Mobile Eye-Tracking in Retail Research

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1 Introduction

Retail has become an increasingly competitive environment, squeezed by online offers that emphasise convenience and cost, while offline, the proliferation of stores results in low perceived differences between physical stores and brand environments. Thus, there is renewed emphasis on the importance of understanding consumer behaviour in stores in order to build profitable propositions, yet little research has been undertaken that considers the holistic environment from the consumer's perspective. This is primarily because of the development of research methods that have, until recently, been limited to mainly quantitative studies using questionnaires to assess attitude, perception and recall.

With the advent of new classes of observational technologies such as mobile eye tracking that captures consumers' audio-visual attention, it is now possible to explore environments using first-person perspectives, with opportunities to provide new insight into naturalistic shopping behaviour.

This chapter reports on an empirical investigation into consumer behaviour in a UK branded retail environment using mobile eye-tracking technology. The chapter begins with a review of relevant literature in the domain of store environments, atmospherics and typical consumer behaviour. Subsequently, a review of eye-tracking literature in the marketing domain is presented. Thereafter, the chapter discusses the research design adopted for the study, which takes a qualitative dominant-less dominant mixed methods approach using content analysis of consumers' gaze fixations, supported by pre- and post-tracking questionnaires and critical incident analysis to assess key elements within the first-person observations. Findings are then presented and discussed.

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M. Horsley et al. (eds.), *Current Trends in Eye Tracking Research,*
DOI 10.1007/978-3-319-02868-2_14,

2 Literature Review

Retail stores are complex and visually rich environments that support both hedonic and utilitarian consumer experiences by managing architectural features, layout, product presentation, design, lighting, scent, etc. (Kotler 1974; Spanenburg et al. 1996; Turley and Milliman 2000; Custers et al. 2010). Navigation and store layout are linked to how products are presented to consumers—walking pace, range (distance) and degree of viewing angle are all aspects which interior designers incorporate into retail environments through the creation of immersive 'theatre' (e.g. Davis 1991), where architecture becomes advertising (Cairns 2010). The resultant store atmosphere influences the emotional state of the consumer, and this influences arousal levels that, if positive, may increase time spent in the store and likelihood of purchase (Mehrabian and Russell 1974; Donovan and Rossiter 1982; Bitner 1992; Rook 1987; Bagozzi and Dholakia 1999). Important elements have been found to be the sense of space and spacing of products which stimulate consumer senses; aesthetic surroundings which influence perceptions and attitudes; product presentation which influences consumer reactions; social surroundings which influence consumption patterns (e.g. conformity); and complexity, i.e. the number of components within the environment, which influences arousal leading to preference (Markin et al. 1976; Belk 1974; Nasar 1987; Uhrich and Benkenstein 2010). Consumer response is subject to intrinsic and extrinsic motivational influences, including time available (Park et al. 1989), mood state (Lee and Sternthal 1999), familiarity with an environment (Hoch and Deighton 1989; Alba and Chattopadhyay 1986), attentional priorities and need (Kent and Allen 1994). These areas have been categorised into three broad domains in the literature: atmosphere, ambience and relationships; yet, little research has considered the interrelationships between them at a holistic level (Ballantyne et al. 2010). The range and arrangement of positive atmosphere building cues remain, however, rather a 'black art', dependent upon retailer brand strategy and implementation and management preferences (e.g. Gauri et al. 2008).

Whilst there is a large body of literature into the components of stores and their impact on different aspects of consumer behaviour, this is primarily examined through evaluation of stated intent, perception and third-person observation techniques. There is limited research on actual browsing and purchasing behaviour and the elements that may influence behaviour in stores using first-person observational techniques (Suhur and Sorenson 2010). Third-person observation via remote forms of tracking, whilst popular in industry, is especially difficult to interpret because often only partial, say photographic or moving image, is used which is then subject to interpretation (e.g. Basil 2011). Consumer behaviour viewed from a first-person perspective is, however, important in generating insight to develop retail 'experience environments' that engage and retain consumers from both design and marketing perspectives (Venkatesh et al. 2011). Of particular interest are the ways in which the complexity of the store environment influences consumers' shopping behaviour. New technologies such as mobile eye-tracking are capable of providing such insight 'in action' rather than reflection of some prior activity ('on action').

