



# Effect of institutional sensory test location and consumer attitudes on acceptance of foods and beverages having different levels of processing



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## ABSTRACT

New food products aimed at delivering specific nutritional requirements must also be subjected to sensory tests to guarantee high acceptance. The effect of information on sensory perception of foods is widely studied and the types of information often investigated are category, nutrition information, composition, product knowledge, applied technology and price. Several studies showed significant effects on acceptance and purchase intention. However, there is a lack of research on the effect of the location of sensory evaluation laboratories, an important variable given that most sensory evaluation laboratories are located in universities and research centers. In this context, two institutional locations were chosen in order to test their influence on consumer acceptance ( $n = 130$ ): Chemistry Location (School of Chemistry, Federal University of Rio de Janeiro) and Nutrition Location (School of Nutrition, Federal University of Rio de Janeiro State). The main hypothesis was that consumer acceptance might be significantly influenced by the institutional location where the sensory evaluation took place. Other hypotheses tested were: Does the degree of processing of the product impact the location effect? Does the degree of processing impact consumers' attitudes? Among other findings, PLS regression showed that the acceptance of the highly processed food was significantly ( $p < 0.05$ ) lower when tested at the Nutrition Location. This is possibly due to the fact that consumers do not expect an institution like the Nutrition Location to perform a test with a highly processed food product. Results suggest that sensory evaluation laboratories located in nutrition related institutions should take into consideration the degree of processing of the products that will be tested with consumers. Other variables found to be significant decreasing the acceptance of a highly processed food were "Pleasure", "Interest in natural products" (Health and Taste Attitude Scale) and age.

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## 1. Introduction

Sensory characteristics of a product are typically related to the context of product evaluation (Moskowitz, 2003), especially for untrained assessors (consumers). Understanding the relative impact of the factors that influence food choice is important to the success of new product development (Di Monaco, Ollila, & Tuorila, 2005) and the effect of information on sensory evaluation of foods and beverages has already been the object of study since the late 1990s (Deliza & Macfie, 1996; Tuorila, Meiselman, Cardello, & Leshner, 1998). The effect of the information can be measured in different ways, for instance, comparing groups of

consumers that received product information to those that did not receive product information (Beasley, Tuorila, & Saris, 2003; Cox, Melo, Zabarar, & Delahunty, 2012; Di Monaco et al., 2005; Puumalainen, Nykopp, & Tuorila, 2002; Tuorila, Andersson, Martikainen, & Salovaara, 1998; Yee Lee, Lusk, Miroso, & Oey, 2015) or using conjoint analysis (Carneiro et al., 2005; da Costa, Deliza, Rosenthal, Hedderley, & Frewer, 2000; Deliza, Macfie, & Hedderley, 2003). However, there is a lack of studies investigating the effect of institutional sensory evaluation location on consumers' responses.

Consumers' expectations, as well as sensory acceptances, are formed by previous knowledge and information about the product given during the test (Kälviäinen, Schlich, & Tuorila, 2000). Furthermore, the relationship between expectations and the real performance of the product is critical in the success of a new product (Tuorila, Meiselman, et al., 1998). It is widely recognized that the sensory experience is important for acceptance, but is also crucial

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to factor in what consumers think about the food (Huotilainen, Seppälä, Pirttilä-Backman, & Tuorila, 2006). The classic theory is that information affects the expectations toward a product and different expectations about certain products can lead to different sensory responses (Cardello & Sawyer, 1992). In addition, information about a food product creates expectations about its properties and, consequently, plays a big role on how the food is perceived (Piqueras-Fiszman & Spence, 2015). Usually, the objective of the industry is to increase acceptance through creation of positive expectations; however, there is a risk that high and unrealistic expectations cause a contrast effect on real sensations (Kähkönen & Tuorila, 1998).

In this context, the information can be from different domains: category (Huotilainen et al., 2006), nutrition information (Beasley et al., 2003; Cox et al., 2012; Tuorila & Cardello, 2002), product composition (Kähkönen & Tuorila, 1999), product knowledge (Puumalainen et al., 2002; Tuorila, Meiselman, et al., 1998), applied technology (da Costa et al., 2000; Deliza, Rosenthal, Hedderley, & Jaeger, 2010; Deliza, Rosenthal, & Silva, 2003; Siegrist, Cousin, Kastenholz, & Wiek, 2007), price (Carneiro et al., 2005; Di Monaco et al., 2005), among others, and a variety of studies have shown their effects, mainly in product acceptance but also in purchase intention (Carneiro et al., 2005; da Costa et al., 2000). For example, studies demonstrated that when advantages of using emerging technology were presented on the label, consumers were able to understand the benefits resulting in higher consumption intention (Deliza, Rosenthal, Abadio, Silva, & Castillo, 2005). Considering that most of sensory evaluation studies are performed in laboratories located in universities or research centers, the information about the institutional location of these laboratories might influence consumers' responses. Different expectations for the products evaluated may result due to the type of institution such as the School of Nutrition or the School of Chemistry.

