

MASTER THESIS

The effect of colour and  
density on the store perception

M. Stappenbeld

S1236547

Graduation committee:

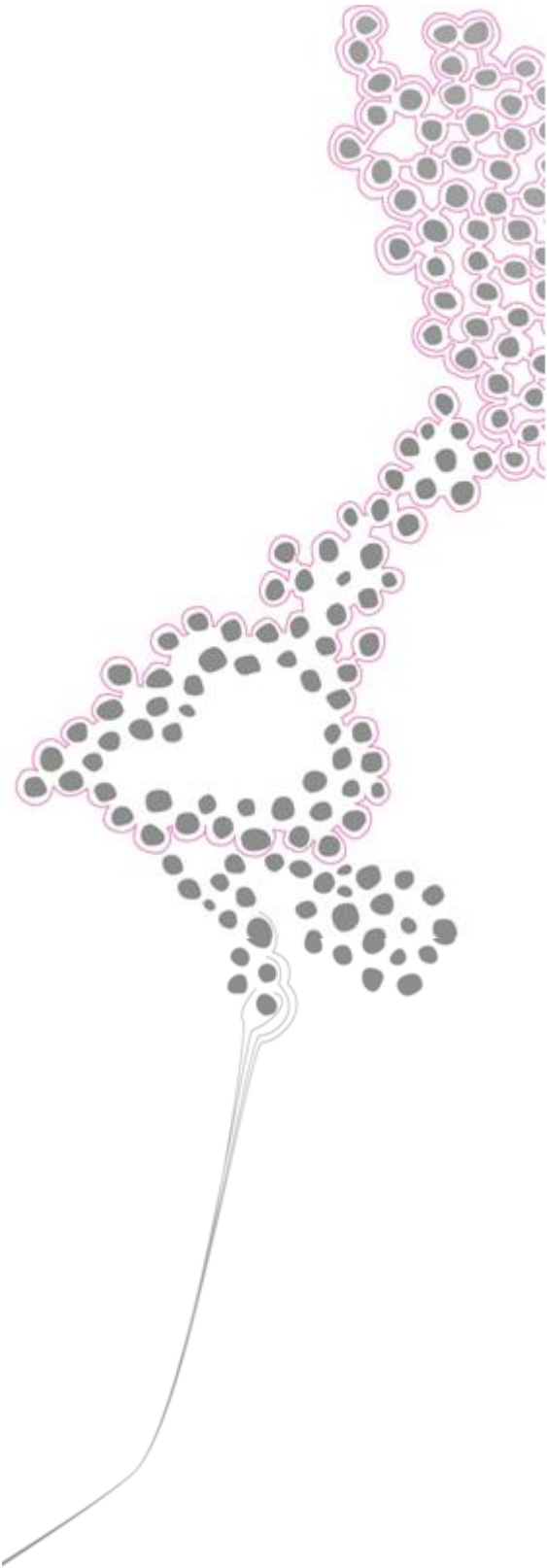
Dr. A. Fenko

Prof. Dr. A. T. H. Pruyn

Master Communication Studies

Faculty of behavioural sciences

Academic year 2011- 2012



# The effect of colour and density on the store perception

M. Stappenbeld, BA.

*Master Marketing Communication, Communication Studies*

*Department of Behavioural Sciences, University of Twente, Enschede, the Netherlands*

*Date:*

19-06-2012

*Place:*

Nijmegen, the Netherlands

*Advisor:*

Dr. A. Fenko, University of Twente

*Co-Advisor:*

Prof. Dr. A. T. H. Pruyn, University of Twente

## **Abstract**

Very little research is done about the *exterior* store atmospherics and to what extent it can influence consumer behaviour. In the shopping environment the consumer is surrounded by colours. Changing or adapting these can influence the perceptual, emotional reactions and actual behaviour (Kotler, 1973). The exterior of a store is occupied largely by the shopping window. By changing the colour of the lights in the shopping window it is possible that the emotions of potential consumers can be influenced and that it can interact with human density. An experimental study was conducted using an online 2x2 between-subjects design with 205 participants. Results showed main effects for density and gender and a three-way interaction effect between density, colour and gender. The attitude towards the shopping environment was more positive in the high density condition compared to the low density condition, but the perceived quality of the store was lower. Females scored more positively on attitude towards the store, pleasure and approach behaviour than males. For males, the attitudes towards the store and pleasure were more positive with the combination of cold light and high density and warm light and low density, but the perceived quality of the store was more positive with the combination of cold light and low density and warm light and high density. Females were less affected by colour than men, for them density was overwhelming. The attitudes towards the environment, - the store and pleasure were more positive in the high density condition, but the perceived quality was more positive in the low density condition. Due to this research, new exterior designs that react to density and match the type of sex, to positively influence the attitude and pleasure of the shopper, can be applied and some interesting implications about gender can be investigated further in future research.