2.1 Eye-Tracking in Marketing

This research uses mobile eye-tracking to evaluate consumer responses at a holistic level. This type of observational technology provides a first-person perspective into embodied behaviour reflecting goal orientation that third-person techniques cannot capture (e.g. Paletta and Rome 2007; Istance 2008). Thus far within marketing, eye-tracking technologies have been used to understand consumer cognitive and emotional responses to advertising communications, focussing on impact of branding, images and text (Pieters et al. 2007; Wedel and Pieters 2008a, b) in media, such as print and feature advertisements (e.g. Aribarg et al. 2010; Zhang et al. 2009), billboards (e.g. Dreze and Hussherr 2003), product labelling (e.g. Fox et al. 1998), TV commercials (e.g. Janiszewski 1998) and supermarket shelving (e.g. Chandon et al. 2007; Van der Lans et al. 2008). Researchers have found correlations between visual attention, i.e. frequency and duration of fixations and product preferences (Maughan et al. 2007) where positive attention results in more and longer fixations, albeit this may be a function of gender, age, personality (Rosler et al. 2005; Isaacowitz 2005) and familiarity with brands (Russo and Leclerc 1994). Of interest to marketers is how well respondents remember what they have seen, for example, firms invest heavily in differentiating brands predicated upon their distinctive and memorable features. Wedel and Pieters (2008a) have also proposed that visual attention in marketing is influenced by both motivational (intrinsic) and environmental (extrinsic) factors. This is, however, a controversial claim within the neuroscience research domain where opposing views suggest that visual attention is a function of purely intrinsic motivations (e.g. Theeuwes 1992) or purely extrinsic stimuli (e.g. Folk and Remington 1998) although these features may be processed in different parts of the brain, and visual attention itself is more a function of the proximity of an individual to relevant features (Becker et al. 2010; Becker 2012).

Thus, this research integrates the use of mobile eye-tracking to assess visual attention in a retail environment in order to explore the types of influences, both intrinsic and extrinsic, upon consumer behaviour at a holistic level. The development of the research methodology is discussed in the next section.

3 Methodology

Wedel and Pieters' (2008a) conceptualisation of visual attention was used as the basis for the research design that aimed to evaluate the naturalistic and holistic visual attention of consumers in a retail environment. A qualitative dominant-less dominant mixed method approach was used for the research design to explore visual attention. Mobile eye-tracking was selected as the dominant method as it provides a flexible means to capture first-person observational data (Duchowski 2007). Wedel and Pieters (2008a) suggest visual attention is both a function of consumer goals that inform what and where to look (intrinsic factors) and saliency of marketing

stimuli. Saliency in the context of marketing is defined as the prominence of objects discerned by consumers within the scene (extrinsic factors) because of their relative luminosity, sharpness, brightness, contrast and colour (e.g. Summers and Herbert 2001; Custers et al. 2010). Intrinsic and extrinsic factors combine to produce attentional priorities and simultaneously suppress non-target perceptual features. Consumers may, however, only partially recall aspects of the goal such as characteristics of a brand (colour, shape, distinctive feature) and this is further influenced by the complexity of the scene (Pieters et al. 2010; Clement 2007). Thus, within a retail environment, visual attention is likely to be dominated by intrinsic relevancy of information to the individual ('informativeness') with the extrinsic effectiveness of marketing stimuli varying according to specific goals (Pieters and Wedel 2008a).

The study was conducted in a department store combining home and garden with men's and women's fashions and incorporating a café bar in the South of England, part of a UK-wide high street chain. Intrinsic factors that were anticipated as being relevant were the specific purchase goals and intentions of consumers coupled with the familiarity (previous experience) with the store layout. Pre- and post-tracking administered questionnaires (Eger et al. 2007) were used to understand these aspects of shoppers' journeys and to identify primary search behaviour and attention within the store environment, including, for example, any pre-planned and impulse purchase and browsing behaviours. Market Research Society ethics were adopted for the conduct of the study.

