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Managing the visual environment of a fashion store: Effects of visual complexity and order on sensation-seeking consumers

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# Managing the visual environment of a fashion store

Visual  
environment of  
a fashion store

## Effects of visual complexity and order on sensation-seeking consumers

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### Abstract

**Purpose** – The purpose of this paper is to investigate the effect of a fashion store's visual complexity on consumers' behaviour. Considering environmental order and individuals' sensation-seeking tendencies, the authors examine the effect of visually complex fashion stores on consumers in a more conclusive way to address the inconsistent effect found in the previous literature.

**Design/methodology/approach** – This study features a 3 (visual complexity level: low, medium, high) × 2 (environmental order condition: low, high) between subjects design, with individual sensation-seeking tendency included as a moderator. Using this design, an online survey was administered to 188 participants in South Korea.

**Findings** – The results indicate that there is a three-way interaction, where the interaction effect of visual complexity and environmental order is moderated by individuals' sensation-seeking tendency. The effect of visual complexity on approach behaviours had an inverted U-shape in the low-order condition, while had a positive linear shape in the high-order condition, and the interaction effect was significant only for high-sensation seekers.

**Practical implications** – The findings assist practitioners in establishing strategies for visual merchandising and store design within fashion stores. It is suggested that retailers consider environmental order when organising a large amount of varied merchandise in a complex environment. Store managers must adjust the complexity and environmental order to meet the optimal stimulation level of their target consumers.

**Originality/value** – This study strengthens the literature on visual complexity by applying the concept to the retail environment. The results provide a significant contribution to the literature because they show how individual-level and store-level variables interact to influence consumer behaviour.

**Keywords** Retail environment, Fashion store, Visual complexity, Order, Sensation-seeking tendency

**Paper type** Research paper

### 1. Introduction

A store's environment has a direct and immediate influence on the shopping experiences of the customers who patronise it (Puccinelli *et al.*, 2009). Environmental factors affect customers' emotions, which in turn, influence decisions to spend time or money in a store (Ballantine *et al.*, 2015; Spence *et al.*, 2014). An effective store design involves more than an attractive display of merchandise for sale. Many other factors, including lighting, temperature, colour, music, layout, and fixtures should also be carefully coordinated to provide customers with pleasant experiences in a store (e.g. Vieira, 2013).



Retailers believe that a store's layout and merchandise presentation affect the degree to which shoppers enjoy their experiences in the store (Sherman, 2016; Wu *et al.*, 2013). Consistent with this notion, most fashion retailers have aggressively increased the complexity of their stores, believing that customers will favour a wide assortment of items and varied experiences. To illustrate, fast-fashion brands fill their mega-sized stores with various products, ornaments, and facilities to maximise the use of limited space (Bruce and Daly, 2006; Ghemawat *et al.*, 2003). However, this practice has rendered some store environments to be excessively complex.

Many researchers have demonstrated that visual complexity influences consumers' first impressions (Cox and Cox, 2002; Reinecke *et al.*, 2013; Tuch *et al.*, 2009). Visual complexity affects observer interest (Berlyne, 1971; Eisenman, 1966), information processing (Reber *et al.*, 2004), and affective states (Berlyne, 1971; Terwilliger, 1963), all of which are linked to evaluations of stimuli. Researchers have investigated how visual complexity affects responses to advertisements (Pieters *et al.*, 2010), package designs (Orth and Crouch, 2014), and website design (Deng and Poole, 2012; Tuch *et al.*, 2009). Results of these studies have revealed that visual complexity is negatively related to observer attention, attitude, perceived attractiveness, and recognition (Orth and Crouch, 2014; Stevenson *et al.*, 2000; Tuch *et al.*, 2009). Some studies, however, have reported that the effect of visual complexity on relevant outcomes is not always negative, particularly when accounting for the influence of certain variables, like the presence of order (Arnheim, 1966; Berlyne, 1971; Nasar, 1997) or individual differences (Orth and Wirtz, 2014; Reber *et al.*, 2004).

In a store environment, a plethora of factors influence visual complexity; these include not only the interior décor of the store but also the merchandise itself. Therefore, planning and designing a store that achieves optimum complexity is a challenging task. Despite numerous previous studies exploring these issues, the findings on the effect of visual complexity are inconsistent and inconclusive. It can be assumed that these inconsistencies are attributable to differences in experimental design that were not effectively controlled across studies. This study explores the effect of a retail environment's visual complexity using designed store stimuli. By using designed stimuli, it is possible to effectively control for variations in store complexity that past studies have overlooked. Controlling store complexity in this fashion allows researchers to test for interactions with other variables, including variables that differ by customer (Baker *et al.*, 1992).

Overall, this study examines the effect of visual complexity of a retail environment on consumers, with the interaction effect of environmental order and the moderating effect of individual differences in sensation-seeking tendency. The findings of the present study will contribute to understanding the role of visual complexity in store design and the response of customers to store environment.

