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Quantitative analysis of product categorization in soft drinks using bottle silhouettes

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ABSTRACT

In our daily life, we use our senses to acquire information about the objects that surround us. However, the information processing that allows for the recognition and consecutive classification of those objects into categories remains unclear. Our purpose is to analyze the categorization mechanism taking into account: (a) package visual metrics and (b) consumer perceptions of this basic visual information. First of all, we quantitatively analyzed the physical characteristics of 52 bottle silhouettes of seven soft drink categories: sports drinks, water, flavored water, sodas, fruit juices, malt drinks and tea. We found that measures of the shape of the bottles can model the membership to a product category. Our first experiment tested how accurately consumers could recognize product category from real bottle silhouettes. We found that the visual characteristics that differentiate product category silhouettes are lid width and bottle shape (body kurtosis). Our second experiment tested the capacity of consumers to recognize artificially created bottle silhouettes. When basic information, such as the product shape is modified, consumers are not always capable of recognizing its corresponding category. We concluded that the physical attributes of bottles are related to the categorization process of the bottle content made by consumers. These findings may provide guidelines for new bottle designs that capitalize on existing categorization rules based on consumer perception.

1. Introduction

Product packaging is believed to enhance consumer awareness and brand recognition because not only is it informative about the product characteristics and attributes, but also has an esthetic meaning to the consumer (Bloch, 1995; Creusen & Schoormans, 2005). A package can be considered the most important communication tool of a product because it is the first and most accessible information that is available to consumers. It is most often the only decision-making tool available at the point of purchase and is the part of the product with which buyers are actively involved during the decision-making process and consumption (Ampuero, 2006).

The accuracy of the product categorization depends upon how the package is able to communicate its content and purpose; that is, the product category it represents. Thus, our purpose is to analyze the accuracy of the categorization mechanism providing information regarding both package design and consumer perceptions. There is extensive literature available regarding the cognitive categorization process in which consumers engage in choosing a product and making a final purchase decision (Bloch, 1995; Cohen & Basu, 1987; John & Sujan, 1990). Nevertheless, consumer behavior studies on categorization have evaluated this cognitive process based on consumer perceptions. We complement the consumer's perspective with the actual physical characteristics of package. In other words, before interpreting the consumer's categorization process, we confirm whether there is in fact a consistent product category according to visual package characteristics.

A package is defined as a product container that has a functional and symbolic purpose. The functions of packaging are to hold, protect, preserve, identify, and facilitate handling and sale of a product (Ampuero, 2006). Packaging has a symbolic purpose because, thanks to its shape and esthetic components, evokes particular product characteristics to the consumer. It plays an essential role in communicating product values as it is consciously designed to blend with a brand (Orth & Malkewitz, 2008). Finding the ideal packaging for a product is a challenge, but both designers and marketing managers should engage into this search for the most suitable kind of packaging for a specific product, considering all product performance requirements, regulations, and

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manufacturing restrictions (Bloch, 1995). It is difficult for product designers to determine which shape a product should have in terms of consumer perceptions to accomplish its informative and esthetic goals.

In particular, the consistency and accuracy of product informative characteristics should motivate product recognition and recall on the part of consumers. Based on product packaging, consumers should be able to determine the category to which a product belongs, its benefits, and form of use. At the point of purchase, consumers choose and decide to purchase a product based on their own experience, but if there is no previous experience and it is the first time a consumer makes a purchase decision, the majority (if not all) of the information is gathered from the packaging and labeling. Both experience and packaging characteristics have an influence on consumer perceptions of a product.

Nevertheless, to optimize the shopping experience, consumers rapidly review basic product characteristics and recognize its overall use and benefits. This cognitive process known as categorization (Bloch, 1995; Cohen & Basu, 1987) reduces the amount of information a consumer has to learn and understand during a shopping experience to be able to recognize a product as a member of a category. When a decision is made, an individual recalls basic cues that provide sufficient information to recognize a product. This paper evaluates packaging silhouette as a minimum packaging characteristic that furnishes information about a product category. We use this specific packaging representation to analyze the consumer's categorization process.