### *1.1 Introduction*

A considerable amount of research focuses on the interior of the retail environment. However, little research has been conducted on the effect of the exterior on customer attitudes and/or behaviour. Research on exterior building shape and characteristics, such as colours and architectural style and the effects of exterior landscaping and signage are particularly called for since so little is known about these variables at present. The exterior variables are particularly important since the exterior of a marketing facility must be considered acceptable before the interior of the building is ever experienced (Turley & Milliman, 2000).

In this study the focus will be for one thing on the effects of coloured light, because these elements are relevant to environmental experience (Valdez & Mehrabian, 1994) and colours strongly determine how we feel (Kotler, 1973). Moreover this element is relatively easy to change and yet, there are just a few stores that have lights other than white in the shopping window. Furthermore the study will focus on the effects of human density, because this element is a fundamental determinant of the shopping experience (Eroglu, Machleit & Chebat, 2005) and is undeniable in a real retail environment. Consumers do not process environmental elements piecemeal. Rather, it is the combination that affect how consumers behave. Because density is dynamic, it can provide useful information for implication in combination with coloured light.

### *1.2 Theoretical framework*

According to the classification of Baker (1986) the environmental elements can be divided into three components: 1) Design elements, which are present visually and/or tangibly, 2) ambient elements, which are also tangible, but often in the background and only noticed when they exceed an acceptable range and 3) social elements, the people who are present in the environment (Baker & Cameron, 1996). The exterior of a store consists of design- and ambient elements, but the environment of the store consists of social factors also. It is possible that social factors can influence the effects of design - and ambient elements. For example a red, arousing exterior of a store in a very crowded street is likely to evoke different emotions than a red, arousing exterior of a store in a very quiet street.

The environment influences a person's wellbeing. According to Mehrabian and Russell (1974) physical stimuli have a direct influence on emotions and affect behaviour. They assume that the environmental perception is influenced by three constructs of experience: Pleasure, arousal and dominance.

Whereby pleasure is the primary assessment and refers to the extent to which a person feels good in the environment, arousal relates to the extent to which a person feels excited or stimulated and dominance to the extent to which a person feels in control. Baker and Cameron (1996) state there is a standard level of environmental elements, which most people feel comfortable. This corresponds to the arousal theory of Berlyne (1967). Too much environmental elements cause too much arousal and too little environmental elements cause too little arousal and both situations may evoke discomfort: Too much may cause anxiety or anger and a lack of it may cause boredom.

As discussed above the environmental stimuli affect the emotional states (pleasure, arousal and dominance) which in turn affect approach or avoidance behaviours (Mehrabian & Russell, 1974). The stimuli are the physical features of the environment (e.g. colour, density). Approach behaviour is a willingness or desire to move towards and explore the environment. Avoidance behaviour is a willingness or desire to withdraw from an environment. The model of Mehrabian and Russell (1974) suggests that the effects of store environment factors on approach or avoidance behaviour is mediated by the affective response (pleasure, arousal and dominance).

### *1.2.1 Shopping motivations*

There are two types of shopping motivations/goals: utilitarian and hedonic. Utilitarian shoppers seek to acquire products through the use of heuristics, goal-oriented behaviour, risk reduction strategies and achievement of information search goals. Alternatively hedonic shoppers focus on fun, entertainment and the more enjoyable aspects of shopping, whether or not a purchase occurs (Babin, Darden & Griffin, 1994). However, the distinction is often not very sharp. When a consumer is pressed in time he/she often becomes a run shopper and becomes less favourable towards a store with a high level of human density.

