REDUIRE L'EFFET DE TAILLE DE PORTION PAR L'IMAGERIE MENTALE

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Résumé: Les consommateurs ont tendance à manger plus de nourriture dans les plus grandes portions que dans les plus petites portions. Nous suggérons qu'il possible de réduire cet effet appelé « de taille de portion » avec l'imagerie mentale. Nous avons réalisé deux expériences en ligne : La première étude a montré que les participants ayant plus d'imageries mentales sélectionnaient un pourcentage moins important de nourriture dans la plus grande portion, que dans les portions de plus petites tailles. La deuxième étude a révélé que lorsqu'il était explicitement demandé aux participants d'imaginer l'expérience sensorielle de la consommation, ce pourcentage était également moins important quand la nourriture était sélectionnée dans la grande portion, par rapport à la moyenne portion, réduisant ainsi l'effet de taille de portion.

Mots clef: comportement du consommateur; taille de portion; santé; imagerie mentale

REDUCING THE PORTION SIZE EFFECT VIA MENTAL IMAGERY

Abstract: Consumers tend to eat more food in larger portions than in smaller portions. Here, we suggest that it is possible to reduce this so-called "portion size effect" with mental imagery. We conducted two online studies: The first study showed that participants with higher scores of mental imagery selected a smaller percentage of food from the largest portion, than from the smaller portions. The second study revealed that when participants were explicitly asked to imagine the sensory experience of eating, the percentage of food selected was also lower when the food was selected in the large portion, than in the medium portion, thus reducing the portion size-effect.

Keywords: consumer behaviour, portion size, health, mental imagery

Introduction

Product package and serving sizes in the marketplace have grown significantly in recent decades (Wansink and Van Ittersum, 2007). Larger food portions have more value for consumers and are often cheaper because of lower packaging costs. However, the problem is that consumers eat more in larger food portions than in smaller food portions (Ordabayeva and Chandon, in press; Zlatevska et al., 2014) which is a major issue for public policy and health (Chandon and Wansink, 2007). Consumers often use visual information coming from the environment, as opposed to their physiological signals of hunger and satiety to estimate the appropriate serving size and to regulate their consumption (Rolls et al., 2002, Spence et al., in press). One suggestion is that, when consumers encounter a large prepared food portion, they assume that it is 'the normal amount to eat', and so should consume it all (Geier et al., 2006).

To help consumers to estimate the quantity of food in a portion, we suggest the use of mental imagery (Barsalou, 2008). Previous research has shown that mental imagery can help to encourage consumer's food regulation by modulating their hunger level (Cornil and Chandon, in press; Morewedge et al., 2010). For instance, asking participants to imagine eating an M&M 30 times (vs. just 3 times) significantly reduces the subsequent consumption of those candies (Morewedge et al., 2010). These studies suggest that imagining the experience of eating the whole portion might lead people to adjust their food intake as a function of the quantity of food contained in the portion. Thus, by promoting the aforesaid mental imagery, it might be possible to 'nudge' consumers toward eating less food in the presence of large portions. In a world where the size of food portions has increased, mental imagery could be instrumental in making consumers and companies choose more economical (i.e., larger) package sizes, without increasing their consumption.

Two studies are reported that provide evidence in support of the notion that mental imagery can have a positive effect in terms of reducing the portion size effect. In the first study, we explore whether consumers with higher scores of mental imagery, select for eating a higher percentage of food from a large portion size, than from a medium portion size (i.e., which can be considered as a consumption norm), and whether this effect is reversed when they see a very large portion (i.e., a portion that is so large that it can no longer be considered as a consumption norm). In the second study, we test whether by prompting mental imagery it is possible to decrease the percentage of food that is selected from a large portion size.

Study 1

People eat more when served a medium portion as compared to a small portion and when served a large portion as compared to a medium-sized portion. However, this effect becomes smaller for successively larger portion-size comparisons. This relationship between portion size and food selection can be explained by the fact that quantity becomes ever more salient with increasing portion sizes (Zlatevska et al., 2014). Since consumers with high scores of mental imagery are more prone to adjust their consumption as a function of visual information (Madzharov and Block, 2010), and since the implicit mental imagery of a large quantity of food can potentially give rise to feelings of fullness (Larson et al., 2014; Toepel et al., 2015), we suggest that they will select a smaller percent food in the largest food portion, and a larger percent of food in the smaller food portions, than consumers with lower scores of mental imagery. We expect a significant interaction between food portion size and mental imagery on the percent of food selected by participants.