The technology used was Tobii Mobile™ glasses (manufactured 2010, recording resolution 640 × 480 at 30 Hz) in conjunction with Tobii Studio (version 2.0) and Noldus Observer XT (version 10.0), which enabled capture and analysis of both visual and audio data from research participants. Thus, the research was able to consider the role of any verbal data in assessing consumer response and together with fixations recorded by the mobile tracker (visual attention) enabling the researchers to identify behavioural patterns in the shoppers' journeys using content analysis and critical incident analysis identified in the videos to give rich insight into observed behaviours (Yin 1984; Miles and Huberman 1994). The technology, therefore, enabled the researchers to examine not only consumers' cognitive and affective behaviour but also conative (i.e. apparently instinctive) behaviour in the environment. Eye-tracking data were, firstly, content analysed and this subsequently informed critical incident analysis using an ethnographic approach (Arnould and Wallendorf 1994; Chong 2010) by coding, troping and representing behaviour constellations (Arnould and Wallendorf 1994) using both fixations and 'scanpaths' of the direction of visual attention (Duchowski 2007).

Firstly, content analysis was used to classify and analyse the frequency of fixations of participants in the store generated using the technology (visual attention). Given that proximity of consumers to extrinsic stimuli varied as they passed through the environment, necessitating a degree of flexibility in interpreting the focus of attention (e.g. near sight of, say, a meter and far sight of several meters, depending on the scene and apparent activity of the participant such as browsing products, walking through the store environment, etc.) it was not deemed possible to use the automated functionality provided by Tobii Studio to analyse locus of attention

Table 1 Study participants

Age	Male	Female	All
18–30 years	2	0	2
31–45 years	2	3	5
46–55 years	0	6	6
55+	0	3	3
Total	4	12	16

and draw meaningful conclusions. Therefore, eye-tracking videos were exported to Noldus Observer for content analysis by hand using fixation data to deduce visual attention. From the initial review of the eye-tracking data collected, the researchers, working with four coders, developed and described mutually exclusive categories (codes) for the content analysis in a qualitative mode (Haney et al. 1998). Extrinsic factors (codes) were identified as the actual store layout (space and product), navigational and section signage, promotional merchandising, product display, in-store offers, sales assistants/store staff and roles played by other consumers that facilitate search and goal-related behaviour.

Subsequently eye-tracking videos were sequentially coded to generate frequency (of occurrence) data for content analysis in a quantitative mode (Berelson 1952; Weber 1990; Krippendorff 2004). Each substantive change of focal attention (fixation) was noted and recorded for each participant, e.g. product A to product X generated two separate counts for the 'product' category. This is a method of event-based coding. A table of data was subsequently extracted and used as the basis for further evaluation. The method of content analysis does not represent a comprehensive analysis of all fixation points produced by the Tobii Mobile™ equipment; however, it facilitated coding for data reduction and subsequent evaluation of critical incidents. A valence for each of the store departments was applied in order to assess focal attention (fixations) within the different areas of the store. Cohen's (1960) kappa coefficient was used to test inter- and intra-coder reliability of content analysis with one recording used as the basis for testing the level of agreement among all coders.

Within the retail environment, 7 h 16 min of eye-tracking data were collected at the store location from 16 adult visiting consumers (see Table 1), 10 of whom were accompanied by other adults (family or friend). Participants were asked not to change their intended shopping behaviour during the data collection process (data suggest that visual attention was naturalistic as it did not appear to alter stated consumer intentions). Non-response to participation was noted to be due to time constraints or unwillingness to be recorded: it was evident the technology was an attractor for some and repellent for others. The constraints of the technology precluded participants wearing prescription glasses, and the researchers also selected out adults with small children (because their focus would be likely to be on the child rather than the shopping experience). Sampling was, therefore, convenience based and bias may be present in the data from both self-selection and unknown/unanticipated factors. Nonetheless, all consumers had approached the store voluntarily before being asked to participate in the study. The preliminary recruitment phase included calibrating the equipment to each participant, followed by the pre-tracking questionnaire (see Table 2)