A study by Van Rompay, Krooshoop, Verhoeven and Pruyn (2011) proposes shoppers have different social needs. The need for affiliation is a fundamental human motivation involving the urge to seek and enjoy relationships with other people (Hill, 1987). Consumers vary in the extent to which they value the presence of others. There are four reasons for consumers to affiliate for others: Some find social contact stimulating or exciting, it may generate attention, emotional support and opportunities for social comparison. A shopping trip is thus for some people not only a goal-directed activity, but also a social experience (Van Rompay et al., 2011).

According to Buttle (1992) there are sex role orientations in shopping. Women do most of the shopping for the family, while men are so-called specialist shoppers.

It could be said that men buy and women shop. Women see shopping as a fun experience and think of the hedonic aspects of shopping as more important than men (Dholakia, 1999). Most men who shop see themselves as fulfilling an instrumental need, rather than engaging in shopping for shopping's sake (Campbell, 1997), which is fairly common among women. Women proved to be more involved with the purchasing activity and associate shopping with their role in the family (Slama & Tashchian, 1985).

Yet men are becoming increasingly visible in retail venues. Dholakia, Pedersen and Hikmet (1995) observed that 10% of men claim to be primary grocery shoppers in their families, with over half buying their own clothes. They also found that the more men report being responsible for a particular type of shopping, the more they enjoy the activity.

Several researchers (Roberts and Wortzel, 1979; Schaninger & Allen, 1980) have suggested that as gender-neutral roles continue to develop (as more women enter the workforce), male/female differences with respect to consumer behaviour will diminish.

### *1.2.2 Colour*

Colours are often categorized as warm (red, orange, and yellow) or cold (blue and green). Red colours are arousing, while cold colours are relaxing (Jacobs & Suess, 1975; Adam & Osgood, 1973). There are three perceptual dimensions of colour: Hue, brightness and saturation. High saturation can stimulate agitation, whereas a low saturation can stimulate calmness (Baker & Cameron, 1996). The hue is determined by its wavelength. Short wavelength is associated with cool colours and long wavelength with warm colours with orange and violet as extremes (Crowley, 1993). Thus colours with short wavelengths evoke generally better feelings (Valdez & Mehrabian, 1994), however colours with long wavelengths are generally more arousing.

The effect of and preference for a colour also varies by location, culture and gender. The colour red for example will have another effect in a hospital than in a restaurant. Colours can have different symbolic meanings and associations across cultures, resulting in different preferences and effects. A study by Hurlbert, Ling and Robinson (2006) about colour preference and gender shows that women prefer red-purple colour dimensions and that men prefer blue-green colour dimensions.

Research into the use of colour within a retail environment shows that it can influence shopping behaviour. In laboratory experiments conducted by Belizzi & Hite (1992) retail environments were simulated using red and blue colours. More positive retail outcomes occurred in blue rather than red environments.

More simulated purchases, fewer purchase postponements, and stronger inclinations to shop and browse were found in blue retail environments. This is in line with the findings of Jacob and Suess (1975) who state that blue and green (cold colours) are perceived to be the most pleasant in a retail environment and are also evaluated more positively than shops with a warm (orange) interior.

Babin, Hardesty and Suter (2003) investigated with a scenario study the importance of colour (and lighting) in the interior of a fashion store. Results shows that shoppers react more favorably to cool colours and rated the blue environments as more likable than the orange environment. The purchase intentions were also influenced more positively in the blue environment.

Van Rompay, Tanja-Dijkstra, Verhoeven and van Es (2011) investigated the effect of colour and shopping intentions. Results show that the effect is dependent on the goals of the shopper: task-oriented or recreational (fun/run shoppers). The fun shoppers responded positively towards the colour in the store: They were more invigorated and indulgent in a red than a blue store. But the same red environment was too distracting or arousing for goal pursuit and in accordance run shoppers rated the blue store as more relaxing and pleasant than the red store. Van Rompay et al. (2011) suggest that when people are browsing and crowding is low, the arousal levels should be increased by selecting warm colours such as yellow and red. At peak hours or before closing time (when task-oriented shoppers are often large in number and/or crowding is high), cool colours such as blue and green are advisable to reduce levels of arousal.

