



Elapsed time on first buying triggers brand choices within a category: A virtual reality-based study[☆]



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ABSTRACT

This study integrates neuroscientific tools such as data from eye movements, store navigation, and brand choice in a virtual supermarket into a single source data analysis to examine consumer choice, customer experience, and shopping behavior in a store. Through qualitative comparative analysis, the findings suggest that a high level of attention to a brand and slow eye movements between brands lead to additional brand purchases within the product category. This study points out that the key driver of additional brand choices is the time buyers spend on the first choice, showing that the allocation of less for the first choice triggers additional purchases within the product category and, therefore, increases sales. In addition, this study discusses practical and methodological implications for retailers, manufacturers, and researchers.

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1. Introduction

Brand choice process at brick-and-mortar store level is still relevant. First, sales volumes are higher offline than online in some product categories (e.g., grocery products account for 80.1% of purchases in UK stores in 2014; Statista, 2015). Second, some retailers implement the “buy-online pick-up-in-store” practice, thus pursuing the integration of online and offline retail channels (Gallino & Moreno, 2014).

Although marketing research devotes huge attention to brand choice (Jacoby, Speller, & Kohn, 1974) and integrative approaches grow in numbers, few of these approaches draw on neuroscientific tools (Van der Laan, Hooge, De Ridder, Viergever, & Smeets, 2015) or virtual reality (Pfeiffer, Pfeiffer, & Meibner, 2013). However, video tracking emerges as a valid alternative despite the limitations of that tool (Hui, Huang, Suher, & Inman, 2013; Zhang, Li, Burke, & Leykin, 2014).

Three main elements may influence shopping behavior in a physical store: (1) brand value as a composite of brand attributes compared with available alternatives; (2) physical variables such as atmospheric, product disposition, and shelf space; and (3) consumer paths (Hui, Bradlow, & Fader, 2009). Shoppers move dynamically within the store,

so brand choice processes cannot ignore flows, product proximity, physical and visual contact, and space within the store. Prior research in consumer behavior in physical store neglects integrative frameworks because of the complexity of gathering consumer information in a single source data context. Furthermore, conscious decision making is not always the key driver in purchasing behavior (Walvis, 2008), and unconscious thoughts can even lead to better, more satisfying decisions. With a few exceptions, recent marketing literature does not pay attention to virtual retailing (Pantano & Laria, 2012), choosing to focus, instead, on online retailing and advertising.

Therefore, the aim of this research is to overcome such gaps in brand choice at store level using human behavior tracking (HBT) and eye tracking (ET) in VR. These techniques report consumer paths, seeking behavior, purchase behavior, and the time a person spends on each task. The specific research goals are threefold. First, despite the number of studies explaining variety-seeking behavior, the literature falls short in differentiating between buying and consuming behaviors. Second, to evaluate the influence of the time people spend examining a brand, which affects subsequent purchase decisions and influences brand choices within the same product category. Third, because the literature considers in-store paths and visual attention explanatory variables for purchase decisions, this study argues that the time people spend on the first brand they purchase influences more purchases within the same product category.

This study tests the effects of store navigation and gaze behavior on purchase decisions within a budget in the context of fast-moving consumer goods (FMCG) using a neuroscientific approach based on

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human behavior tracking (HBT) (Gonzalez, Hidalgo, & Barabasi, 2008) and eye tracking (Wedel & Pieters, 2014) in a VR store. This research contributes to the existing literature by integrating HBT and eye tracking to overcome the limitations of prior neuroscientific studies based solely on eye tracking (Van der Laan et al., 2015) or video tracking approaches which do not capture the scan path and fixations of shoppers' eye movements (Hui et al., 2013). In addition, this study introduces new metrics of interest in consumer choice at store level that link with brand choice and consumers' paths and attention to specific brands foster shoppers' decisions and different behavioral responses such as time spent at the store, time spent on first purchase, or number of eye fixations on each brand on the shelf.

As far as the literature goes, this is the first study to use qualitative comparative analysis (QCA) drawing on neuroscientific information.

2. Literature review and hypotheses

Individual preferences, past experience, and marketing mix elements influence consumers' brand choice (Shin, Misra, & Horsky, 2012). At store level, retailer's decisions also play a key role. This study integrates individual preferences and manufacturer and retailer policies in a virtual store to capture consumer responses to an integrated stimulus from the brand and shelf space (i.e., manufacturer and retailer policies).

Khan (1995) defines variety seeking in purchase behavior as the tendency of individuals to seek diversity in their choices of services or goods. Consumer behavior is goal-oriented and draws on deep reasoning (Kopetz, Kruglanski, Arens, Etkin, & Johnson, 2012). Consumers may differ from buyers in many product categories and more interestingly may differ in their behavior goals. Consumers may pursue variety seeking to achieve emotional goals or new experiences, whereas utilitarian tasks such as saving money, saving time, or following orders is what drives buyers. Although researchers argue that experiential or hedonic motives explain variety seeking, (Van Trijp, Hoyer, & Inman, 1996), studies tend not to differentiate buying and consuming.