Table 2 Primary reason for visit compared to familiarity with store

Primary reason for store visit	Familiarity with store			Total
	First-time visit	Been twice before	Been 3+ times before	
Buy a particular product	1	3	1	5 (31.3%)
Compare specific products	1	0	0	1 (6.3%)
Browse products generally	4	1	3	8 (50.0%)
Coffee	1	0	1	2 (12.5%)
Total	7 (43.8%)	4 (25.0%)	5 (31.3%)	16

Table 3 General satisfaction with store visit

Agreement with statement of satisfaction	Mean score ($n=16$) (1 = disagree, 2 = disagree slightly, 3 = agree slightly, 4 = agree)
The atmosphere in the store was appropriate for me (lighting, ventilation and heating)	4.0
I found what I was looking for	3.8
The store layout made it easy for me to find what I was looking for	3.8
The store layout made it easy to browse/find other interesting products	3.8
Information I used in the store was helpful	3.7
The information about the products I was interested in was clear	3.6
The sight lines in the store made it easy to navigate around	3.4
The signs for store departments/sections were clear	3.3

(see http://www.tobii.com/en/eye-tracking-research/global/library/manuals/ for a full description of this process). Consumers then shopped the store in their own time and subsequently returned to the researchers where the technology was removed and a post-tracking questionnaire completed the process (see Table 3). Given the qualitative sample used, it is not possible to apply statistics to produce more than a descriptive overview. Triangulation of methods and investigators (data coders) were primary modes of validation (Shapiro and Markoff 1997).

Table 4 summarises the frequency (count) and percentage of data coded for each category, i.e. coded fixations representing visual attention (total number of observations coded = 44,625). Table 5 identifies the locations in the store browsed/shopped by the participants. Data indicate that participants primarily browsed/shopped within the home (52.3% coded behaviours), women's/children's (28%) and garden (7%) departments of the store.

The findings show each area of the store elicits different visual attention patterns alluding to the interplay between the design, ambience and social-relational features and characteristics of the environment (Allen 2005). Of note are the roles of shopping partners and staff, who appear to play a greater role in the experience in home than observed in women's, where labelling played a greater role than in home

Table 4 Content analysis of eye-tracking data

Category	Category description	Frequency of coded fixations (n = 44,625)	% coded behaviours to all (mean)
Product	All products in store	32,342	72.5
Shopping partner	A person in the store identified as shopping with the glasses wearer	2,868	6.4
Product label/price	All labels that identify product details or pricing	2,615	5.9
Staff	A person in the store identified as a member of staff (with or without an apron)	1,257	2.8
Customer	A person in the store shopping, excluding a shopping partner or member of staff	878	2.0
Brochure/leaflet	A loose brochure or leaflet about products, services, offers, prices, etc.	366	0.8
Set offer	All signs that identify a promotional offer located within a home design style set	179	0.4
Navigational sign	All signs that identify location or direction of a store section	159	0.4
Other	Looking at floor/ceiling/wall; no obvious focus on another defined category	3,961	8.9

Table 5 Content analysis of eye-tracking data by store department

Category	Home n = 23,361 (%) (rank order)	Women's/ children's fashion n = 12,488 (%) (rank order)	Garden n = 3,142 (%) (rank order)
Product	74.4 (1)	82.7 (1)	87.6 (1)
Shopping partner	8.9 (2)	3.3 (4)	3.9 (2)
Product label/price	4.3 (4)	6.0 (2)	3.5 (3)
Staff	2.2 (5)	0.9 (6)	1.9 (4)
Customer	1.8 (6)	1.7 (5)	0.9 (6)
Brochure/leaflet	1.1 (7)	0.6 (7)	0.2 (7)
Set offer	0.7 (8)	0 (9)	0.1 (8)
Navigational sign	0.5 (9)	0.2 (8)	0 (9)
Other	6.1 (3)	4.6 (3)	1.8 (5)

and garden. This is broadly consistent with findings of research by Hu and Jasper (2006) into the positive impact of attentive store staff on consumer experiences. In the present study, the differences observed were felt likely to be due to the more specialized and technical nature of the product offer in home and garden and a greater familiarity with the purchase environment in fashion. It may also be a coincidental