Belizzi, Crowley and Hasty (1983) did a laboratory experiment to test whether colour affects approach orientation and attraction. It showed that persons are physically drawn to warm colours, but that warm coloured environments are generally unpleasant. In the study the subjects actually sat closer to yellow and red walls than to blue and green walls. Subjects indicated that while warm environments were bright and colourful, they also considered them to be less attractive and less pleasant than cooler environments. The warm colours were rated higher on an activity factor, but lower or unfavourable on an evaluative factor. Customers may consider shortening their shopping time in a negative, tense environment. Also, warm colours were associated with unplanned, impulse purchases. These results indicate that if a retail display is designed to draw customers physically by using warm colours, it runs the distinct risk of creating a less-than-attractive or less-than-pleasant environment. While red and other warm colours may be good physical attraction colours, they were rated colourful yet negative, bright yet tense. Bellizzi et al. (1983) recommend not to use warm colours for bulk usage, as it can become irritating and distracting on larger scale. Note that in this research the examined colour effects were in the context of a furniture store and that fully saturated colours were used (Bellizzi, Crowley and Hasty, 1983).

Based on these results it can be suggested to use cooler colours within the store, because consumers feel more pleasant and will stay longer. Warmer colours are probably more suitable for a store's exterior or display window to draw customers into the store.

### *1.2.3 Colour and light*

Light and colour combined have seldom been investigated (Hardesty and Suter, 2003). Baker and Cameron state that light has influence on human behaviour. Light has a strong effect on the degree of arousal (Gifford, 1988; Miwa & Hanyu, 2006). In a study of non chromatic colours by Valdez et al. (1994) it was found that the brightness strongly determines the degree of stimulation and dominance.

Light can also influence a shop's image and the stimulus to look at and scrutinize the merchandise (Baker, 1994). The literature suggests that bright fluorescent lights and warm colours are more consistent with a discount store concept and that soft lights and cool colours are more consistent with a prestige store concept (Baker et al., 1992; Belizzi & Hite, 1992; Schlosser, 1998).

Areni and Kim (1994) did a field experiment on the impact of in-store lighting in a centrally located retail establishment (wine cellar of a restaurant). They found that customers examined and handled more items under bright lighting conditions than under soft lighting conditions. Also they handled more eye level merchandise when the lighting was bright rather than soft. They point out that attention must be given to the impact of lighting on functional aspects. A restaurant for example, typically employs soft lighting to create a romantic atmosphere, but this is at the expense of the readability of the menu (Areni & Kim, 1994). In an extending study Summers and Herbert (2001) tested the effect of light in two types of stores: A hardware store and a western apparel/feed store. The results confirm the findings of Areni and Kim (1994) that consumers examined and handled more items under bright lighting than soft lighting. In addition results showed that consumers touched more items and picked up more belts with additional display lighting. These results supports that light affects arousal and can increase approach behaviours.

According to Baker et al. (1994) lights may moderate the effect of colour. These findings are confirmed by a scenario study of Babin et al. (2003) who compared an orange and blue shop with different levels of lighting and found that it affected consumers' cognitive representation and affective reaction. The blue shop was preferred the most, but when the orange shop was combined with soft lighting, it became almost as positively rated as the blue shop.

#### *1.2.4 Density*

Retail density is defined by Eroglu, Machleit and Chebat (2005) as the number of people (human density) and objects (spatial density) in a limited space. Shoppers perceive retail crowding when density restricts or interferes with their activities and shopping goals. Retail crowding affects consumer behaviour. It is a fundamental determinant of the shopping experience.

In a typical shopping street there are normally no or almost no spatial elements, which restrict or interfere with the shoppers' activities and goals. Therefore this study will focus only on human density.

Crowding can create psychological stress and increased arousal (Michon, Chebat & Turley, 2004). When human density is low, people can get bored, resulting in avoidance behaviour. The effect of human density on consumer perceptions and behaviour varies depending on the motivation and goals of the shopper (Eroglu & Harrell, 1986) and types of stores (discount versus upscale) (Machleit, Eroglu & Mantel, 2000). Density negatively influences perceived control (Hui & Bateson, 1991) by restricting movement, lengthening of shopping time, presenting social interactions etc. However by a study by Van Rompay, Galetzka, Pruyn and Moreno-Garcia (2008) density also negatively influenced perceived control, but only for those high in need for control. Furthermore a study by Van Rompay, Krooshoop, Verhoeven and Pruyn (2011) showed that the effect of density on shopping pleasure and approach behaviour vary with shoppers' affiliation needs: Negative effects were only apparent for shoppers with low affiliation needs.