In addition to information, consumers' attitudes interact with sensory perception, health attributes and food acceptance (Aaron, Mela, & Evans, 1994). Moreover, it is meaningful to consider that information affects people in different ways depending on the relevance they give to it (Kähkönen, Tuorila, & Rita, 1996). Several psychometrics scales have been developed and validated to measure consumers' attitudes, such as the Food Neophobia Scale (Ritchey, Frank, Hursti, & Tuorila, 2003), routinely used in studies about information effect and consumers' segmentation (Henriques, King, & Meiselman, 2009; Puumalainen et al., 2002; Tuorila, Meiselman, Bell, Cardello, & Johnson, 1994; Tuorila, Andersson, et al., 1998; Tuorila, Meiselman, et al., 1998). In the same way, the Food Technology Neophobia Scale measures consumers' fears of novel food technology (Cox & Evans, 2008; Evans, Kermarrec, Sable, & Cox, 2010; Rollin, Kennedy, & Wills, 2011). Another factor considered is the consumer behavior in relation to health and taste of food and it is possible to measure the features of this behavior using the Health and Taste Attitude Scale (Cox et al., 2012; Roininen, Lähteenmäki, & Tuorila, 1999; Roininen et al., 2001). Equally important to note, consumers might evaluate products more positively if they consider the product less processed and this can be related to data collected with the previous scales. Also, the same university or research center institutes related to nutrition or to food science and technology generally have sensory evaluation facilities as well as pilot-plants and laboratories for food processing and research. Therefore, it is reasonable to consider that consumers with no knowledge of those fields may be influenced, positively or negatively, by the institute's name. For instance, consumers may think that a food product processed in an institute called School of Chemistry is more highly processed.

Considering the lack of investigation on the effect of the institutional location of sensory evaluation laboratories on consumers'

sensory responses, the main objective of this study was to verify if the institutional locations Nutrition or Chemistry influence consumers' responses. In addition, if there is a location effect, would this be further influenced by the product's degree of processing, and how is this related to consumers' attitudes?

## 2. Materials and methods

### 2.1. Stage 1: determination of perceived degree of processing

A ranking test (Meilgaard, Civille, & Carr, 2007) was carried out in order to determine consumers' perception of the degree of processing for food products. Aiming for at least three statistically different processing levels, ten commercial samples were chosen: five animal origin products (Minas cheese, *doce de leite*, *mocoto* jelly, ham and salami) and five vegetable origin products (ready-to-eat fruit salad, canned olives, guava jelly, grape nectar and soda). Minas cheese is a popular Brazilian slightly matured white cheese. *Doce de leite* is a milk-based product, with added sucrose that has been evaporated and caramelized. *Mocoto* jelly is a sweet, flavored dessert prepared with the gelatin extracted from calf's foot. Consumers only had to visually rank samples in terms of degree of processing (concept), so 10 samples did not cause sensory or mental fatigue.

The test was carried out in the School of Chemistry Sensory Evaluation Laboratory (Federal University of Rio de Janeiro – UFRJ) and consumers were recruited among university students and employees. In order to make results relevant to the general population, participants were not connected to the food science and technology or nutrition programs at the university. Samples were coded with three-digit numbers and presented simultaneously to consumers in a balanced design (Macfie, Bratchell, Greenhoff, & Vallis, 1989). Data were analyzed using Friedman analysis at 5% significance level (Meilgaard et al., 2007).

### 2.2. Stage 2: effect of institutional sensory evaluation location

Consumer acceptance and purchase intention were evaluated for five samples with different perceived degrees of processing as determined in the previous study. In order to investigate the influence of the institutional location of sensory evaluation laboratories on consumers' responses, the test was carried out in two different sites: School of Chemistry at Federal University of Rio de Janeiro and School of Nutrition at Federal University of Rio de Janeiro State. These two locations were chosen due to the contrast between the cores of their names: "Chemistry" vs. "Nutrition", which may be reflected in consumers' responses. During the recruitment and on the ballots, participants were always informed that they were taking part in a sensory evaluation performed in a laboratory at the School of Chemistry or at the School of Nutrition. Due to this study's characteristics, a control group was not used given that it would not be possible to guarantee that a group of participants would completely ignore the institute's name where the sensory evaluation is held. Participants were recruited among university's students and employees, not related to the food science and technology or nutrition programs so that a possible knowledge of those fields did not influence their responses. Demographic variables gender and age were controlled so there was no difference (chi-square tests) between the two groups (participants at School of Chemistry and participants at School of Nutrition).

Consumers received samples with three-digit codes in a balanced sequential monadic presentation (Meilgaard et al., 2007; Macfie et al., 1989). Each participant evaluated samples for overall liking using a structured 9-point hedonic scale ranging from "dislike extremely" to "like extremely". Crackers and taste-free water

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