The literature on consumer categorization understands categorization as a cognitive process (Bloch, 1995; Cohen & Basu, 1987; John & Sujan, 1990). Also, the cognitive process depends upon the consumer's experience and upon the products available in the market. Therefore, this study evaluates consumer's categorization based on the physical characteristics of bottle silhouettes of soft drinks commonly available in the market. Consistently, our purpose is to analyze the categorization mechanism considering two levels at which this process takes place, namely, at the product and consumer level. We assume that accurate categorization firstly depends upon the consistency of products within a category and secondly upon an individual's capacity to recognize a product based on basic physical product attributes. Our literature review provides an understanding of the consumer's categorization mechanism as a cognitive process that facilitates the consumer's decision-making process.

Our objective requires two stages of analysis. First, we quantitatively analyzed the physical characteristics of 52 real bottles silhouettes of seven soft drink categories: sports drinks, water, flavored water, sodas, fruit juices, malt drinks and tea. The results show the consistency of the physical patterns of soft drink bottles in each category. Our second analysis is at the consumer level. We ran an experimental study that evaluated the consumer's ability to determine whether a product belongs to a particular soft drink category by using visual information about its silhouette (Gofman, Moskowitz, & Mets, 2010). Following, we tested the consumers' ability to recognize artificially created silhouettes. We manipulated the real silhouettes in two ways; firstly, by extracting an average silhouette for each category, and secondly, by creating a shrunken and expanded version of each silhouette. In this case, we also tested consumers' accuracy or ability to recognize each manipulated silhouette within the right category.

2. Categorization

In their everyday life, individuals use their vision to acquire information about the objects that surround them, like the freshness of vegetables (Arce-Lopera, Masuda, Kimura, Wada, & Okajima, 2015) or the age perception of the human skin (Arce-Lopera, Igarashi, Nakao, & Okajima, 2013); also, this includes learning about products and brands. However, not every object or product is noticed and memorized. The best individuals can do is to identify simple characteristics which are common to a product group, and to remember the group as a whole or as a category (Cohen & Basu, 1987). Categorization is a cognitive mechanism that enables consumers to understand a product by placing it within an existing category and to simplify their attention and decision-making processes (Bloch, 1995; Kahneman, 2011).

A product category represents a concept that groups a number of products that share similar attributes and characteristics. When there is not a sufficient number of attributes to define a category, boundaries tend to be fuzzy, and it is not always clear whether or not a product belongs to a particular category (Fiske & Taylor, 2008). The categorization process involves a comparison between different products to enable differentiation from others that belong to different categories. Subsequently, these differences are learned as functional and esthetic characteristics of a group. This process is important in a consumer environment because it allows individuals to find and choose a product easily by recognizing its basic attributes and benefits. Individuals use basic information like the shape or silhouette of a product to make an evaluation and recognize its attributes (Becker, van Rompay, Schifferstein, & Galetzka, 2011; Parise & Spence, 2012). Thus, a packaging shape that is easily assigned to a category is more efficient, compared to one that does not belong to a particular category, because consumers need less time and lesser details to understand its use and benefits. Hence, categorization is an important mechanism in the consumer's decision-making process.

The cognitive categorization process is explained through two alternative models: feature-based and exemplar-based models (Cohen & Basu, 1987). The feature-based model is based on a prototype perspective. The prototype perspective states that individuals reach a category prototype by finding an overlap between products of a category. The prototype is the central tendency or average of a product category (Fiske & Taylor, 2008). Details of every product are lost, and individuals are left with a schema-like representation that evokes a "typical" category product. When consumers find a new product, they learn about its characteristics and match these with a certain category.

The second model is the exemplar-based categorization perspective, which emphasizes the importance of some brands as individuals learn about a product category. Therefore, when individuals think of a category, a specific category member comes to mind. As the variation of product characteristics within a category increase, individuals tend to take the prototype approach. However, for more complex concepts the exemplar basis is a preferred path. In this case, prototypical features may be difficult to remember, whereas those of an exemplar are easily brought to mind. In practice, both perspectives depend upon contextual characteristics that influence choice and consumption due to an individual's exposure to particular brands through marketing and advertising (Cohen & Basu, 1987).

2.1. Study 1: market categories

At the point of purchase, products are organized into product categories, namely, sets of products that have similar functions and benefits. This preliminary study evaluates the extent to which product categories have a consistent shape, which is observed through product silhouettes. Consistency means that a given physical attribute has a similar measure across different kinds of bottles (i.e., relatively low variance). We choose the physical attributes of a bottle silhouette as the following: Centroid X coordinate (CX), Centroid Y coordinate (Emery, Kramer, & Tian, 2001), Body