



Eye-tracking: understanding the WHY behind shopping behavior

Abstract: This paper discusses a mixed method study in which we combine eye-tracking with semi-structured in-depth interviews, conducted at two similar stores of a retailer in the cosmetics sector. With this study the retailer wanted to investigate, on the one hand, how customers navigate and move around the store and, on the other hand, what they think of the design and experience of the two stores. Through this qualitative research method, you get a very rich set of information that mainly provides insights into the "why" behind shopping behavior. The results concerning shopping behavior indicate that in this store customers mainly navigate at eye level through product recognition. On the evaluation of the shopping experience, customers fairly unanimously recognize which elements are positive and which are more likely to be disruptive in a store design.

Keywords: Eye-tracking; retail design; customer experience

1. Introduction

The retail sector is rapidly changing and brick-and-mortar stores are facing important challenges, triggered by disruptions in digital and mobile technologies and changes in the sociodemographic composition of the population (e.g. more single households, more double income families). Today, still more than 80% of retail sales is happening in brick-and-mortar stores (Statista, 2022). It is therefore no surprise that many retailers are spending millions each year to design, build and refurbish their brick-and-mortar stores (Baker et al., 1992). Under the pressure of the abovementioned evolutions, this focus on improving brick-andmortar store designs has further increased today, certainly because a store design has a strong impact on consumer perceptions and store performance as suggested by marketing literature (Brüggen et al., 2011; Dagger & Danaher, 2014). All over the world, we see examples of retailers that are experimenting with what could become the (physical) stores of the future (Alexander & Cano, 2020). Merely selling products and services does not suffice anymore (Berry et al., 2002; Stein & Ramaseshan, 2016), stores need to stand out and capture the attention of consumers, retailers need to go the extra mile (Servais et al., 2022). But what means 'going the extra mile'? What are customers stimulated by when they visit a store? What makes them happy in the store or what makes them unhappy?



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With these challenges in mind, a retailer from the cosmetics sector came to us. The retailer wanted to know (1) how customers navigate thought the store and (2) what customers thought of the experience of the store and (3) if their brand values (classy, luxurious, empowering, inspiring) came across through the design of the store. To this end, we combine eye-tracking data with semi-structured in-depth interviews. Eye-tracking data is used to provide insight regarding a person's route in a store and gaze trajectory to see whether or not he or she dwells on a certain element. The semi-structured in-depth interviews help shedding light on the why behind this gaze behavior, what they think of the store and its experience. In this way, we better understand which in-store retail design elements enable an optimal customer experience and why (Janssens et al, 2021).

2. Method

Mobile eye-tracking is a technique that allows a researcher to follow and track a person's eye movements (Van Gompel et al., 2007) and it allows to work directly in the field and perform in-store studies (Pentus et al., 2020). It reveals in what direction a person looks, what that person is looking at and for how long. The great advantage of mobile eye-tracking is that it measures both conscious and unconscious gaze behavior (Holmqvist et al., 2011). Eye movements happen unconsciously most of the time. Although people can very well decide where to look at and for how long, details of those movements are mostly out of people's control and occur unintentionally (Carter & Luke, 2020). As such, in-store mobile eye-track-ing makes it possible to assess the role of retail design and atmosphere, literally from the point of view of the shopper (Dowiasch, 2020; Wästlund et al., 2015). More specifically, mobile eye-tracking tells us something about people's visual attention while moving around, giving researchers moment-by-moment information. This real time feedback helps to better grasp and understand (more unconscious) interactions with the store environment and the atmosphere present (Jung et al., 2018). By combining this with semi-structured interviews, we can elaborate on the more cognitive and conscious response to their in-store behavior.

In literature, so far, mobile eye-tracking research has mostly been focusing on isolated aspects such as texts on product packages, on print ads, position of products on shelves and displays (see Janssens et al., 2021 for a review). To the best of our knowledge, and apart from our own previous studies (Janssens et al, 2021), no eye-tracking study has focused on capturing the real-life retail environment, more specifically on capturing the atmosphere and design of the store, using a qualitative approach where the eye-tracking movements immediately provide input for consumers' feedback and reflection via semi-structured in-depth interviews. This study specifically, looks at one retailer in the cosmetics sector from a practical point of view. It is contract research for a retailer with onus on practice.

