



Influence of cognitive style on information processing and selection of yogurt labels: Insights from an eye-tracking study



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ABSTRACT

Cognitive styles are characteristic and stable ways in which people acquire, organize and use information for solving problems and making decisions. Field dependence/independence is one of the most studied cognitive styles. Field independent subjects are characterized by having less difficulty in separating information from its contextual surroundings and being less likely to be influenced by external cues than field dependent individuals. The present work aimed at studying the influence of field dependence/independence cognitive style on consumers' visual processing and choice of yogurt labels. One hundred and thirty three consumers completed a choice conjoint task. They were asked to select their preferred yogurt label from each of 16 pairs of labels. While they completed the task their eye movements were recorded using an eye-tracker. Then, consumers were asked to complete the Group Embedded Figure Test to determine their cognitive style. Consumers were divided into two groups with different cognitive styles: 58% of the sample was characterized as field dependent and 42% as field independent. When making their choices, field dependent consumers tended to engage in less thoughtful information processing than field independent consumers and they made fewer fixations on traditional nutritional information. Besides, cognitive style significantly affected the relative importance of fat and sugar content on consumer choices and modulated the influence of the traffic light system. Field dependent consumers gave less importance to the nutritional composition of the yogurts than field independent consumers for selecting their preferred label. Results from this work suggest that studying the psychological underpinnings of consumers' decision making process when selecting food products has a great potential to contribute to a better understanding of how eating patterns and consumer preferences are shaped.

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1. Introduction

Food choice is a complex behavior that is influenced by several inter-related factors (Köster, 2009). In the contemporary developed world a large number of foods can be acquired without significant effort and several different options are available within each food category (Rozin, 2005). In this context, food labels play a major role in attracting consumers' attention and providing information that shape expectations and influence purchase decisions (Moskowitz, Reisner, Lawlor, & Deliza, 2009). When consumers have difficulty in selecting among several options of a specific product they can use specific information from labels to make up their mind (Bredahl, 2004; Mueller, Lockshin, Saltman, & Blanford, 2010).

Food labels communicate information to consumers in two main forms: linguistic signs (e.g., information about ingredients, brand, manufacturer, nutritional information) or signs that are based on appearance (colors, shapes or pictures) (Smith, Møgelvang-Hansen, & Hyldig, 2010). Given that consumers make more than 200 food choice decisions

per day (Wansink & Sobel, 2007), it is unlikely that they invest a large amount of cognitive effort for making their food-related decisions (Wansink, 2010). Besides, even if they would be willing to think carefully about all their food choices, they have a limited capacity to process all the available information (Kahneman, 2003, 2011). Therefore, in the few seconds consumers usually invest in deciding which product they will buy, they only pay attention to some of the information provided in labels (Milosavljevic & Cerf, 2008). Although consumers are constantly exposed to food labels, relatively little research has been carried out on the cognitive processes that mediate information processing of food labels (Ares et al., 2013; Gaschler, Mata, Störmer, Kühnel, & Bilalić, 2010).

Consumers have been reported to differ in how they process information to make their decisions (Epstein, 2003; Stanovich & West, 2000). Cognitive styles can be defined as stable and consistent ways in which an individual acquires and processes information (Ausburn & Ausburn, 1978; Guildford, 1980). They determine the strategies that people use for perceiving, thinking, learning, solving problems and making decisions (Hayes & Allinson, 1998; Messick, 1984). According to Kozhevnikov (2007) cognitive styles can be a better predictor of people's choices in a particular situation than contextual factors, cognitive ability,

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cognitive complexity or creativity level. Besides, cognitive styles have been reported to influence attentional processes, academic achievement, acceptance of novel goods and purchasing behavior (Foxall, 1993; Foxall & Bhate, 1991; Guisande, Páramo, Tinajero, & Almeida, 2007; Khodadady & Zeynali, 2012; Tinajero & Páramo, 1997).

One of the most widely studied cognitive styles is field dependence/independence, which describes two ways of processing information (Guisande et al., 2007; Witkin & Goodenough, 1981). Field independent subjects have less difficulty in separating information from its contextual surroundings and are less likely to be influenced by external cues than field dependent individuals (Zhang, 2004). Also, field independent individuals have been reported to have greater ability than field dependent individuals of focusing and sustaining attention on relevant information, while inhibiting attention to irrelevant information (Guisande et al., 2007; Macizo, Bajo, & Soriano, 2006). Studying the influence of cognitive styles on consumers' food choices can contribute to a better understanding of how eating patterns and preferences are shaped. Field dependence/independence is expected to affect processing of food labels and how consumers make their choices (Kozhevnikov, 2007). Field dependent ones are expected to rely to a larger extent on simple information, whereas field independent consumers are expected to give more importance to objective and complex information, such as nutritional information. Besides, field independent consumers are expected to be able to sustain their attention longer on food labels when choosing between alternative products than field dependent consumers (Guisande et al., 2007; Macizo et al., 2006). The largest differences in information processing of food labels between field dependent and independent participants are expected to be found in complex information, such as nutritional information, which has been reported to be difficult to understand (Mhurchu & Gorton, 2007; Sharf et al., 2012; Zhang, 2004).