## 2. Conceptual framework

### 2.1 Visual complexity and store environment

Visual complexity refers to the amount of detail or intricacy in visual stimuli (Snodgrass and Vanderwart, 1980). Berlyne (1971) initiated empirical scholarship on visual complexity in a study in which he manipulated the complexity of drawings, line pictures, and other stimuli. According to Berlyne's theory of aesthetic preference, an increase in the amount of one determinant leads to a decrease in the maximally preferred level of other determinants, resulting in an inverted-U shape of preference. Research on environments later applied this theory to understanding the effect of complexity in real environments, including natural scenes, building exteriors, and retail signscapes (Nasar, 1997). The visual complexity of an environment is defined as its visual richness, amount and diversity of ornamentation, and amount of information in the environment (Nasar, 1997). In store environments, visual complexity is characterised by the designs of the store's walls, floors, ceilings, furniture,

installations, and other elements, as well as the diversity and quantity of products available in the store (Gilboa and Rafaeli, 2003; Orth and Wirtz, 2014). One might possibly confuse store crowding with the store's visual complexity. However, crowding is a subjective experience that occurs when numerous people or objects restrict or otherwise disturb individuals' behaviours (Eroglu and Harrell, 1986; Machleit *et al.*, 2000). Store crowding may be an antecedent to perceptions of visual complexity, but a visually complex environment is not necessarily crowded. Visual complexity can be increased through complex patterning that does not take up additional physical space.

Gilboa and Rafaeli (2003) revealed an inverted U-shaped relationship between visual complexity and customers' approach behaviours in a grocery store context, using multiple photographs taken of several sections inside of stores. This finding is consistent with Berlyne's theory of aesthetic preference (Berlyne, 1971), in which the author posited that customers will show a higher preference for a moderate level of visual complexity. Huffman and Kahn (1998) explained this phenomenon in the context of information theory. The authors proposed that people seek medium-level environmental stimuli to avoid processing too much information (when there are too many stimuli) or understanding the uncertainties associated with minimal information (when there are too few stimuli). However, when applied to different contexts (like advertising and website interface), findings on the relationship between visual complexity and preference are largely inconsistent. For example, the visual complexity of websites has been found to be inversely related to user pleasure and recognition (Tuch *et al.*, 2009). Visual complexity has also been shown to hinder advertising effectiveness in terms of attitude towards the ad, attitude towards the brand, and purchase intention (Stevenson *et al.*, 2000). Similarly, the visual complexity of a deli store was also found to negatively affect consumers' approach behaviours and patronage intentions (Orth and Wirtz, 2014).

Despite the abundance of research on visual complexity, there has been little to explain its effect in retail fashion contexts. Compared to other retail stores, fashion stores tend to create a unique store environment, including colourful merchandise and interior design and furniture with a planned motif (Morgan, 2011). Applying the foundations of aesthetic preference theory (Berlyne, 1971) to a fashion retail context, we expect that the visual complexity of a store environment will also lead to inverted-U shaped consumer preferences. A preference for visually complex stimuli is operationalized as approach behaviours in relation to a store, which include the following aspects: desire to look around or explore, desire to physically stay, willingness to communicate with staff or customers, and reinforcement of money or time spent in the store (Donovan and Rossiter, 1982). The current study uses this definition because retail research has long used approach behaviours as a proxy for favourable attitudes (e.g. Orth and Wirtz, 2014), patronage intention (e.g. Oliver *et al.*, 1997), and preference (e.g. Donovan and Rossiter, 1982; Rosen and Purinton, 2004). Given the above, the following hypothesis is proposed:

- H1.* There is an inverted U-shaped relationship between the visual complexity of a store environment and consumers' approach behaviours.

## 2.2 Visual complexity and order

Order refers to the degree of lawfulness governing the relations among elements of a larger group (Arnheim, 1966). In a physical environment, order refers to spatial arrangement, and is associated with the degree to which items are organised, coherent, congruent, legible, and/or clear (Nasar, 1997). Of course, the concept of order can be invoked in many contexts. In this vein, visual order is more associated with spatial features (e.g. non-straight edges, asymmetry) than colour features (e.g. hue, saturation, value; Kotabe *et al.*, 2016).

Given its relationship with spatial organisation, order is a source of fluency that facilitates observer recognition or stimulus interpretation (Reber *et al.*, 2004). Several studies on environmental order have revealed its positive influence on observer preference or

pleasantness in a variety of contexts, including urban street scenes (Nasar, 1990), housing scenes (Devlin and Nasar, 1989), and building and architectural exteriors (Nasar, 1994; Oostendorp, 1978; Oostendorp and Berlyne, 1978). In addition to demonstrating the general valence (i.e. positive or negative) of responses that an ordered environment can induce, some studies have revealed specific effects of visual order. For example, Fennis and Wiebenga (2015) found that goal-pursuit responses, prompted by the need to reassert perceptions of order, were triggered by a disordered environment. In another line of research, Chae and Zhu (2014) found that disorganised environments threaten individuals' sense of personal control, which result in self-regulatory failure. Environmental order can also influence an individual's manifest behaviours; Kotabe *et al.* (2016) demonstrated that a disordered (vs ordered) environment can induce many kinds of rule-breaking social behaviours, like cheating. Similarly, Bossuyt *et al.* (2016) showed that disordered environments can also produce unethical consumer behaviours.

