghubir, and Krishna 2001). In contrast, calorie estimation is conceptually driven. Because calorie is ambiguous and intangible, calorie judgment relies on inferences based on cognitive associations. This is reason why consumer’s calorie estimation has been shown to be influenced by situationally activated concepts (Chandon and Wansink 2007; Chernev 2010; Scott et al. 2008; Kardes, Posavac, and Cronley 2004, Wansink and Chandon 2006).

We hypothesize that package shape affects calorie estimation due to different conceptual associations activated by different shape. We propose that taller and thinner packages activate the concepts relating to slimmness and lightness, whereas shorter and wider packages activate concepts relating to fatness and heaviness. Further, consumers use concepts brought to their mind to infer calories, resulting in biases in judgment. The slimmness and lightness activated by an elongated container will lead to underestimation of calories. By contrast, fatness and heaviness associated with a shorter and wider container will lead to overestimation of calories.

Hypothesis 1: Food will be perceived to have lower calories when it is contained in a taller container than when it is contained in a wider container even though the actual volume is made constant.

In Study 1, 40 participants estimated the calories of milk placed in a tall or a wide glass. The two glasses had equal volumes. The estimated calorie of milk in the wider glass was higher than that in the taller glass ($M_{taller} = 140.0$ vs. $M_{wider} = 163.3$; $F(1, 38) = 20.75, p < .001$). The results were consistent with our hypothesis.

Study 2 demonstrates the opposite effect of package shape on volume estimation and calorie estimation. We expect a taller container to be perceived to have more volume but lesser calories than a wider glass. Participants were presented with orange juice placed in a tall or wide glass. The participants estimated either the calories or the volume of the contained orange juice. Consistent with the elongation bias, the juice in the taller glass was perceived to be greater in volume than that in the wider glass ($M_{taller} = 947.9$ vs. $M_{wider} = 917.6$; $F(1, 143) = 5.42, p = .021$). However, the juice in the taller glass was judged to have lower calories than that in the wider glass ($M_{taller} = 461.3$ vs. $M_{wider} = 485.6$; $F(1, 144) = 7.92$).

Study 3 extends our findings to the package display orientation. In this study, the same rectangular-shaped package is displayed either vertically or horizontally. Vertical display would make the product look slimmer and lighter, whereas horizontal display would make the product look fatter and heavier. Accordingly, perceived calorie would be lower when the same package is presented vertically instead of horizontally. In the study, participants were presented with five food products, each of which is contained in a rectangular-shaped package. The packages were then presented either vertically (i.e., height is greater than width) or horizontally (i.e., width is greater than height). A 2 (package display: vertical vs. horizontal) × 5 (products) ANOVA on estimated calories showed the significant main effect of package display, indicating that participants estimated lower calories when the packages were presented vertically, rather than horizontally ($M_{vertical} = 334.7$ vs. $M_{horizontal} = 475.2$; $F(1, 53) = 11.27, p = .001$). Separate test for each product category showed the significant effect of display direction for all five products (all $t$ values $> 2.12$, all $p$’s $< .046$).

In conclusion, the results of the current research demonstrate the relationship between shape of product package and consumer’s calorie estimation. Contradicting to the belief that calorie estimation is a positive function of volume estimation, our findings from three studies show that a taller package perceived to have more volume was judged to contain lesser calories. We believe our research contributes to the existing literature on consumer calorie estimation and spatial perception by separating the psychological mechanisms underlying these two seemingly related judgments.

REFERENCES