Table 6 Summary of components used by consumers in store (excluding signage)

Component	Description
Light contrast	A product or visual component of the scene that is brightly illuminated or is in light contrast to its immediate vicinity (may be reflecting light, a feature light/product or natural day light)
Colour contrast	A product or visual component of the scene that is prominent by its colour (either neutral tones in a dark-colour scene or dark tones in a light-colour scene)
Vertical sight line (VSL)	A view in the shopping expedition where the consumer makes a directional decision and the decision scene is predominantly made up of vertical lines
Horizontal sight line (HSL)	A view in the shopping expedition where the consumer makes a directional decision and the decision scene is predominantly made up of horizontal lines ('panorama')
Socialisation	'Active' consumption experience—interactive elements that engaged consumers in experimenting with products
Flow	Immersion in the store layout enabling associations between product sections and departments

observation as a consequence of uneven distribution of staff in the departments across the store, with more staff evident in the technical store areas than elsewhere. Overall, content analysis of visual attention illustrates that participants focus most on products, whilst relatively little attention is given to signage, particularly navigational signage, in all areas of the store. From a marketing management perspective, this finding is especially important—marketing and merchandising materials (signage and display information) that support the consumer experience in store are considerable areas of spend for organizations but our data suggest they receive relatively little attention in this type of environment. Thus, ethnography was used to provide insight into critical incidents in the shopping episodes of consumers.

Critical incidents were identified as being those points in the store visit where decisions on what do, where to go or who to speak to were important considerations for the consumers, i.e. key decision points. The researchers aimed to identify elements that were intrinsic to the consumer and extrinsic in relation to the retail environment. Findings highlighted a range of elements that appeared to influence consumer behaviour in store (see Table 6). The intrinsic cues, comprising the products of relevance to an individual consumer, were most clearly evident in those observations where consumers were accompanied by partners through verbal discussion or sought assistance from a member of staff. The analysis identified behaviour patterns in the observations that were replicated across the data set. Patterns are noted in response to sight lines (vertical and horizontal) and saliency achieved through lighting and colour. Saliency (contrast) was found to be the dominant cue in the environment used by consumers to navigate the store. Lighting also supported socialising and flow in the environment. The patterns observed in relation to these findings are now discussed in turn, using video frames from participant eye tracking (fixations and scanpaths removed) to illustrate.

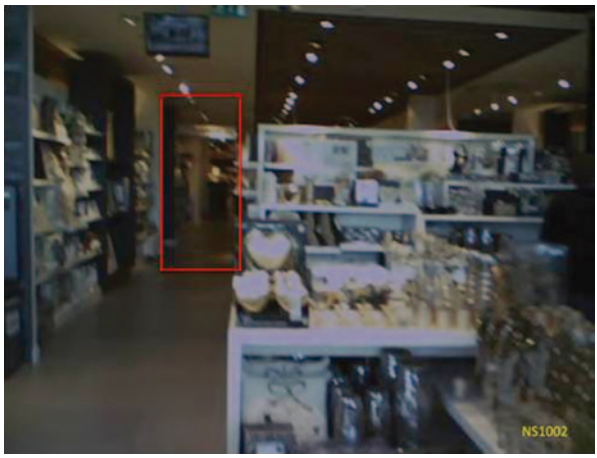

Fig. 1 Vertical sight line (VSL) towards back of store (*left*)

3.1 Sight lines and saliency

On entry to the store, participants paused a few seconds to look at an early feature in the store, low tables filled with highly salient products, and then towards either the back of the store (Fig. 1) or to the right using a vertical sight line (VSL). A less evident VSL was apparent to the left but not selected—research participants clearly preferred the more constrained aisle spaces offered. Thus, the VSL presentation appeared to facilitate the directional decision-making process which may also have been influenced by the highly salient product presentation evident along the aisles. Sight lines are an explicit component of store design that serve both functional and aesthetic needs. Functionally, they enhance store merchandise security by providing increased visibility to products and consumers; aesthetically, sight lines support the organization's aims and objectives for consumption activities within the space that underpin the creation of store ambience (Cohen 1998).