Past researchers have extensively explored the relationship between visual complexity and order. Arnheim (1966) and Berlyne (1971) reported that when complex stimuli were ordered, they generated different effects than unordered stimuli. More specifically, when a highly complex stimulus was ordered, it was found to induce interest and foster understanding; when a low-complexity stimulus was ordered, it decreased interest and generated boredom. Based on these findings, Berlyne (1971) proposed that highly complex environments must be ordered to facilitate observers' capacity to process information related to the stimuli. In this vein, Reber *et al.* (2004) found that the highest preference with respect to visual stimuli can be attained through "uniformity in variety" or "simplicity in complexity", both of which emphasise the interaction of visual complexity and order. Reber *et al.*'s (2004) assertion relates to the concept of processing fluency. Processing fluency concerns the notion that although a visually complex stimulus may be difficult to process, when it is ordered in some way, individuals are likely to positively evaluate its aesthetics.

Using images of geometric patterns, Tinio and Leder (2009) also found an effect of the interaction between visual complexity and order (e.g. symmetry) on aesthetic preference. They showed that participants rated complex ordered patterns most favourably, followed by simple ordered patterns, and complex non-ordered patterns, in that order, and simple non-ordered patterns least favourably. Research on the application of visual complexity to digital user interfaces or retail environments has also indicated that visual complexity and order interact to affect preferences for websites or stores (Deng and Poole, 2012; Gilboa and Rafaeli, 2003). For example, Deng and Poole (2012) found that there was a positive relationship between complexity and website preference, but only when the complex information was well ordered. Gilboa and Rafaeli (2003) also revealed that customers were most likely to approach a store characterised by moderate visual complexity and high order. We assume that the effect of high order makes the optimal stimulus level of visual complexity ( $x$ -axis) move to the right, resulting in a linear pattern of increasing preference ( $y$ -axis in the inverted U-shape form). Thus, we expect that when environmental order is high, approach behaviours will increase even after the visual complexity of a store exceeds a moderate level. As such, the following hypothesis is proposed:

- H2.* There is an interaction effect of a store's visual complexity and environmental order on approach behaviours. We hypothesise that (a) low order visual complexity has an inverted U-shaped effect (b) while high order visual complexity has a linear effect on approach behaviours.

### *2.3 Individual differences in sensation-seeking tendency*

Past research has shown that environmental effects on consumer behaviours can vary as a function of consumer personality (e.g. Dijkstra *et al.*, 2008; Kwallek *et al.*, 2007;

Rosenbaum *et al.*, 2016). Van Rompay *et al.* (2012) argued that individual disposition (i.e. personal characteristics) should be considered when investigating consumer response towards the environment. One individual difference variable, sensation-seeking tendency, has been examined in many studies on visual stimuli and preference (Martin *et al.*, 2005; Zuckerman *et al.*, 1993). Sensation-seeking tendency is an individual's desire for diversity, novelty, and complex sensory experiences, as well as the willingness to undertake physical and social risks that accompany these experiences (Zuckerman, 1994). Sensation-seeking tendency differs from person to person; some individuals prefer higher levels of stimulation than others (Raju, 1980; Zuckerman, 1994). Zuckerman *et al.* (1972) found that, whereas high-sensation seekers preferred complex designs, low-sensation seekers preferred simple designs. Zuckerman (1994) also found a positive relationship between an individual's preference for complexity and their score on the sensation-seeking scale. Martin *et al.* (2005) found that preferences for visual complexity on websites differed according to the level of an individual's sensation-seeking tendency; high-sensation seekers preferred complex visual designs and low-sensation seekers preferred simple visual designs.

While several studies addressed high-sensation seekers' preference for visually complex stimuli (e.g. Zuckerman, 1994), little attention was paid to understanding this relationship with respect to order condition. As we hypothesised the interactive effect of visual complexity and order of an environment in the previous section, we will address the boundary conditions of such interactions with the role of individuals' sensation-seeking tendency. That is, the predicted interaction pattern of visual complexity and order on approach behaviours may appear in a different way for high-sensation seekers vs low-sensation seekers. As ordered (non-ordered) complexity fosters higher interest and better understanding (Arnheim, 1966; Berlyne, 1971), we expect that approach behaviours of both high- and low-sensation seekers will be affected by the ordered condition but to a different degree. When stimuli are ordered, it is expected that high-sensation seekers will show the highest approach behaviours to the store with a high level of visual complexity. To a lesser degree, though, low-sensation seekers, who are known to favour less stimulation, will also be affected by the order condition; they will show no fewer approach behaviours to a visually complex (high-level) store when it is ordered. However, the low-sensation seekers' approach behaviours to a visually complex (high-level) store will be significantly decreasing when it is not ordered, resulting in the inverted-U shape:

- H3.* The interaction effect of a store's visual complexity and environmental order condition on approach behaviours is moderated by individuals' sensation-seeking tendency, suggesting that the interaction effect is significant for high-sensation seekers but not for low-sensation seekers.

### 3. Method

#### 3.1 Stimuli

To present participants with environments of different complexities and order levels, Adobe Photoshop CC 2014 was used to design virtual store stimuli. Past studies that have explored the effect of store environments on consumer responses have used photos taken from real stores (Damminga *et al.*, 2012) or have prompted recollections of stores that participants have visited in the past (Jung and Choi, 2011; Park and Jeon, 2008). However, these methods have several limitations. Most notably, data provided in response to these stimuli could be biased by insufficient control of exogenous variables or time lag between the participant's actual experience in the store and the data collection period (Chen and Xu, 2016; Jones, 1999). As suggested by Baker *et al.* (1992), presenting participants with virtual store environments can circumvent these limitations. Consistent with work that used virtual store environments

in experimental manipulations (see Baek *et al.*, 2015), six virtual store environments were created (i.e. three levels of visual complexity and two levels of environmental order).