3. Set-up

3.1 Store setting

On request of the retailer, we studied two outlets of the newest concept of the chain retailer, located in different cities (location A and location B). The retailer chose the locations because they were both the latest concept of the store in two different countries, yet with similar shopping culture. Only small differences are to be found between the two outlets. The facade and location of the two stores is the major difference (as Figure 1 shows). The store at location A had a wide, open facade in a static and modern building where plenty of natural light could penetrate the store. The store at location B was rather hidden in a corner of a shopping mall where the surrounding brands stood out more.



Figure 1 Differences in store façade A (left) and B (right)

A second difference was the color of the ceiling. Location A had a white ceiling and location B had a black one (as Figure 2 shows). As the pictures show, there was also a difference in the width of the store. Location A was slightly wider than location B. However, the order of products and the intended flow of customers was the same.



Figure 2 Difference in ceiling A (left) and B (right)

3.2 Participants: management and recruitment

Because the retailer is very active on social media participants were recruited via calls on their social media. Their main target audience is also the generation that is engaged with this. A mix of ages, of clients and non-clients, men and woman took part, with the majority being women (reflecting the target group of the retailer). In each store eight people participated. Janssens et al. (2021) indicated that saturation occurs after six to eight participants. Three conditions had to be met to participate: knowing the brand, but not yet seen or visited the store's newest concept; and not wear glasses because they are not compatible with the mobile eye-tracking device (lenses are no problem). Interior designers, retail designers, and respondents active in design or retail were excluded from the study. Indeed, they are more sensitive to atmospherics and retail design elements, know how to create an agreeable retail experience and look different at the store's environment than laypersons (Gifford et al., 2002).

3.3 Procedure

For our research purposes, a mobile eye-tracking device (Tobii Pro Glasses 2) and accompanying software (Tobii Pro Glasses Analyzer) were used to track and analyze the participants' gaze behavior (i.e., the pattern of people's eye movements, including fixations and saccades). Mobile eye-tracking can be worn like glasses and measures gaze location within the visual field of the participants. Three micro cameras (illuminators) in the eye-tracking glasses register the participants' eye movements. These movements directly appear on screen via a (wireless) connected tablet pc making it easy for the researcher to simultaneously follow the participants' gaze behavior.

Each participant engaged in a study of approximately one hour. Before entering the store and putting on the mobile eye-tracking device, every participant was questioned about expectations of the store, its new concept, and the upcoming shopping experience. The participant was asked relevant probing questions regarding first impression, expected experience, and associations with brand and store to break the ice and get her/him in a shopping mindset.

Next, the participants put on their glasses and were taken through a calibration procedure to assure the eye tracker was correctly capturing and processing the gaze behavior. During calibration, the illuminators in the frame of the eye-tracker measure how light is reflected in the participant's eyes and captures gaze points, which are unique. Based on these data the eye-tracker can accurately render the participant's gaze behavior. Then the participant was given a specific shopping task. To get an answer to question (1) three different tasks were altered between the shoppers: with €100 budget you may let yourself go for once; buy something for yourself and a gift with a €150 budget; you have wrinkles (or pigmentation, dry skin,...) and you want to do something about it. What would you buy? The purpose was to analyze how participants navigate through the store when searching for a specific item (do they see any signage, do they find their way easily, how do they orient themselves, on what elements do they focus,...). A more holistic approach is used to understand the role of store design for

visitors, meaning that different elements cannot simply be viewed as separate categories, but must be considered as a whole (Quartier, 2016; Petermans & Van Cleempoel, 2010). The impact of staff and service was not included. Indeed, we asked the store staff not to interact with the participants.

Following the eye-tracking task the researcher interviewed the participants on the entire shopping experience to answer question (2) and (3). Both pre-set questions as questions specific to the participants journey were asked. More specifically, atmospheric elements including sensory cues, design elements, communication and visual merchandising are aspects considered to communicate the retailer's story and were therefore covered in the interview. To structure the interview, we used the Perception model of Quartier (2022). As Quartier explains, the model includes six groups of design aspects on which the experience of a store falls back: the perception of the outside of the store, the facade, to the intervier shell, spatial implementation, communication an overall experience (360°). All interviews were recorded with the participants' permission and the researcher also took notes.