Materials and methods. 142 participants (64 females, mean age = 29.80 years, *SD* = 8.97) took part in the online study, conducted with the Xperiment research package (www.xperiment.mobi). All of the participants were recruited using Prolific Academic (http://prolificacademic.co.uk/) in exchange for a payment of £0.40. They evaluated a portion of French fries in one of three experimental conditions (to which each participant was randomly allocated to): medium (45 participants), large (50 participants), and very large portion (47 participants), in a between-participants experimental design. Note that the different portions corresponded to three different portion sizes that can be found in McDonald's restaurants (http://www.mcdonalds.com/us/en/home.html). The medium portion size had 17 French fries (i.e., ± 114 g of French fries or 340 kcal) presented in a medium package, the large portion 26 French fries (i.e., ± 175 g of French fries or 520 kcal), presented in a large paper serving container, while the very large portion consisted of 51 French fries (i.e., ± 340 g of French fries or 1020 kcal) shown in a very large package. The participants were asked to answer the question "How much of the portion of French fries would you like to eat?" by manipulating a scale (anchored on the left with "none" and on the right "all of the portion") which adjusted the number of French fries in the portion shown in the centre of the screen. A 3 item scale was used to measure the mental imagery (Elder and Krishna, 2012). The participants also rated the extent to which mental images of eating the portion of French fries came to mind (1 = not at all; 7 = very much so), the number of images of eating the French fries came to mind (1 = few or no images; 7 = lots of mental images), and the extent to which they could imagine eating the French fries (1 = not at all; 7 = to a great extent).

Results and discussion. A median-split was used to create two categorical levels of mental imagery with an equal number of participants. We conducted an ANOVA with the portion size of the French fries and mental imagery as the independent variables and the percentage of French fries selected as the dependent variable. We found a significant interaction between the two factors ($F(1, 136) = 4.163$, $p = .018$, $\eta^2_{partial} = .058$).

Figure 1: Percentage of French fries selected by consumers with lower scores of mental imagery and consumers with higher scores of mental imagery in medium, large, and very large portions. Error bars represent the 95% confidence intervals.