“Visual complexity” and “order” in the stimuli were operationalized in accordance with past literature on the topics. The visual complexity of the stimuli was varied as a function of their visual richness and diversity. More specifically, visual richness was manipulated by varying the quantity of products and furniture in the stimuli, as well as altering the lighting and the patterns on the walls and floor. Visual diversity was operationalized by altering the variety of products, furniture, lighting, and materials that were available in the store. Visual complexity was presented at three levels (i.e. low, medium, and high). The low-level stimulus was created as a baseline for visual complexity, and the medium and high-level stimuli were subsequently created by adding elements to the store.

We operationalized “environmental order” in a manner consistent with Arnheim (1966). Environmental order is the logical organisation of product arrangement, coherence, and clarity. More basically, logical organisation is a general positional guideline that is associated with intuitively sensible arrangements. A logically organised fashion store stimulus was produced by positioning cash registers at the back of the store, hangers at the sides of the store, and display stands at the store’s centre. Logical product display relates to intuitively sensible product placement (i.e. hats on upper shelves, shoes on lower platforms). Coherence refers to the degree to which the elements in the store conform with one another or are positioned harmoniously. Coherence was operationalized by arranging similar products together as a group. Clarity is the degree to which there are obvious distinctions between store elements. For this study, low-clarity stimuli featured mixed and overlapping store elements. To create two levels of order, we first created a stimulus of high order as a baseline, and subsequently arranged the store’s elements with decreasing levels of logical organisation, coherence, and clarity.

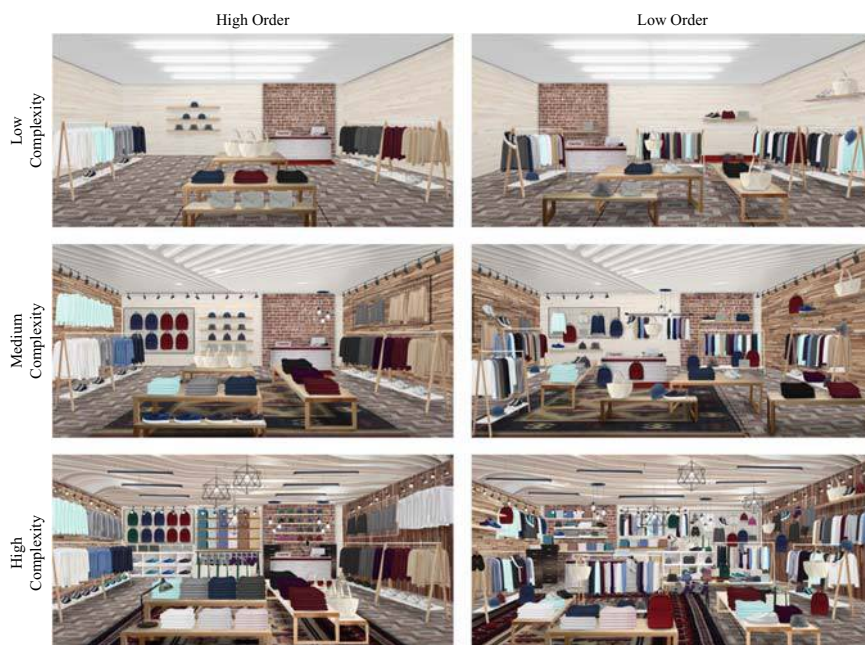
Given that the merchandise presented in the stimuli could affect participants’ perceptions, the merchandise presented in the stimuli were limited to t-shirts with basic designs, shoes, and bags. No elements with brand names, logos, or symbols were included in the stimuli. The furniture in the store included a cash register, cabinets, display stands, display cases, shelves, and hangers. Interior materials consisted of those used for ceilings, walls, and floors, rugs, and carpets. All images were 1,186 × 571 pixels in size (see Figure 1).

### 3.2 Participants and design

In total, 200 participants were recruited through an online survey agency in South Korea. Responses were solicited only from female participants in their 20s and 30s, because the store stimuli were based on existing fashion retailers who target women in their 20s and 30s. Participants ranged in age from 20 to 39 years old, with an average of 29.25. Upon being recruited, participants were randomly assigned to one of the six conditions and were asked to respond to questions concerning the stimulus to which they were exposed. In total, 12 incomplete response sets were removed from the analyses, resulting in a final sample size of 188.

### 3.3 Procedure and measuring instruments

Participants first responded to eight items related to their sensation-seeking tendencies. These items were based on Hoyle *et al.*’s (2002) Brief Sensation-Seeking Scale (BSSS). They were then shown full-screen images of a virtual store and asked to imagine they were shopping there. After being exposed to one of the six stimuli, participants responded to seven items related to approach behaviours (Donovan and Rossiter, 1982), three items concerning perceptions of the store’s visual complexity, and three items related to perceptions of the store’s order. All items were adapted from Gilboa and Rafaeli (2003) and responses were presented on five-point Likert scales.