3.4 Analysis

The advantage of the current technology is that mobile eye-tracking devices and accompanying software already automate contextual analysis within their software, converting raw data samples into fixations and saccades using algorithms. These the researcher sees in the form of a moving dot in the recording of the glasses. We used the eye-tracking data two times: once as direct, in-store input for the interviews – reflecting on the participants' experience – and later, identifying fixations and gaze trajectory. We prepared a logging scheme with categories – including those categories under study (Perception model). Based on these categories, codes were assigned to fixated targets of interest (i.e., atmospheric elements and in-store communications). As mentioned earlier, although eye-tracking data captures a customer's visual attention, the true behavior and motives behind certain actions can only be explained when linking customers' reactions to certain environmental stimuli. Lastly transcribed interviews were structured as well as the additional field notes around the main themes that are of most interest to the questions (2) and (3). To discuss the results, we thematically combined the eye-tracking and interview data.

4. Discussion of the results

4.1 Exterior

Please see Figure 3 for an overview of all the results. The previously mentioned difference in the facades of the two stores was also mentioned by participants. Location A, with its wide-open facade provided a more welcoming feeling than the deep store at location B. Location A also stood out more because of a large, illuminated logo hanging on the facade. Location A had a sidewalk sign clearly communicating the promotions which was also immediately no-ticed by participants. As location B did not have the possibility to put up a sidewalk sign, actions were communicated on the shop window, causing participants to indicate that there was too much stimulation. Although a large logo hung here as well, it was not noticed by the participants.

4.2 Interior shell

Although the store concepts were the same at both locations, only the ceiling was different. As mentioned, at location A, there was a white ceiling with black fixtures on black rails. This was perceived as noisy by the vast majority, but airier. At location B, where it was all black, it was indicated that this gave a pleasant atmosphere that was not distracting. Somewhat surprising were the comments about the wallpaper used to indicate different zones in the store. The wallpaper was totally disliked for being non-trendy.

4.3 Spatial implementation

What became clearer with every participant is that on both locations there were issues with the digital screen, the shopping baskets, and the appearance of the cash register. At both locations there was a digital screen right after the entrance. The eye-tracking images showed the poor few viewed the screen briefly, but not long enough to read the message. The majority simply did not see the screen. This result is consistent with the results from Paco Underhill's (2001) study that indicates that the first few meters in a store serve as a landing zone. A zone where people take time to orient themselves in a space they have just walked into, so they don't pay attention to other things. The baskets were also set up in this zone, so they were also missed. For example, it would be better to put more shopping baskets throughout the store. It was also said that the shopping baskets are dull and that it would be better if they had more retailer character (brand values). The same remarks were made about the cash registers. According to the participants they did not fit the brand in terms of design and materialization. It was even said that these looked too ordinary and cheap.

The vast majority of participants indicated that there were very many products in the store making the density very high. This led to an overload of stimuli and information, slowing down the shopping process because the participants needed time to absorb and process everything. However, it is notable that participants looked around at eye level to navigate. For example, although the wall with the perfumes had clear white signs hanging above the wall rack showing the brands of the perfumes, these were not used to navigate. Instead, the products themselves were used. This, of course, also slows down the shopping process.

What was mentioned positively was the flow and route in both stores. The route was very logically structured. Indeed, the zones that were arranged in different materials and color palettes provided overview. Moreover, the fact that the furniture in the middle was kept low and light, versus the tall dark shelves against the wall, also provided overview. Visual merchandising was also cited as a positive point. Eye-catching presentations and product packaging of certain brands stood out and acted as eye-catchers. Campaign images and illuminated ads of different brands also served as landmarks. The presentation islands in the middle of both stores where scented candles and sticks were presented were also an attractive eye-catcher, as was the presentation table with gifts.

4.4 Communication

Although the various departments in the store were logically structured, it was indicated that especially in skincare there was a lack of signage/communication. There was a lot of confusion about the different brands. This contrasted with the neutral, white signs with brand names hanging above the perfume. Along the same line, the private labels the brand offered were not clearly indicated. Most participants were not even aware that there were private labels.

There was clearly a difference between the announcement of promotions in the two stores. At location A, they were often not seen because they hung in places that participants did not see. At location B, promotions hung clearly between the shelves and were seen.

4.5 360°

Although one of the brand values of the brand is "classy," this was not perceived as such by the participants in the store. The other brand values luxurious, empowering and inspiring did get mentioned during the interviews with the participants.