Whichever aisle participants moved into or towards, they initially focussed on feature-lit salient points in the scene—typically products (Fig. 2). They followed the VSL looking left and right, drawn quickly through the environment by the most salient features that their walking speed allowed. Whilst in an aisle, participants found something of more specific (intrinsic) interest that often appeared to be a neutral-coloured object, most likely located in a salient part of the scene. Aisles were filled with products and related information; thus, the focus on relatively neutral objects appears to reflect the idiosyncratic curiosity and preferences of research participants (Berlyne 1960). This may be because the 'noisiness' of the visual cues in the environment drives consumers to consider non-conforming stimuli but may also be because they have a directional aim and merely seek variety as they continue to their goal (e.g. Howard and Sheth 1969; Steenkamp and Baumgartner 1992).

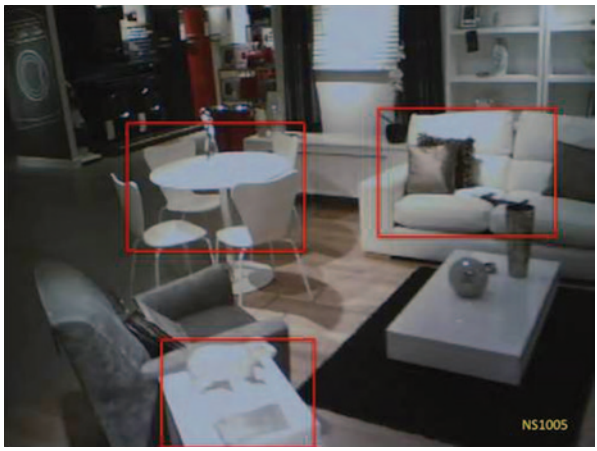

Fig. 2 Feature lit salient product (*right*)

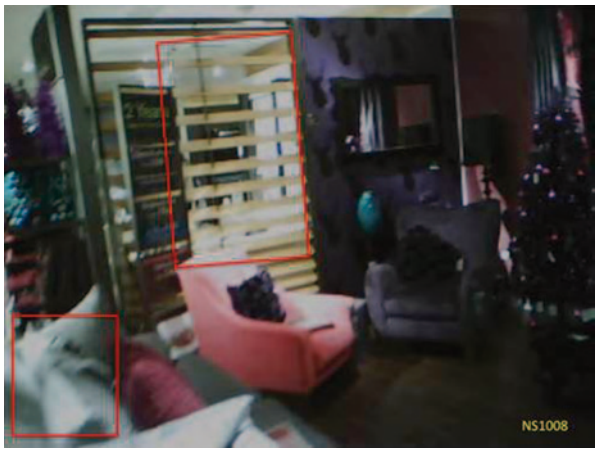

Fig. 3 Colour contrast saliency (neutral in dark tones, *left*)

Further investigation of browsing using saliency identified it was influenced also by contrast emphasised by colour blocks (Fig. 3). Colour blocking is likely to be both an extrinsic and intrinsic cue—salient within a scene but relevant to the participant in some way; for example, there is evidence that colour preference is used in consumers' search patterns evoking empathy with the scene in some way (Klonk 2005) such as red-themed store offers which were dominant for some participants (Clynes 1977). Colour has a long association with designed environments (Fortune 1930), influencing consumer behaviour by enhancing ambience (Nayar 2008) and influencing mood states in stores (Martineau 1958; Bellizzi et al. 1983).