Visual environment of a fashion store

**Figure 1.**  
Images used as stimuli for the experiment

All constructs were internally consistent with Cronbach's  $\alpha$  coefficients higher than 0.70 (Nunnally and Bernstein, 1994) and were found to be unidimensional, extracting only one factor, with the exception of BSSS. BSSS originally consisted of four subdimensions (e.g. experience seeking, and thrill and adventure seeking), each of which includes two items (Hoyle *et al.*, 2002). However, Hoyle *et al.* (2002) suggest using a composite by combining pairs of items as an indicator of a sensation-seeking latent variable. Since our primary objective is not to examine the distinct effect of subdimensions of BSSS, we adopt this approach. We conducted factor analysis with a fixed number of factors to extract as a single factor, based on extant literature that regards the eight items of BSSS as a single construct (Hoyle *et al.*, 2002; Lu, 2008; Primi *et al.*, 2011). The results of factor analysis of each scale along with means and standard deviations are reported in Table I.

## 4. Results

### 4.1 Manipulation checks

We performed a one-way ANOVA that tested the manipulation of visual complexity (i.e. low, medium, high), and found that it was successful. Results of the ANOVA showed that participants' perceptions of visual complexity were significantly different as a function of their assignment ( $F(2, 185) = 16.17, p < 0.001$ , partial  $\eta^2 = 0.15$ ). A Duncan's *post hoc* test indicated that at  $\alpha = 0.05$ , the three conditions could be sorted into three different subgroups ( $M_{vc\_low} = 2.18, M_{vc\_med} = 2.69, M_{vc\_high} = 2.98$ ).

To check the experimental manipulation of environmental order, a *t*-test was performed. Results showed that participants in different order conditions (i.e. low vs high) differed significantly in their perceptions of the store environment ( $M_{order\_low} = 2.92$  vs  $M_{order\_high} = 4.13; t(186) = -9.76, p < 0.001$ ).



Construct	Items	Mean (SD)	Factor loading	Eigen value	% of variance explained
Sensation seeking ( $\alpha = 0.787$ )	(1) I would like to explore strange places	3.05 (0.69)	0.689	3.33	41.58
	(2) I get restless when I spend too much time at home		0.613		
	(3) I like to do frightening things		0.753		
	(4) I like wild parties		0.702		
	(5) I would like to take off on a trip with no pre-planned routes or timetables		0.597		
	(6) I prefer friends who are excitingly unpredictable		0.661		
	(7) I would like to try bungee jumping		0.546		
	(8) I would love to have new and exciting experiences, even if they are illegal		0.568		
Approach behaviours ( $\alpha = 0.943$ )	(1) I would like to explore around this store	2.92 (0.75)	0.774	5.23	74.70
	(2) I would like to stay as long as I can in this store		0.820		
	(3) I would like to buy products in this store		0.897		
	(4) I would like to visit this store again		0.896		
	(5) I would like to buy a product at this store in the future		0.892		
	(6) I would like to introduce this store to my friends		0.888		
	(7) I would like to say a good word about this store to other people.		0.874		
Visual complexity ( $\alpha = 0.754$ )	(1) An image of this store is complex	2.62 (0.87)	0.878	2.02	67.48
	(2) This store has a various objects		0.754		
	(3) This store has a large amount of products		0.828		
Order ( $\alpha = 0.943$ )	(1) This store environment has an order	3.54 (1.04)	0.944	2.70	89.82
	(2) This store has regularity in arrangement		0.954		
	(3) This store is well organised		0.946		

**Table I.** Measurements' reliability and factor analysis results

## 4.2 Hypothesis testing

4.2.1 *Effect of visual complexity on consumers' approach behaviours.* To test  $H1$ , which predicted a curvilinear pattern, the analysis used perceived visual complexity in a continuous form as an independent variable rather than using the level of visual complexity as a multi-categorical variable. We conducted an analysis that regressed approach behaviours on perceived visual complexity and the squared term for perceived visual complexity. Results of this analysis showed that although both the linear and quadratic terms were significant predictors of approach behaviours (see Table II), inclusion of the squared term in the model at the second stage significantly improved the model's predictive power ( $\Delta R^2 = 0.05$ ,  $p = 0.002$ ).

Figure 2 offers a graphical depiction of this relationship; approach behaviours increase until a moderate level of visual complexity level is reached (i.e. 3). Beyond this point, as complexity increased, approach behaviours decreased. These results provide support for  $H1$  – there is an inverted U-shaped relationship between visual complexity and approach behaviours.

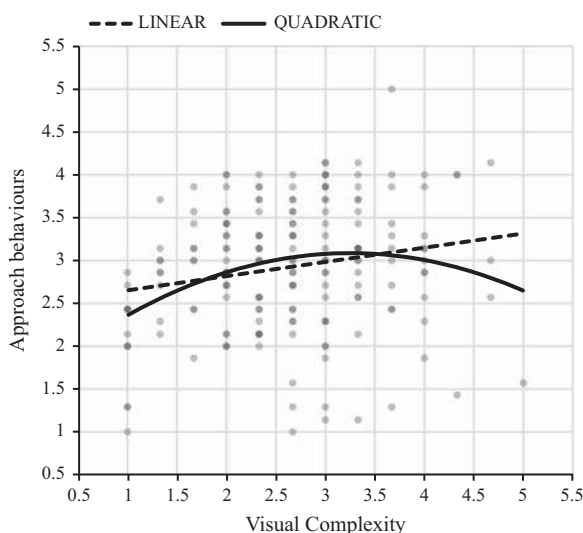
4.2.2 *The interaction effect of visual complexity and order on consumers' approach behaviours.* To test  $H2a$  and  $H2b$ , a 3 (visual complexity: low, medium, high)  $\times$  2