The overall experience was perceived as very positive, the fragrances provide a pleasant sensation, this was enhanced by pleasant music. Being able to test products was also experienced as positive.

Location city A	Location city B
Exterior	
Wide storefront with transparent facade, looks spacious and bright	Narrow, deep storefront with less daylight
Promotions clear through sidewalk sign	Too many promotions and discounts visible through the facade: too many incentives
Interior shell	
White ceiling with black fixtures = light and spacious feeling = too busy due to great contrast with black fixtures	Black ceiling with black fixtures = spacious feeling and cozy = no distractions from technique
Wallpaper does not attract and offers little added value in layout Wallpaper does not attract and offers little added value in layout	Wallpaper does not attract and offers little added value in layout Wallpaper does not attract and offers little added value in layout
Spatial	
Digital screen at entrance is often shunned and not read	Digital screen at entrance is often shunned and not read
Shopping baskets are only at the entrance and are not seen	Shopping baskets are only at the entrance and are not seen
Appearance of cash registers does not fit with brand	Appearance of cash registers does not fit with brand
Many products, close together, create many stimuli and distractions	Many products, close together, create many stimuli and distractions
Flow and route through store is good	Flow and route through store is good
Good visual merchandising	Good visual merchandising
Communication	
Need for clearer breakdown (communication) in skincare	Need for clearer breakdown (communication) in skincare
During stores promotions and discounts not always clear (and in the right place)	Promotions and discounts always clear because hang between the shelves
Private labels are not clear	Private labels are not clear
360°	
The brand and store is not considered stylish	The brand and store is not considered stylish
Pleasant sensory experience	Pleasant sensory experience

Figure 3 Gives a summary of the results with improvements indicated in red, opportunities in orange and positive aspects in green.

5. Conclusion

In conclusion of the results, our analysis of two store locations, A and B, revealed important insights in several key areas. As for the questions to which the retailer sought answers, we can summarize the following. The first question asked is how customers navigate through the store and if their communication and lay-out were an aid in this. We can conclude that although the retailer had signage in place, the participants just did not use it to navigate. They navigated by looking at the products at eyesight. Participants did find their way quite easily because of the different colors used in the different departments. Only on product

level there seemed to be a lack of product communication (and more specific in the cosmetic area). Does this mean that all signage is abundant? Of course not, from previous research we know that signage is valuable when people have a job to do (for example finding a product).

Second, on what customers felt about the store experience, we can conclude that participants enjoyed the experience. The logical flow, well-defined zones, and attractive visual merchandising received praise. The overall experience was positive, with pleasant fragrances, music, and product testing enhancing the shopping experience. Only some elements, like the cash desk and the wallpaper did not fit the brand experience. Whereby the brand value "classy" is not recognized. Leading to the answer of the third question whether the brand values (classy, luxurious, empowering, inspiring) came across through the design of the store. Luxurious, empowering and inspiring did come to the fore.

Through this exploratory research, we learned more. More specifically, people fairly unanimously recognize which elements are positive and which are more likely to be disruptive in a store design. As could be predicted, the differences between location A and B on the outside were noticed by the participants. More surprising, however, was the difference in ceiling design that evoked different feelings. A black ceiling was perceived as cozier, but the white ceiling was perceived as more airy (despite the black lighting fixtures that were also noisy). From this study, it seems that if the white ceiling had white light fixtures, it would have been appreciated even more.

Last but not least, we were able to identify areas that need improvement: the location of the digital screens and the shopping baskets, the design of the cash registers, and the communication of promotions. Suggestions included better basket placement and more engaging designs for cash registers. Moreover, high product density in both locations caused sensory overload and slowed down the shopping process. In terms of communication, there was confusion in the skincare section, and private labels were not clearly indicated. So, for this retailer communication in general needs extra attention.

Regarding our qualitative research method, and the contribution of this paper, this study benefitted from an intuitive approach, unravelling meaning behind the data. Linking back the participants' interview answers to the eye-tracking data provided valuable insights. That is, being able to follow participants in real time helped directing interview questions on their eye movements. Participants' statements during the interview could have been instigated by socially desired answering whereas with eye-tracking participants' eye movements were directly shown on screen, automatically registering all visual cues that caught the attention. Thus, this research method has given us insights from the customer's perspective by literally looking through the eyes of the customers.