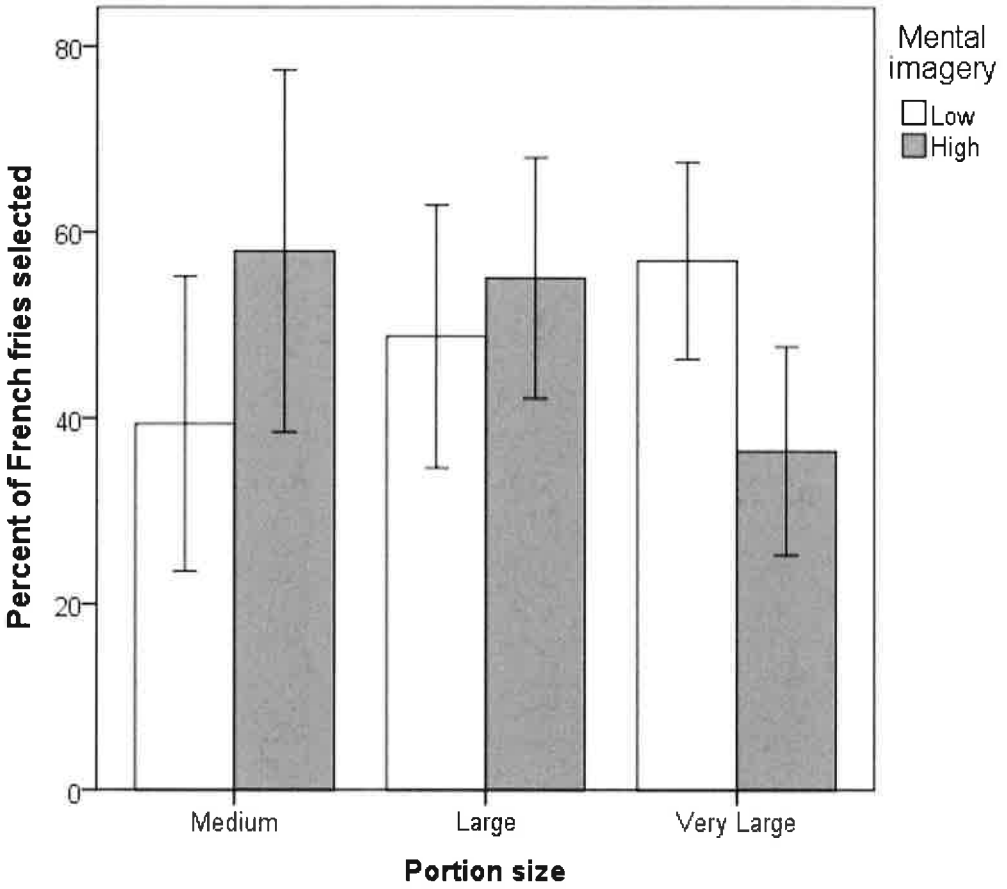


Figure 1 shows that those participants with higher scores of mental imagery selected a lower percentage of French fries from the very large portion ($M_{\text{high mental imagery}}$ = 36.47 %, SD = 6.66) than in the large ($M_{\text{high mental imagery}}$ = 55.08 %, SD = 6.66) and medium portions ($M_{\text{high mental imagery}}$ = 57.98 %, SD = 7.26). By contrast, those participants with lower scores of mental imagery selected a higher percentage of French fries from the very large portion ($M_{\text{low mental imagery}}$ = 56.95 %, SD = 7.09) than in the large ($M_{\text{low mental imagery}}$ = 48.77 %, SD = 6.66) and the medium portions ($M_{\text{low mental imagery}}$ = 39.38 %, SD = 6.79). These results suggest that the portion size effect becomes smaller for successively larger portion-size comparisons for consumers with higher scores of mental imagery, but not for consumers with lower scores of mental imagery.

Study 2

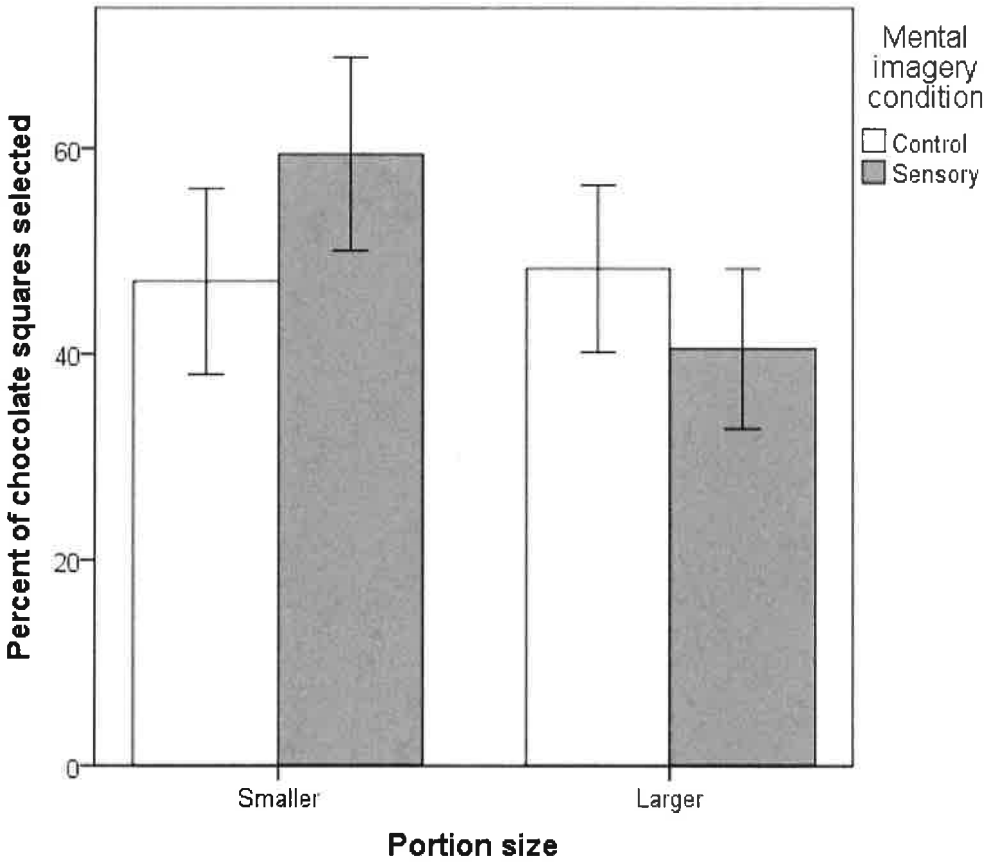
In Study 2, we hypothesize that asking consumers to imagine the sensory experience of eating all the food portion will reduce the percentage of food selected in the larger portion but increase the percentage of food selected in the smaller portion.