#### *1.2.5 Colour, light and density*

Little research is done about the interaction of colour (and/or light) and density in a retail environment. Colour and density can both have influence on the dimensions pleasure, arousal and dominance, which in turn influence behaviour. It is known that space is experienced as less busy when the colours have short wavelength (Mehrabian & Russell, 1974),

In an experiment of Baker, Levy and Grewal (1992) a group of subjects was exposed to one of four videotapes manipulated with low/high ambient levels ( background classical music with soft lighting/ foreground top 40 music and bright lighting) and low/high social levels (one employee ignoring customers/ three friendly employees) in a laboratory setting. Pleasure, arousal and willingness to buy were measured by a self-administered questionnaire. The results show that the high social store environment initiated greater feelings of arousal in respondents than did the low social store environment. Furthermore they found that the ambient cues interact with social cues to influence the shoppers' pleasure and subsequently their willingness to purchase.



Thus when the ambient environment is low, the social factor becomes important and similarly when the social environment is low, the ambient factor becomes more important. Because the ambient cues consisted of music and lighting, the results from lighting alone are impossible to interpret.

It still remains uncertain how density interacts with colour and vice versa. Presumably colour and human density will strengthen or weaken each other. For example a red, arousing colour of the exterior may increase the perceived human density and evoke even higher levels of arousal.

#### *1.2.6 Main problem setting*

In the shopping environment the consumer is surrounded by colours. Changing or adapting these can influence the perceptual, emotional reactions and actual behaviour (Kotler, 1973). The exterior of a store is occupied largely by the shopping window. By changing the colour of the lights in the shopping window it is possible that the emotions of potential consumers can be influenced and that it can interact with human density. A fashion store was chosen deliberately. The shopping window can be determinative for these type of stores, because there are many stores with similar products. Fashion stores always have big shopping windows where mannequins demonstrate the clothing. Even outside opening hours it is important that the exterior attracts potential clients to come back and visit.

Therefore the key question of this research will be: How can colour of the lights in the shopping window of a fashion store be strategically deployed in low vs. high human density shopping environments to positively influence emotions, the attitude towards the store and shopping environment?

#### *1.2.7 Hypotheses*

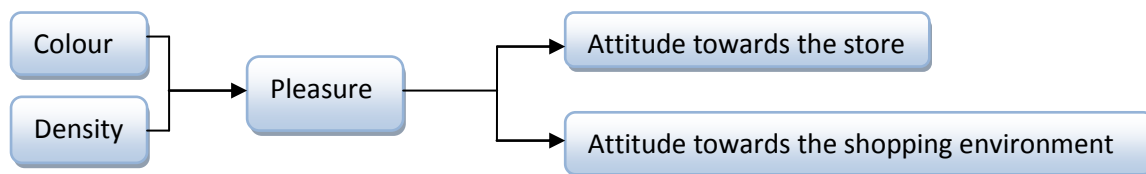
It is expected that in a quiet shopping environment (low human density) warm coloured lighting in the shopping window in comparison to cool coloured lighting will lead to a more positive attitude towards the store and shopping environment and that in a crowded shopping environment (high human density) cool coloured lighting in the shopping window in comparison to warm coloured lighting will lead to a more positive attitude towards the store and shopping environment.

These expectations are in line with the arousal theory of Berlyne (1967) which states that too much arousal caused by too many environmental elements and too little arousal caused by too little environmental elements evoke emotion of discomfort and that there is an optimum level of arousal where people feel comfortable with (Baker & Cameron, 1996).

*H1. In a quiet shopping environment (low human density) warm coloured lighting in the shopping window in comparison to cool coloured lighting will lead to more pleasure and subsequently a more positive attitude towards the store and shopping environment.*

*H2. In a crowded shopping environment (high human density) cold coloured lighting in the shopping window in comparison to warm coloured lighting will lead to more pleasure and subsequently a more positive attitude towards the store and shopping environment.*

Figure 1. Conceptual Research Model



## 2. Materials and methods

### 2.1 Participants and design

A total of 205 valid online questionnaires were completed. 84 (41%) were male and 121 (59%) female. Age varied between 13 and 77 years ( $M=28.65$ ,  $SD=11.96$ ). In total 153 participants (74.6%) liked to shop against 51 participants (24.9%) who did not like to shop, of which the major part were men. Most participants indicated they went shopping at least once a month.