5.1 Limitations

The study as described here has limited generalizability. It would be beneficial to study further stores within the same sector to arrive at generalizable results for this sector. By extension, other sectors could also be subjected to such a study to arrive at transferable findings.

5. References

- Alexander, B., & Cano, M. B. (2020). Store of the future: Towards a (re) invention and (re) imagination of physical store space in an omnichannel context. *Journal of Retailing and Consumer Services*, 55, 101913.
- Baker, J., Grewal, D. and Levy, M. (1992), An experimental approach to making retail store environmental decisions, *Journal of Retailing*, 68(4), 445-460.
- Berry, L. L., Carbone, L. P., & Haeckel, S. H. (2002). Managing the total customer experience. *MIT Sloan management review*.
- Brüggen, C., Foubert, B., & Gremler, D. (2011). Extreme makeover: Short-and long-term effects of a remodeled servicescape. *Journal of Marketing*, 75(5), 71-87.
- Carter, B. T., & Luke, S. G. (2020). Best practices in eye tracking research. *International Journal of Psy*chophysiology, 155, 49-62.
- Dagger, S. and Danaher, J. (2014). Comparing the effect of store remodeling on new and existing customers. *Journal of Marketing*, 78(3), 62-80.
- Dowiasch, S., Wolf, P., & Bremmer, F. (2020). Quantitative comparison of a mobile and a stationary video-based eye-tracker. *Behavior Research Methods*, 52, 667–680.
- Gifford, R., Hine, D. W., Muller-Clem, W., & Shaw, K. T. (2002). Why architects and laypersons judge buildings differently: cognitive properties and physical bases. *Journal of Architecture and Planning Research*, 19, 131-148.
- Holmqvist, K., Nystrom, M., Andersson, R., Dewhurst, R., Jarodzka, H., & De Weijer, J. (2011). *Eye-tracking: a comprehensive guide to methods and measures*. New York, NY: Oxford University Press.
- Janssens, K., Beckers, C., & Quartier, K. (2021). Retail design as a communication strategy: Exploring customer experience via eye-tracking. In The value of design in retail and branding (pp. 137-146). Emerald Publishing Limited.
- Jung, Y. J, Toomey Zimmerman, H., & Pérez-Edgar, K. (2018). A methodological case study with mobile eye-tracking of child interaction in a science museum. *Techtrends*, 62, 509-517.
- Pentus, K., Ploom, K., Mehine, T., Koiv, M., Tempel, A., & Kuusik, A. (2020). Mobile and stationary eye tracking comparison package design and in-store results. *Journal of Consumer Marketing*, 37(3), 259-269.
- Petermans, A., & Van Cleempoel, K. (2010). Research in retail design: Methodological considerations for an emerging discipline. *The Institute of Design*, IIT.
- Petermans, A., Doucé, L., & Willems, K. (2012). Environmental simulation techniques in retailing: a review from a store atmospheric and customer experience perspective. In K. Quartier, A., Petermans, T. C. Melewar & C. Dennis (Eds.), The Value of Design in Retail and Branding. UK: Emerald.
- Quartier, K. (2016). *Retail design: What's in the name?* In A. Petermans & A. Kent (Eds.), Retail design (pp. 39–56). UK: Routledge.
- Quartier, K. (2022). The big book of retail design, Leuven: Lannoo Campus.

- Servaisn E., Quartier, K., Vanrie, J., 2022. Designing for valuable in-store experiences: what to consider in practice. *Corporate Reputation Review*. https://doi.org/10.1057/s41299-022-00137-9
- Statista (2022). E-commerce as percentage of total retail sales worldwide from 2015 to 2025. Retrieved: https://www.statista.com/statistics/534123/e-commerce-share-of-retail-sales-worldwide/
- Stein, A., & Ramaseshan, B. (2016). Towards the identification of customer experience touch point elements. *Journal of Retailing and Consumer Services*, 30, 8-19.
- Underhill, P. (2001). Why we buy. The Science of Shopping. NY, Simon & Shusser.
- Van Gompel, R. P., Fischer, M. H., Murray, W. S., & Hill, R. L. (2007). *Eye movements: A window on mind and brain*. Amsterdam: Elsevier.
- Wästlund, E., Otterbring, T., Gustafsson, A., & Shams, P. (2015). Heuristics and resource depletion: eye-tracking customers' in situ gaze behavior in the field. *Journal of Business Research*, 68(1), 95-101.