Horizontal sight lines (HSLs), where the scene was presented as a 'panorama' (Fig. 4), were evident in a few parts of the store and these elicited different visual search behaviour to VSLs. Visual behaviour at HSLs involved pausing for a longer

Fig. 4 Horizontal sight line (HSL, *right*)

period of time than VSLs and scanning the scene rapidly far left to far right, fixating on feature-lit objects across the scene. The decision to move appeared to follow some apparent indecision to return to an aisle, i.e. turning around and looking back. Feature lighting and colour-blocked objects acted as draws in the 'panorama'; and once in the scene, participants seemed to revert to rapid browsing behaviour as well as scanning their visual horizon to navigate through the space, until they found a product or feature they may be more intrinsically interested in. Browsing behaviour is most evident when consumers are in scenes presented as VSLs.

Whereas HSLs support store management, because there are fewer visual barriers for security cameras, the findings suggest these areas within the store discourage browsing behaviour. The most likely reason is that consumers are simply too far away from products to investigate them in sufficient detail; however, another reason may be the holistic impact generated by the store ambience. Whereas previous research has found space to positively influence consumer behaviour (Ballantyne et al. 2010), this appears not to be the case in this research. Consumers clearly found the store engaging as a social space, evidenced through the ways in which they interacted with products, staff and other consumers as they shopped. The enforced distance between the consumer and the merchandise apparently presented through an HSL effectively decreased proximity (immediacy) of staff, other consumers (Janakiraman and Niraj 2011; Xu et al. 2012) and products, which the consumers participating in the study evidently found discomforting. Social interaction theory has been found to explain the affective influence of the presence of people on consumer behaviour in shopping environments (Argo et al. 2005), but the impact of store ambience and the ways in which it may change over the store context is not well understood despite a number of researchers investigating this from the stimulus–organism–response (Turley and Milliman 2000; Baker et al. 2002; Hyde 2006) or hedonic-consumption (combining attractive and facilitating stimuli) perspectives (Kotler 1974; Hirschman and Holbrook 1982; Ballantyne et al. 2010).

3.2 Socialisation

Socialisation is more than just the interactions between consumers and staff; it encompasses their interactions with the whole environment—in our evaluation, social consumption is central to the ambience in the store that has been intentionally incorporated into the design of the space, including the presentation and merchandising of products and inclusion of a café concession. A purchase decision from a design (product) set, which was used by the store to present connections between the products in interactive displays, typically involved a staff member, either in locating a particular product on a shelf display or in completing an order process for a product. Elsewhere in the store, products on shelves, or otherwise grouped together into a display, were selected from the display and taken to a check out. Store staff were an active part of many scenes, appeared to be easily approachable and drawn into both browsing and purchase episodes. Participants also actively engaged with design sets, such as room layouts in the store, 'trying out' products by enacting some imagined behaviour from their personal lives and involving others in the consumption experience, e.g. putting feet up on a foot stool, laying back on a sofa, sitting at a dining table, etc. Interesting products placed in design sets were subsequently sought out from shelves (e.g. cushions, bed linen, ornaments), but areas where products were displayed on shelves were of less focal interest to participants than products in sets (which was consistent with stated browsing intentions). Thus, the creative display of content appealed to participants, giving them an opportunity to browse, relax and enjoy the physical and visual stimulation provided by the environment. This was reinforced by the café, where consumers paused in their shopping trip for refreshments, discussion with their shopping partners or just to sit and contemplate the store environment.

The ambience generated by the socialisation within the environment was therefore co-created by consumers (Vargo and Lusch 2004). This finding is consistent with research into hedonic consumption but also highlights the store's intentions in creating experiences through its designed layout and merchandise presentation. Crilly (2011) uses visual rhetoric to consider the role of design in persuading consumers to engage and affect behavioural patterns, albeit an underdeveloped concept. He states there is a tension between informing and persuading through the design process that only the consumer experiences in order to infer 'persuasive intention', depending on their motivations for participation. Considering such an approach, consumers may infer from the presentation of products and presence of a café in the store that interaction and role play are intended to be part of the consumption experience in addition to their purchase behaviour.