This study argues that consumers are more variety seeking than buyers, and because purchase frequency also affects repeat purchasing (Van Trijp et al., 1996):

H1: Usual consumers differ from usual buyers in their variety-seeking behavior, showing more diversity in their brand choice.

Turley and Milliman (2000) summarize the atmospheric effects on shopping behavior, positing a bundle of influences on consumer evaluations and subsequent behaviors. This research replicates store elements using VR. Prior research posits the influence of atmospheric elements on traffic paths within the store. More interestingly, consumers' visual attention to brands is the key driver of potential purchases through perception in different parts of the brain, like the fovea and brain area V1 (Orquin & Loose, 2013). Therefore, choice modeling begins to incorporate objective measures of visual attention that derive from eye movement research (Orquin & Loose, 2013).

Human behavior studies define fixation as the point in time and space when the eyes are relatively stationary and virtually all visual input occurs (Rayner, 1998). Almost all human decisions involve acquisition of visual information, but decision making is a special kind of task where the valuation of information is different depending on each case and user (Just & Carpenter, 1985). Russo and LeClerc (1994) find that the decision process in a prototypical physical store involves orientation, evaluation, and verification with different fixation patterns at each stage. This study uses two measures from eye-tracking studies: "average fixation duration (AFD)" to capture attention to one specific stimulus in seconds and "fixations per second" to reflect the speed of attention. Pieters and Warlop (1999) argue that time pressure may lead customers to accelerate information acquisition, filter part of the available information, and/or shift the information acquisition strategy.

Therefore, at store level, on the one hand, customers who spend more time (i.e., non-accelerated processes) and/or do not filter much of the brand information purchase more products; in addition, this behavior may stem from emotional goals and occurs in variety-seeking behaviors. On the other hand, customers with less time and a high level of filtering make fewer purchases and their behavior relates to brand loyalty, through a retrieval of the main features of their regular brand.

H2a: A high level of attention to a brand and slow eye movements between brands lead to additional brand purchases within the product category.

H2b: A low level of attention to a brand and quick eye movements between brands lead to few brand choices within the product category.

Time at the store is an exogenous variable with various influences on consumer behavior. When consumers spend more time in a store, they become more goal-oriented, spend less time on exploration, and are more likely to buy (Hui et al., 2009). Time pressure also limits the ability to process information (Suri & Monroe, 2003) and therefore of fostering the choice of additional brands.

H3: When less time is spent on the first purchase, more purchases of other brands within the same category emerge.

3. Methods

3.1. Research design and study context

This study uses VR and neuroscientific techniques, which have proven their suitability in other contexts (Bohil, Alicea, & Biocca, 2011). The virtual environment (VE) was a high-quality 3-D simulation of a supermarket aisle projected into a cave automated virtual environment, CAVE, setup, a 3 × 3 × 3 immersive reality room with three walls and a floor capable of displaying stereo images (Carlson et al., 2011). Position tracking is also available in CAVE. Graphic programming and natural interfaces allow the user to navigate freely through the store and interact with 3D products. In addition, CAVE records eye movements, gaze time, and fixations.

This study focuses on fast-food product category. The criteria for this choice were high brand assortment, price and package sensitivity, and a wide range of varieties and formats. Beer meets the above criteria and also shows brand switching in brand choice studies (Van Trijp et al., 1996). This study invited purchasers of beer at a supermarket within the last 3 months to participate in the research. Participants do not suffer from claustrophobia, epilepsy, and/or anxiety. Participants had a fixed budget of 15 euros to spend on any type or amount of beers, following their regular shopping pattern. To reflect reality as much as possible, the study limited the time at the virtual store to eight minutes, following previous experience in similar VR studies. Participants could move through the supermarket aisle, examine, and return the product or put it into the shopping trolley.

This study collected user behavior through HBT technology, a monitoring layer that runs in background, and grouped the data into the following: (1) product interaction and choice, that is, data on products that consumers took off the shelf, viewed, and had information on their attributes, in-depth information on the depth of the interaction (viewed vs. taken off the shelf), viewing time, and final selection of products for the virtual shopping basket, taking into account order of purchase and personal budget evolution; and (2) in-store navigation, that is, data on how shoppers navigate, time spent in areas of interest (AOI), proportion of AOI visited, stops inside the space, and paths into the virtual store.

An eye-tracking system embedded in the HBT technology monitored eye movements. Participants had wireless SMI eye-tracking glasses with a video-based pupil and corneal reflex system and head-tracking

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