Materials and methods. 197 participants (80 females, mean age = 28.90 years, SD = 9.20) took part in the online study, conducted with Xperiment. All of the participants were recruited using Prolific Academic in exchange for a payment of £0.40. The participants had to evaluate a chocolate bar in a 2 (food configuration: small vs. large portion) x 2 (mental imagery: eating

mental imagery vs. control mental imagery) between-participants experimental design. The smaller food portion condition consisted of a picture of a chocolate bar of 15 squares (approximatively 75 g and 400 calories), while the larger food portion included a picture of a chocolate bar of 24 squares (approximatively 100 g and 530 calories). The 98 participants assigned to the sensory mental imagery condition were instructed to imagine the sensory experience of eating all of the chocolate. In the control mental imagery condition, 99 participants were encouraged to "think about anything (they) you would like to think about". After viewing the manipulated graphics of the chocolate bar, the participants have to indicate "How many squares of chocolate would you like to eat?" on a scale from "0" to "all" of the portion. The scale is illustrated with a chocolate bar on the screen, with the number of chocolate's squares varying as a function of the participant's answer.

Results and discussion. An ANOVA was conducted with the size of the chocolate bar and the mental imagery condition as the independent variables and the percentage of chocolate squares selected as the dependent variable. We found a significant main effect of the size of the chocolate bar ($F(1, 193) = 4.23$, $p = .041$, $\eta^2_{\text{partial}} = .021$). Importantly, the interaction between the two factors was also significant ($F(1, 193) = 5.52$, $p = .020$, $\eta^2_{\text{partial}} = .028$). Figure 2 shows that those participants in the sensory mental imagery condition selected a lower percentage of chocolate squares in the larger portion ($M = 59.47$ %, $SD = 4.26$) than in the smaller portion ($M = 40.57$ %, $SD = 4.34$). By contrast, the percentage of chocolate squares selected in the larger portion ($M = 48.33$ %, $SD = 4.26$) was approximatively the same as in the smaller portion ($M = 47.07$ %, $SD = 4.30$) for those participants in the control mental imagery condition. The results of Study 2 are largely supportive of our initial hypothesis, that by asking participants to imagine the sensory experience of eating all of the portion of food, the portion size effect is reduced.

Figure 2: Percentage of chocolate's squares selected in the medium and large chocolate bar sizes, by consumers in the control mental imagery and in the sensory mental imagery conditions. Error bars represent the 95% confidence intervals.



General discussion

The results of the two experiments reported in the present study provide several contributions to the literature on food portion size and provide insights related to the efficacy of mental imagery use in health prevention and food marketing campaigns. Specifically, this research is the first to show that it is possible to reduce the food portion size effect by means of mental imagery. The results of Study 1 reveal that consumers with higher scores of mental imagery select a lower percentage of food than those consumers with lower scores of mental imagery in the very large portion. The results of Study 2 indicate that it is possible to significantly reduce the portion size effect by asking consumers to imagine the sensory experience of eating the entire portion of food. Contrary to consumers in the control mental imagery condition, those in the sensory mental imagery condition selected a lower percentage of the food in the larger portion, than in the smaller portion. These results suggest that mental imagery of the experience of eating does not lead to anchor the consumption in function of the food portion size, but results in an evaluation of the food inside the portion. Portion size has been shown to significantly influence energy intake (Chandon and Wansink, 2011; Rolls et al., 2002; Wansink and Van Ittersum, 2007; Zlatevska et al., 2014). By asking consumers to imagine the sensory experience of eating all the portion of food, it is possible to increase their amount of mental imagery and, by so doing eliminate the portion size effect. We suggest that public policies might want to consider encouraging health prevention campaigns that help consumers to consider the consumption of the food inside the portion. For instance, Mantzari

et al. (2015) suggest presenting the same total amount of a carbonated cola sugar-sweetened beverage in multiple, smaller package to reduce the consumption. One may also imagine that short promotion texts in a product's packaging (e.g., "Imagine the pleasure inside") may enhance consumer's mental imagery related to the experience of eating its containing portion and therefore result in reducing the consumption. Thus, consumers could benefit from more economical package sizes (that are also less costly for food companies), without gaining weight. Our next step is test for the effect in a real consumption scenario.

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