

Judging the Size of Food Portions and Packages: Errors and Remedies

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The size of food and beverage portions and packaging has increased significantly in recent years: for example, by over 60% for salty snacks and by 52% for sodas (Nestle, 2003; Rolls et al., 2002; Nielsen and Popkin, 2003). The supersizing trend has been identified as one of the key drivers of the obesity epidemic and related health concerns (Ledikwe et al., 2005; Young and Nestle, 1998). Size perceptions are the primary driver of portion size decisions, and biases which hinder the accuracy of consumers' size perceptions can lead to unhealthy choices.

But do consumers even know how large packages and portions are? This is doubtful given that upwards of 70% of consumers do not check size information to make quantity judgments (Lennard et al., 2001). Instead, consumers rely on the packaging as a cue for how much food is contained inside and use their visual impressions, instead of actual size information, to make decisions (Wansink and Chandon, 2014). The problem is, however, that visual impressions of package and portion size are biased. Often times, biased size perceptions, stemming from various sources, lead consumers to significantly underestimate package or portion size, resulting in significant overconsumption because consumers do not realize just how large a package or a portion really is (Chandon and Wansink, 2007a; Wansink and Chandon, 2014). Thus uncovering the sources of size perception biases and finding effective strategies to curb these biases is crucial for public policy and consumer health.

In Table 1, we outline five systematic sources of biases in consumers' perceptions of package and portion size, and we propose remedies that can effectively reduce these biases.

Errors in the judgment of the size of food portions on the plate or of food packages on supermarket shelves can significantly influence how much food is selected. This, in turn, can influence how much food is consumed. A recent Cochrane Review of 72

Table 1

<i>Bias</i>	<i>Description</i>	<i>Remedies</i>	<i>Literature</i>
Underestimation	Consumers underestimate the sizes of packages and portions, more so for large portions than for small ones.	<ul style="list-style-type: none"> - Providing information about the bias, drawing attention to the object or the estimation task, and motivating individuals to be accurate through intrinsic or extrinsic (financial) means do not mitigate the bias. - Prompting a piecemeal estimation of individual food items before estimation of the entire meal mitigates the bias. 	<p>Chandon and Wansink (2006, 2007a)</p> <p>Stevens (1986)</p> <p>Krider et al. (2001)</p> <p>Krishna (2007)</p> <p>Wansink and Chandon (2006a)</p>
Dimensionality	Consumers are more sensitive to changes in size that occur along one pack dimension than to changes that occur along all three pack dimensions (length, width, and height), especially if dimensions change in opposite directions (e.g., if the height of a package grows while its length and width shrink).	<ul style="list-style-type: none"> - Linearizing the size change from multiple to a single pack dimension mitigates the dimensionality bias, increases the appeal of supersizing, and informs consumers about the actual size of supersized portions. - Implementing the size change through multiple dimensions, especially if dimensions change in opposite directions, increases the appeal of downsizing. - Easing the monitoring of product volume by using transparent packaging or by allowing the use of additional, non-visual, sensory information (e.g., weighing products by hand) mitigates the dimensionality bias. 	<p>Chandon and Ordabayeva (2009)</p> <p>Deng and Srinivasan (2013)</p> <p>Krishna (2007)</p> <p>Ordabayeva and Chandon (2013)</p> <p>Raghubir and Kirshna (1999)</p> <p>Wansink and Van Ittersum (2003)</p>
Directionality	Consumers are more sensitive to decreases in product quantity than to increases in quantity. Whereas consumers significantly underestimate size increases, they almost perfectly estimate size decreases.	<ul style="list-style-type: none"> - Imposing implicit or explicit bounds to estimations of increasing portions by providing a numeric bound or by having people pour, instead of estimate, portions increase consumers' sensitivity to size increases and mitigates the directionality bias. - Removing the zero bound from estimations of decreasing portions by having people estimate the factor of change in portion size, instead of the final portion size, desensitizes consumers to size decreases and mitigates the directionality bias. 	<p>Chandon and Ordabayeva (2017)</p>

(Continued)

Table 1 —cont'd

Bias	Description	Remedies	Literature
Labeling	Consumers believe that a product is smaller, lighter, or less caloric when it has a label highlighting its small size, healthy components, healthy positioning, or showing the product on the top-left (vs. Bottom-right).	<ul style="list-style-type: none"> - Highlighting the healthiness (or unhealthiness) of the meal or its components increases the labeling bias. - Having people evaluate the size of individual meal components or providing serving size information reduces the labeling bias, but only among normal-weight individuals (who focus on the perceived reduction in product size resulting from health labels), not among overweight individuals (who focus on the reduction in consumption guilt resulting from health labels). - Downplaying the healthiness of individual items served at restaurants with healthy positioning (by having people consider why individual items at these restaurants may not be as healthy as expected) mitigates the bias created by healthy restaurant positioning. - Placing products with “heavy” product positioning (bottom-right) on the label next to other products with similar labels reduces the positioning bias created by the location of the product image on the label. 	<p>Aydinoglu and Krishna (2011) Chandon and Wansink (2007a,b) Chernev and Gal (2010) Deng and Kahn (2009) Wansink and Chandon (2006b)</p>
Affect	Consumers are more sensitive to package and portion sizes when they feel conflicted between their desire for the product contained in the package and their perception of the product's potential health risk.	<ul style="list-style-type: none"> - Consumers who inherently experience high conflict between desire for hedonic food and fear of its unhealthiness (e.g., dieters) are more accurate in estimating portion size. - Simultaneously inducing both desire (by having people sample the food before consumption) and the perceived danger of food (by highlighting its unhealthy nature or components) can improve the accuracy of size perceptions. 	<p>Balcetis and Dunning (2010) Cornil et al. (2014) van Koningsbruggen et al. (2011)</p>

studies (Hollands et al., 2015) of the “portion size effect” concluded that there is strong evidence that “people consistently consume more food and drink when offered larger-sized portions, packages or tableware than when offered smaller-sized versions.” It called for policies and practices that successfully reduce the size, availability and appeal of larger-sized portions, packages, individual units and tableware.

Still, more research is needed to examine whether the outlined factors impact other food behaviors, such as the amount of food people stockpile or waste, and to study its effects on the long term rather than just over the short term. It will also be important to test if the magnitude of the biases and the effectiveness of their remedies vary by context (e.g., cultural context), food type, and consumer segment (e.g., overweight, normal weight, and underweight; young and older populations).

More generally, it will be useful to understand how consumers integrate their size estimations with other information available in the retail environment such as price (unit and total), costs, retail atmospherics (e.g., music), serving plates and utensils (e.g., size and shape of a serving plate), and consumers’ affective states (e.g., mood), as all of these factors have been previously linked to individuals’ information processing strategies and food decisions. Finally, it will be crucial for future work to uncover new remedies for the existing biases as well as new biases that may impact size perceptions, including those stemming from non-visual food properties (e.g., sound, smell, texture).

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