In this context, the aim of the present work was to study the differences between field independent and field dependent consumers in the way in which they process information and select yogurt labels.

2. Materials and methods

A consumer study was carried out to evaluate the influence of cognitive style on visual processing and choice of food labels. Yogurt labels, not available in the Uruguayan market, were used as stimuli due to the variety of products available in the marketplace and the wide range of associations they generate in consumers' mind (Ares et al., 2011). Besides, yogurt is a product widely consumed worldwide, and particularly in Uruguay, by several groups of consumers, including children and elderly people. Consumers' choices were determined using a choice conjoint-task (Elrod, Louviere, & Davey, 1992), whereas visual processing was evaluated using eye-tracking (Holmqvist, Nyström, Andersson, & van de Weijer, 2011).

2.1. Participants

The study was carried out with a convenient consumer sample. One hundred and thirty three people participated in the study, 66% of which were females. Their ages ranged from 18 to 46 years old (average 23.3, standard deviation 5.1). Consumers were recruited among students and workers of the Psychology Faculty of Universidad de la República (Uruguay), according to their interest and availability to participate in the study. The only requirement for recruitment was being consumers of yogurt, at least occasionally (twice a month). All participants self-declared normal or corrected-to-normal vision and full color vision. Participants signed an informed consent form and received a gift for participating in the study.

2.2. Stimuli

A choice-based conjoint was used to study consumer choice of yogurt labels (Elrod et al., 1992). Yogurt labels were designed considering four 2-level variables: fat and sugar content, label background, brand, and traffic light system. Fat and sugar content, label design and brand are responsible for the major differences among commercial plain yogurts available in the Uruguayan market.

Fat and sugar content is the nutritional characteristic most frequently modified in commercial healthful products. High and low levels of each nutrient were selected considering the technical guidance proposed by the Food Standards Agency (2007).

Label design has been reported to affect consumers' expectations and willingness to purchase (Ares et al., 2011; Deliza, MacFie, & Hedderley, 1996). Two backgrounds were considered to study the influence of the graphic design of the label on consumers' choices. Backgrounds were selected considering results for a previous word association test in which 111 yogurt consumers evaluated five labels. One of the selected backgrounds (Background A) was strongly associated with health-related concepts (health, wellbeing, healthful, nutritious), whereas Background B was related to freshness, naturalness, sensory characteristics (fruity, sour, sweet) and positive hedonic terms (yummy, nice, tasty, tempting) (Fig. 1). Both backgrounds were different from those of commercial products available in Uruguayan market and therefore were not familiar for participants.

Considering the relevance of brand name on consumer food choices (Jaeger, 2006), two brands with different familiarity in the Uruguayan market were considered: a very well-known brand (Brand A) and a small brand (Brand B).

The traffic light system was considered as an independent variable in the study to evaluate if simple formats of front-of-pack nutritional information affect consumers' choice of yogurt labels and if their influence is different for field dependent and field independent consumers. For this purpose, labels were design with and without the traffic light system.

A summary of the variables considered in the study is presented in Table 1. Labels were designed using GIMP 2.6. All compulsory information was included on the labels. A total of 16 labels were designed: 8 labels included the traffic light system and the other 8 did not.

Two choice sets composed of 8 pairs of labels were generated, one composed of labels with the traffic light system and the other composed of labels without the traffic light system. Labels with and without the traffic light system were considered separately in order to obtain a more realistic situation and to evaluate if the inclusion of front-of-pack nutritional information changed the relative importance that consumers gave to the other three independent variables when selecting their preferred yogurt label. Choice sets were generated using the mix-and-match procedure (Johnson, Kanninen, Bingham, & Ozdemir, 2007) in the support.CEs package (Aizaki, 2012). The choice sets considered in the study are presented in Appendix A. An example of a choice set is shown in Fig. 1. The position of the labels (top or bottom) within each set was randomized across participants. The no choice alternative was not included in the design. Brazell et al. (2006) reported that dual response choice designs do not systematically bias results from choice-conjoint studies.

2.3. Procedure

The choice sets composed of two labels were presented following a balanced complete block experimental design (William's Latin Square) on a 17-inch thin-film transistor LCD monitor of a Tobii T60 eye tracker (Tobii Technology, Stockholm, Sweden) with a 1280 × 1024 pixel resolution.

Participants were asked to sit at a distance of 65 cm from the monitor and to move as little as possible. Before starting the task participants

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