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Role of Expiration Dates in Grocery Shopping Behavior: An Eye Tracking Perspective

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Purvi Shah
Worcester Polytechnic Institute
pshah@wpi.edu

Minal Goyal
Worcester Polytechnic Institute
mhgoyal@wpi.edu

Daiyang Hu
Worcester Polytechnic Institute
dhu@wpi.edu

Abstract

When consumers search for and check expiration dates, the risk of purchasing a stale and diminishing quality product reduces. The authors use a simulated eye tracking enabled IT mediated environment to understand the underlying motivation of consumers for checking expiration dates while purchasing groceries. Preliminary findings suggest that expiration date plays an important role in consumers' grocery shopping decision making. This research provides evidence that IT mediated test environments enabled with eye tracking can provide a powerful tool for studying consumer behavior and decision making in regard to expiration dates. The findings from this research have the potential to provide several implications to theory and practice.

Keywords

Eye tracking, expiration dates, grocery shopping behavior, and IT mediated environment

Introduction and Background

Eye tracking is a valuable addition to an IT mediated environment when unobtrusive observation of attention and awareness is necessary. Eye tracking techniques enable researchers to record and observe consumers' eye movements and understand their decision making process. It facilitates collection and analysis of data that describe how consumers interact with their environment and make dynamic choices (Hui, Fader, and Bradlow, 2009). Eye tracking enabled IT mediated environment also provides results for choices made, total decision time, and fixation durations (Glockner and Herbold, 2011). This research uses such a simulated eye tracking enabled IT mediated environment to understand the underlying motivation of consumers for checking expiration dates while purchasing groceries. While examining eye movements to understand decision making in regard to expiration dates is very important, little work has been done in this area. Expiration date is an important piece of external information consumers search for while purchasing perishable grocery products as it provides information about the shelf life and freshness of perishable grocery products such as milk, bread, eggs, meat, or packaged vegetables. The expiration date is an indicator that the product is fresh and at its best quality. Consumers use expiration dates to reduce the uncertainty and risk of purchasing a stale and denigrated quality food product that could

negatively impact consumers' health and safety (Tsiros & Heilman, 2005). Despite its importance in consumer decision making, there are very few research studies in the domain of expiration dates and consumers' grocery shopping behaviors (for e.g., Harcar & Karakaya, 2005; Sen & Block, 2009; Tsiros & Heilman, 2005). Consumers' understanding of and motivation to check expiration dates deserves greater consideration from two perspectives: (1) from the micro level point of view of consumers' personal health and safety and a retailer's marketing and inventory management and (2) from the macro level social and public policy aspect of consumer protection and food waste reduction (Brody, 2008).

Methodology

This research uses an IT mediated environment to collect qualitative and quantitative data of the user's eye movements, gaze patterns, and variables influencing the decision making in a simulated shopping environment as shown in Figure 1 and 2.
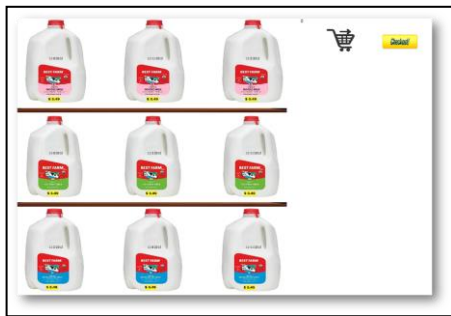
Figure 1. Stimulus – Milk Shelf

Figure 2. Stimulus– Medicine Shelf

Sample and Data Collection

Data was collected from 44 U.S. consumers who purchase grocery products for their household on a regular basis. The participants' ages ranged from 18 to 50 years (mean = 34 years). The sample was comprised of 56% female participants. Participants were invited to an eye tracking lab where they were asked to shop for milk and cough medicine. In each product category, 9 stock keeping units (SKUs) were displayed. These were identical to one another except the expiration dates, which were randomly assigned to each SKU. There were three kinds of dates for milk: (1) expired 3 days ago; (2) expiring 3 days from today; (3) expiring 7 days from today. And the kinds of dates for medicines were as follows (1) expired a week age; (2) expiring one month from today, and (3) expiring 6 months from today. The position of the SKUs were also randomized to control for ordering effects. Participants were asked to complete the shopping task and then were directed to an online survey. The participants then completed the survey. Participants were asked to answer questions about their general grocery shopping behavior, health consciousness, perceived risk in not checking expiration dates, demographic characteristics, and importance of expiration dates in their shopping decision. All these measures were assessed using established scales.

All the data collected by the eye tracking device, the survey, and the backend database of the website will be used in the analysis to understand consumers' motivation to check expiration dates at the retail shelf while shopping for perishable groceries.