(order: low vs high) between-subjects ANOVA was performed for the dependent variable of approach behaviours. Results indicated a significant main effect of visual complexity ( $F(2, 182) = 6.30, p = 0.002$ , partial  $\eta^2 = 0.07$ ) and an interaction between visual complexity and order ( $F(2, 182) = 3.63, p = 0.028$ , partial  $\eta^2 = 0.04$ ). The main effect of order on approach behaviours was not significant ( $p = 0.127$ ). As shown in Figure 2, participants' approach behaviours driven by an increase in the level of visual complexity differed as a function of the order condition to which they were assigned. Simple effects of the level of visual complexity within each order condition were both significant (Low-order:  $F(2,182) = 6.43; p = 0.002$ , partial  $\eta^2 = 0.07$ ; High-order:  $F(2,182) = 3.64, p = 0.028$ , partial  $\eta^2 = 0.04$ ). Pairwise analysis on each order condition elaborated the effect of visual complexity; in the low-order condition, approach behaviours at the mid-level of visual complexity ( $M = 3.18, SE = 0.130$ ) were significantly higher than those at the low-level ( $M = 2.53, SE = 0.128; p < 0.001$ ) and at the high-level ( $M = 2.79, SE = 0.130, p = 0.035$ ). The approach behaviours at the low-level and high-level were not significantly different ( $p = 0.155$ ). The results provide support for the inverted U-shaped pattern of approach behaviours in the low-order condition (see Figure 3). Thus,  $H2a$  is supported. On the other hand, in the high-order condition, the only significant difference in approach behaviours was between the low-level ( $M = 2.78, SE = 0.122$ ) and high-level of visual complexity ( $M = 3.24, SE = 0.122; p = 0.008$ ), supporting  $H2b$ , that approach behaviours increase as the level of visual complexity goes higher. Overall, these results support  $H2$ , the interaction between visual complexity and environmental order.

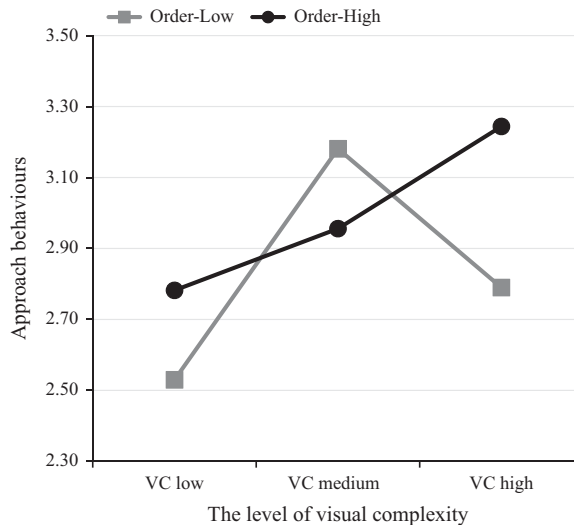
	Stage 1	Stage 2
Visual complexity	0.178**	1.21**
(Visual complexity) <sup>2</sup>		-1.06**
Variance explained ( $R^2$ )	0.032**	0.079**
$R^2$ Change	0.047**	

Notes: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

**Table II.**  
Standardized  $\beta$   
coefficients for the  
hierarchical regression  
used to predict  
approach behaviours



**Figure 2.**  
A curvilinear  
relationship between  
visual complexity and  
approach behaviours

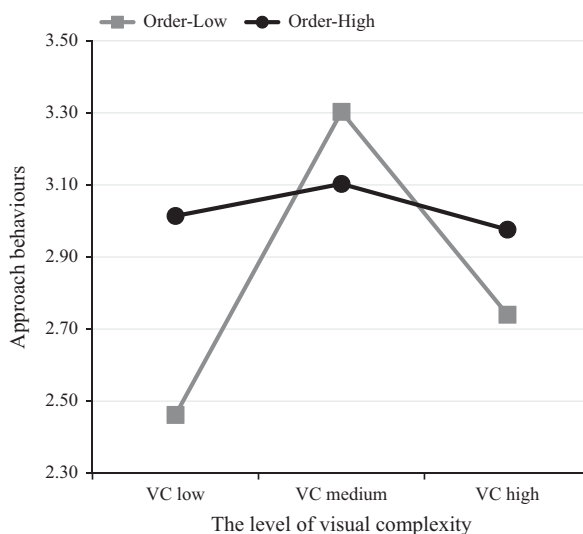


**Figure 3.**  
The effect of visual complexity on approach behaviours by order condition

*4.2.3 The moderation effect of consumer sensation-seeking tendency.* To test *H3*, a PROCESS SPSS Macro (Model 3,  $n = 5,000$  resamples; Hayes, 2013; Spiller *et al.*, 2013) was implemented to perform a bootstrapping analysis on approach behaviours. Model 3 allows the estimation of a three-way interaction whereby the interaction effect between visual complexity and order condition is moderated by the sensation-seeking tendency. The results revealed a significant three-way interaction ( $\beta = 0.404$ ,  $t = 2.13$ ,  $p = 0.034$ ) with no other significant effects. Interpretation of this three-way interaction would allow for a determination of how the interaction effect of visual complexity and order conditions on approach behaviours is moderated by sensation-seeking tendency ( $M = 3.05$ ,  $SD = 0.69$ ). At the +1SD value of the mean of sensation-seeking tendency (at 3.75), the interaction effect of visual complexity and order condition was significant ( $t(180) = 2.06$ ,  $p = 0.040$ ) while the effect was not significant ( $p = 0.334$ ) at the -1SD value of the mean (at 2.36). Therefore, *H3* was supported.