3.3 Flow

Flow is the sense of immersion in an experience, a mood state between arousal and relaxation wherein the individual is in some optimum state of intrinsic motivation (Csíkszentmihályi 1990). Within a store, antecedents may be the challenge

and skills consumers have in engaging in the experience environment (Wang and Hsiao 2012), such as the nature of the products and number of choices (Swaminathan 2003) or familiarity with the store (Wang and Hsiao 2012). Evident in the discussion above in the ways in which consumers engaged with design sets, flow was apparent when the store layout and navigational signage became frustrating and consumers could not find something they were specifically interested in, say that they had identified in a design set or possibly from a previous store visit, or the content of the section did not appear to 'make sense'. Findings suggest participants were using a narrative approach to shop the store that was more intrinsically directed than random or directed by the store navigation system. For example, participants appeared to correlate content between sections and subsections which may psychologically influence flow behaviour: there were links made between living room and decorative items; kitchens and utilitarian items; lighting, mirrors and wall paints; women's clothing and shoes; etc. The store presentation clearly reinforced the interconnections but large sections of the store were not visited by participants which may represent a disconnect in the narrative they pursued—the sections may repel the consumers because there are no clear associations being made between product categories as presented in the sections and subsections.

4 Conclusions

Our findings provide general support for Wedel and Pieters' (2008) theory of visual attention, i.e. consumer goals (intrinsic motivation) and saliency (prominence) of marketing stimuli (extrinsic stimuli) appear to have combined to establish attentional priorities within the store environment: visual attention is dominated by intrinsic relevancy of information to the individual ('informativeness') with the extrinsic effectiveness of marketing stimuli (Pieters and Wedel 2008a) driving both goal/task-related and browsing behaviour. Findings also highlight that attention is influenced by proximity to relevant features (Becker et al. 2010; Becker 2012). Within the store, signage was relatively little used compared to other components of visual scenes such as products and people. Therefore, although both intrinsic and extrinsic motivators appear to play a role, key elements consumers used in the store were lighting, colour blocks, sight lines and product. These combined and were presented through design sets that, in turn, promoted socialising behaviour and flow, where consumers engaged in 'active consumption' of the store environment. This pattern appears to contribute to store ambience, but more needs to be understood about the dynamic interplay between the elements and the ways in which they influence behaviour during a shopping episode.

Saliency (prominence) is highlighted as a dominant aspect that impacts on consumers' attentional priorities. Within the store, used in this study, saliency was primarily achieved with lighting, which was evidently used by consumers as a stimulus that encourages exploration of the departments of the store. Whereas previous studies have tended to associate saliency, using contrast and colour, with recall (Alba

and Chattopadhyay 1986; Lynch and Srull 1982), this finding is particularly interesting because it adds a further dimension to our understanding of store environments. For example, the store clearly used lighting to highlight details and features of products or product areas but in so doing it has created contrast that added to the 'drama' into the store experience that appears to influence consumers to socialise and induce flow (Csikszentmihalyi 1990). The dominance of the lighting in the store appears to have impacted the hierarchy of effects of other components such as marketing messages and navigational aids. These findings are broadly consistent with design principles (e.g. Israel 1994); yet, this is an aspect that is apparently ignored in the marketing literature (Ballantyne et al. 2010). Much more needs to be understood about the role of lighting in influencing consumer response patterns, especially in relation to store navigation, because of the potential impact it has on the use of traditional (and expensive) promotional materials.

The research undertaken has obvious limitations that relate to the use of small samples and qualitative methodology. The research reported on is, however, an exploratory study that sought to evaluate naturalistic behaviour at a holistic level and its design was intended to consider visual attention from a first-person perspective. Whilst the size of samples used in the research limits the generalizability of findings, the external validity of findings reported on may, nonetheless, be used to develop hypotheses for more quantitative focussed investigations in the future.

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