Preliminary Results

On an average participants took 41 seconds to finish the shopping task for both products. For shopping milk, participants took 38 seconds on an average as compared to 44 seconds on an average for cough medicine. This shows that participants invested more time in decision making while shopping for

medication. The decisions made by participants in the shopping task are illustrated in figure 3. 31 participants purchased the milk SKU with the farthest expiration date, 10 purchased the milk SKU with the closer expiration date, whereas 3 purchased the expired milk SKU. In the case of the cough medicine, 22 participants purchased the SKU with the farthest expiration date, 17 purchased the SKU with the closer expiration date, whereas 5 purchased the expired cough medicines.

Only quantitative data is not sufficient to understand why these decisions were made. Therefore, we will be analyzing the open-ended qualitative responses provided by participants when they were asked in the survey, "Why did you choose to buy this product?"
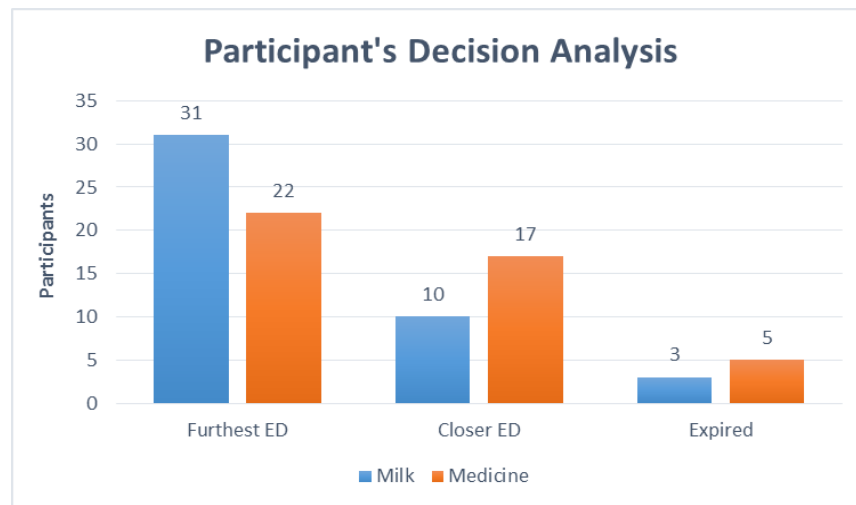

Figure 3. Participants' Decisions

Further, literature has shown that the length of fixation can affect the distribution of attention, narrowing down the select range of options, and also affects decision making. Figure 4 illustrates the total time of fixation of the participant's eye on the areas of interests (AOIs) i.e., expiration dates. It is clear from this chart that the participants who purchased the SKUs with the farthest expiration date had the highest average time of fixation on the expiration date ranging from 1 minute 80 seconds for milk to 2 minute 30 seconds for medicines. This again shows that participants spend more time in checking expiration dates when medicines and health are involved. The participants who purchased expired products had the lowest average time of fixation on expiration dates i.e., from 1 minute for milk to 2 minute 35 seconds for medicines. However, it is also important to note that participants were fixated on the expiration date of the medicine for almost the same amount of time irrespective of the decision they made later. Whereas, for milk a clear pattern can be seen that more fixation time led to a better decision.