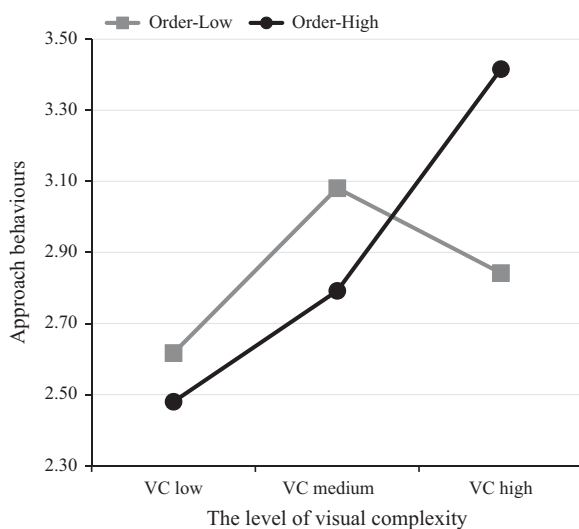
To understand the interaction pattern of visual complexity and order condition at both low and high values of sensation-seeking tendency, a series of pairwise comparisons were conducted. For those who have a low-sensation seeking tendency (-1SD), the effect of different levels of visual complexity on approach behaviours was found only for the low-order condition ( $F(2,176) = 5.00$ ,  $p = 0.008$ ), not for the high-order condition ( $p = 0.871$ ). Under the low-order condition, there were significant differences between low vs medium ( $p = 0.002$ ), and medium vs high visual complexity ( $p = 0.041$ ) while there was no difference between low vs high-level of visual complexity ( $p = 0.255$ ). As shown in Figure 4, low-sensation seekers' approach behaviours are described as an inverted U-shape according to the level of visual complexity under the low-order condition, while the approach behaviours do not seem to be affected by the level of visual complexity under the high-order condition.

For those who have a high-sensation seeking tendency (+1SD), the effect of different levels of visual complexity on approach behaviours was found only for the high-order condition ( $F(2,176) = 7.53$ ,  $p = 0.001$ ), not for the low-order condition ( $p = 0.219$ ). Under the high-order condition, there was a significant difference in approach behaviours between the low vs high ( $p < 0.001$ ), and medium vs high levels of visual complexity ( $p = 0.008$ ), yet no difference between the low vs medium levels ( $p = 0.261$ ). Figure 5 describes the linearly increasing approach behaviours by the increase in the level of visual complexity under the



Visual environment of a fashion store

**Figure 4.** The effect of visual complexity on approach behaviours by order condition: low sensation seekers



**Figure 5.** The effect of visual complexity on approach behaviours by order condition: high-sensation seekers

high-order condition. Under the low-order condition, there was a marginal increase in approach behaviours from the low to medium level of visual complexity ( $p = 0.082$ ) with no difference between the medium and high levels or the low and medium levels, generating an inverted U-shaped curve.

## 5. Conclusions and implications

This study investigated the effect of a store's visual complexity on consumer behaviour. Results of the analyses demonstrate that consumers' behaviours differed as a function of environmental order and individual sensation-seeking tendency. Consistent with past

studies that have investigated how visual complexity affects aesthetic preferences (Berlyne, 1971; Vitz, 1966), the effect of visual complexity of a store environment on approach behaviours was curvilinear in shape, but only in the low-order condition. With the interaction effect of visual complexity and environmental order, we found that when the stimulus environment was highly ordered, visual complexity of an environment affected approach behaviours in a different way due to the moderating effect of individual sensation seeking.

Among low-sensation seekers, there was no statistical significance of the interaction between visual complexity and environmental order condition. However, there was a significant difference in approach behaviours at each level of visual complexity under the low-order condition, revealing an inverted U-shaped pattern. That is, approach behaviours of low-sensation seekers were found to be the highest at a moderate level of a store's visual complexity under the low-order condition, which is consistent with the previous findings of Berlyne (1971). Interestingly, low-sensation seekers were not affected by the level of visual complexity under the high-order condition. This may imply that if an environment is well-organised in a way that the placement of products and furniture is understandable, such that similar products are arranged together, low-sensation seekers would not be significantly affected by the amount of merchandise, furniture, and so on, which form the level of visual complexity. These results explain the independent effect of order and visual complexity on people's perceptions even though order is highly correlated to visual complexity.

Among high-sensation seekers, there was an interaction between visual complexity and environmental order condition. As expected, there was a positive linear relationship between visual complexity and approach behaviours among them, but only when the environment was highly ordered. Similarly, increasing approach behaviours from low to medium level of visual complexity were found to drop at a high-level of visual complexity under the low-order condition, while reaching the highest level under the high-order condition. Thus, it is believed that despite one's high-sensation seeking, a moderate level of visual complexity is most preferred unless there is an order in terms of logical organisation, coherence, or clarity.

Overall, this finding is consistent with that of previous studies that revealed the inverted U-shape of the preference for visual stimulation whereby a moderate level of visual complexity is most preferred (Berlyne, 1971). Additional findings on this effect, with the consideration of environmental order and individuals' sensation-seeking tendency, are also built upon the outcomes of previous studies of high-sensation seekers' preference for greater stimulation (Martin *et al.*, 2005). While research on visual complexity has generally been limited to design of products or flat materials such as advertisements, this research investigates visual complexity in relation to spatial environment design. These findings are important, given the application of theories from multiple fields (e.g. cognitive psychology, Berlyne, 1971), to the study of retail store environments, and have multiple practical implications. The findings of the current research can be extended to online/mobile commerce, and to the application of virtual/augmented reality technologies that require spatial design. Since there is little guidance for such emerging retailers to manage their store environments, this study is believed to provide a milestone for marketers and brands to effectively design and differentiate their stores from their rivals' offerings.

The current study is also important methodologically, as it differs from past studies on how retail environments are presented to participants. Whereas past researchers presented respondents with images or asked respondents to recall past visits to stores, this study featured specially designed stores to embody specific variables of interest. This allowed participants to experience a realistic (but still controlled) shopping event with variable characteristic elements (e.g. visual complexity). As such, this study represents an advancement in methodology for the literature on retail environments.

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As managers expand and diversify techniques to optimise customers' in-store experiences, those customers have come to be exposed to increasingly complex retail environments. This study has several practical implications for managing a store environment's visual complexity to induce positive responses on the part of consumers. The findings presented here may assist practitioners in establishing strategies for visual merchandising and store design within fashion stores. First, the study's findings suggest that retailers must consider environmental order when organising a large amount of varied merchandise in a complex environment. Although retail managers cannot reduce the quantity or variety of elements in a store environment, they should seek to maintain order among the merchandise and elements of interior design (e.g. grouping similar products together and placing furniture in an organised and structured way).

Second, complexity of a store that is too low hinders consumers' approach behaviours. Particularly when the store has a limited variety and small volume of merchandise, store managers must adjust the complexity and environmental order to meet the optimal stimulation level of their target consumers. According to previous studies on fashion behaviour and consumers' sensation-seeking tendency, high-sensation seekers are likely to be fashion leaders, whereas low-sensation seekers are likely to be fashion followers (Kwon and Workman, 1996; Stanforth, 1995). Fashion leaders tend to seek new fashion items that provide novelty and uniqueness, whereas fashion followers tend to adopt fashion styles that are more common and widely available (Workman and Kidd, 2000). Therefore, for stores that primarily sell basic and low-trendiness fashion products, arranging products in an orderly manner can be helpful for improving consumer approach behaviours. However, for stores that deal with high-trendiness fashion products, improving only the environmental order may reduce consumers' interest. In that case, it would benefit retail managers to produce complexity that meets consumers' optimal stimulation level by diversifying interior elements.

Despite its practical and theoretical contributions, this study has some limitations that can be addressed. The first limitation is that the means for the complexity manipulation of this study were somewhat low. There are two reasons for this. First, in designing the experiment, we avoided using an extreme level of visual complexity because the stimuli we used to provide visual complexity were in a retail and commercial context. This is based on the notion that retail stores typically avoid extreme levels of complexity in order not to drive away their potential customers (Orth and Wirtz, 2014). Second, we assume this is also due to the static format of stimuli provided to participants. In the current study, we used still images that may not fully convey the perception of visual complexity. Therefore, for future research, scholars may benefit from using three-dimensional simulations to model store environments and provide stereoscopic views more consistent with reality. This can enhance participants' perceptions of presence in the store by facilitating movements (with a joystick) that would normally occur in a real-world store environment, including walking and looking around (see Hwang and Yoon, 2009). The application of these experimental methods will enable a more accurate measurement of consumers' complexity perception level.

The second limitation is that we used the quantity and variety of elements in store environments for manipulating visual complexity. There may be other ways to manipulate the visual complexity of store environments, such as the use of patterns, colours, or lighting. From a practical perspective, especially when space is limited, the level of visual complexity can be controlled by changing the pattern of walls without adjusting the assortment of physical objects. Future research can consider the relationships between such environmental factors and the visual complexity of a store.

Regarding the third limitation, this study focussed on the sensation-seeking tendency, which is related to sensory experience of stimuli. However, several individual variables related to visual processing, such as creativity, information processing style, gender, and age, remain to be explored. By considering these characteristics, future research can further

explain the preference and behavioural intentions formed by visual complexity and the potential effect on certain individuals.

Finally, this study demonstrated the timeliness and utility of exploring visual complexity in a retail environment with digital technologies. A recent study concerning dynamic presentation showed that using a dynamic visual format (i.e. video or slideshow) to present products to consumers increased those consumers' involvement in decisions and willingness to pay for the product (Roggeveen *et al.*, 2015). With respect to the study of visual complexity and store environments, it may be useful to investigate how the dynamism of a presented environment moderates the effects of visual complexity on salient outcomes.

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