Along with average task time and fixation, eye tracking also generated heat maps (figures 5 and 6) which depict where and how long the participants looked at on the stimuli and AOIs. It can be seen from the heat maps that the participants looked more on the expiration date labels for the products on the top two shelves. Also, the eye fixation was observed to be more on the middle and right corners of the shelves. This helped us to understand how expiration date and location of the products influenced user's decision making.
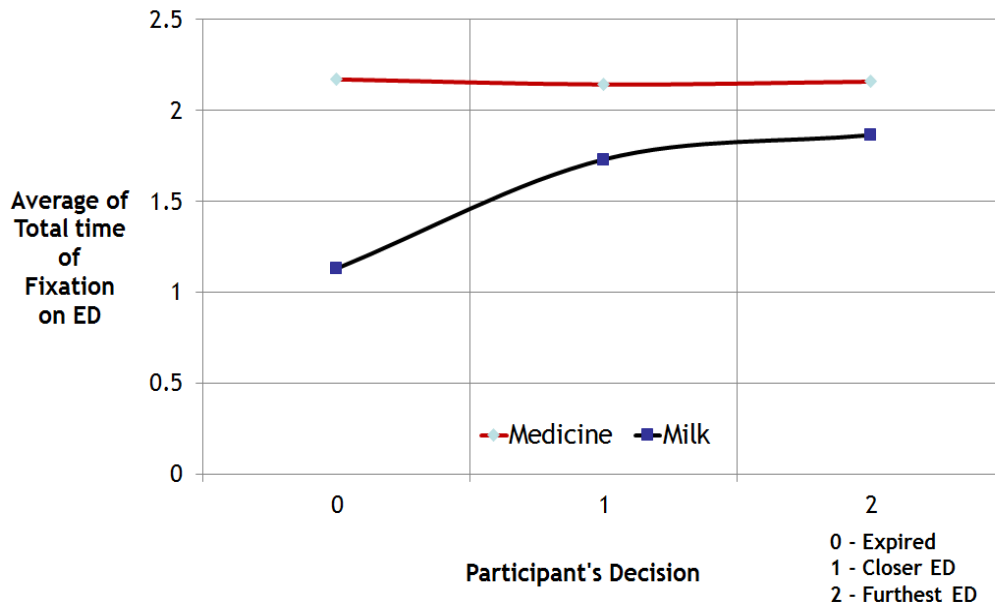
Figure 4. Average Fixation Time and Decision-making
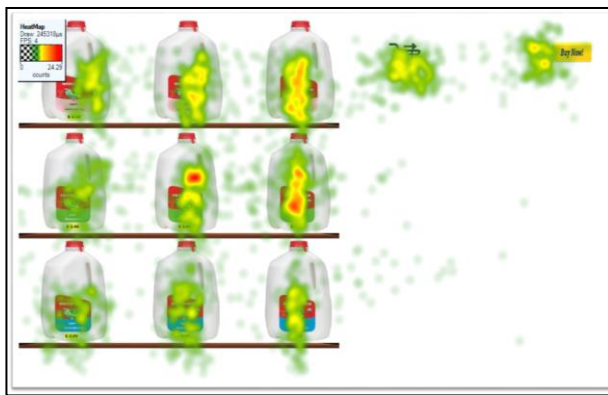
Figure 5. Heat Map - Milk
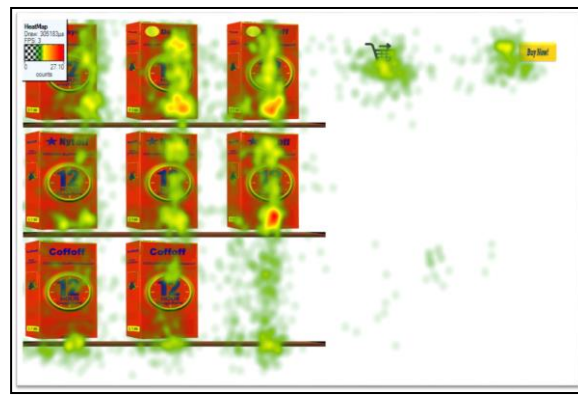
Figure 6. Heat Map – Medicine

Discussion and Implications

This research provides evidence that IT mediated test environments enabled with eye tracking can provide a powerful tool for studying consumer behavior and decision making in regard to expiration dates. Qualitative and quantitative data collected the eye tracking enabled IT mediated simulation environment shows differences in the way consumers purchased milk and medicines and the role played by expiration dates in the case of each product. Future analysis will include qualitative data analysis (gaze plots, scan paths, heat maps, and open-ended survey questions), survey data analysis and linking the survey data with eye tracking measures. For example, a health conscious participant could have a longer fixation duration on the expiration date AOI and could also purchase a product with farthest expiration date whereas a participant who is not health conscious could spend less time in the decision making and also end up buying an expired product.

Overall, this research has the potential to provide several implications for theory and practice. This study introduces the application of eye tracking in the IT mediated environment in the context of expiration dates. This IT influenced environment provides invaluable information for food research because they can capture information about user attention and awareness unobtrusively. For example the results of our study showed that people exhibit a different eye movement pattern when looking at expiration dates on different products. This type of nuanced information about users' non-conscious behavior provides invaluable insight for researchers to better understand consumer behavior and needs. The findings in this study also have several implications for consumers, retailers, and policy makers. Consumers motivated to check expiration dates experience reduced risk in grocery shopping and this further facilitates informed decision making. For marketers and retailers, expiration dates are useful point-of-sale information linked to inventory management and sales. If a shopper buys an expired product, he/she will either go through the trouble of going back to the store and returning the product, or might not return to the store for the next purchase. In either case, the retailer and manufacturer face negative consequences in terms of inventory management, returns processing, food wastage, financial loss, unpleasant shopping experience of its shoppers, or loss of a valued customer. At a societal level, billions of pounds of food are wasted annually due to the misinterpretation of expiration date labels, which are unstandardized and unregulated. Policy makers also need to understand what motivates consumers to search for expiration date information because it can help them develop consumer education programs that provide instruction on food dating and proper food storage and handling. This IT application to consumer behavior and grocery shopping will not only improve consumer decision-making, it will reduce the risk and time involved at the shelf.

Conclusion

This research provide evidence that IT mediated simulated environments, when enabled with eye tracking, provide invaluable insight for consumer decision making. The preliminary analysis has given us some insight into the role played by expiration dates in grocery shopping decisions. The qualitative and quantitative data from eye tracking, simulation website, as well as the survey together provide a multi-method perspective. In order to further understand the influence of expiration dates on consumer's grocery shopping decisions, additional eye tracking measures like the gaze plots, eye movement scan paths, and pupil dilation will be used. Along with this, consumer's personality and demographic characteristics will also be analyzed to understand their role in consumer's grocery shopping decision making with respect to expiration dates.

Acknowledgements

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