The questionnaire was distributed in English as well as in Dutch (see appendix A for the English version and appendix B for the Dutch version).

To test the hypotheses an experimental 2 x (density: high vs. Low) x 2 (colour of the lights in the shopping windows: warm vs. cold) between participants design was employed. Density was manipulated by showing one of two video's shot at a different time: crowded and non-crowded (see figure 2).

The colour of the lights in the shopping windows were manipulated by showing one of two different video's, in which the colour was manipulated with Adobe after effects. The colour used in the main study was selected based on the results of a pre-test. 21 participants rated 13 possible colour scheme's of the lights in the shopping window on a 9 points semantic differential scale (1: Cold, 9:Warm). The two colours chosen for the main study were blue and red, these were rated the most cold and most warm (see figure 2).

Figure 2a. High density condition with cold (left) vs. warm (right) coloured lights



Figure 2b. Low density condition with cold (left) vs. warm (right) coloured lights



Attitude towards the store, Attitude towards the shopping environment, Pleasure, Arousal, Dominance and Approach behaviour were the dependent variables. To control that the stimuli worked as they were supposed to work, seven control variables were added that measured the attitude towards shopping, how frequently participants went shopping and to what extent they showed compulsive shopping behaviour, whether they thought the shopping environment was crowded, the lights of the shopping windows had colour, whether they recognized the store and what their favourite colour was.

## 2.2. Procedure

An online questionnaire was created in Thesis Tools and available online for 17 days, from March 23 to April 2, from April 24 to 26 and from May 15 to 17. Participants were recruited by sending email invitations. First to people from own network (about half of the participants).

Then by posting on online social networks (LinkedIn, Twitter, Facebook) and by asking people in the public library of Arnhem, library of the Radboud University in Nijmegen and the auditorium of the HAN in Arnhem to participate. Attempts have been made to reach a group as large and diverse as possible to ensure the generalizability. Participants who reported to shop daily or never and participants who recognized the store in the video were deleted. Participants were randomly assigned to one of the four conditions.

### *2.3 Stimuli*

For the high and low human density condition a video was made in a shopping street focusing on the exterior of a shop on a very crowded and a quiet moment. The crowded condition was shot at 19.30pm and the quiet condition was shot at 20.50pm, just before closing time of the shop.

Both video's were shot from exactly the same angle, by using a tripod. In the low density condition there was never more than one person in the street and in the high density condition there were all the time at least three persons in the video. The video lasted twenty seconds.

For the warm and cold coloured condition the two video's taken were edited with Adobe After Effects. With this programme it was possible to display the same exterior of the same store with warm versus cold coloured lights in the shopping window. The manipulated colours were based on the pre-test described in section 2.1. To ensure that the manipulation of the colours were clear enough it was decided to film at late night shopping. The brand name of the store was erased from the video and it was chosen to film a shop which had a relatively neutral exterior design.

The stimuli were initiated with the following instruction: *"Now you are going to watch a video of a shopping environment. Imagine that you are there. It is late-night shopping and you want to buy yourself a new outfit. The store you can see in the video sells fashionable clothing for both men and women."* Then the video representing the manipulations of one of the four conditions was showed.

### *2.4 Measures*

*All items are included in appendix A and B.*

Attitude towards shopping was measured with one item "Do you like shopping?" (Yes, No). Frequency of shopping was measured with one single item "How frequently do you go shopping?" on a five point Likert scale (1: Never, 2: Anually, 3: Monthly, 4: Weekly, 5: Daily). Then the variable compulsive shopping behaviour was measured by the scale of O'Guinn and Faber (1989;1992), but applied to clothing.

The scale consisted of three items on a five points Likert scale (1: Very infrequent, 5: Very frequent), for example: "How frequently have you experienced the following? Bought something and when I got home wasn't sure why I had bought it" and "My closets are full of unworn clothing". The scale was reliable ( $\alpha=.73$ ).

Attitude towards the store was measured with two scales. First by adjusting the scale of Chattopadhyay and Basu (1990) with one item on a five points Likert scale (1: Strongly disagree, 5: Totally agree): "I like the shop" and second by using the scale of Pan & Siemens (2010) with five items on a five points semantic differential scale, such as: "The store in the video is ..." "unfavorable-favorable" and "bad-good". This scale was very reliable ( $\alpha=.90$ ). Originally this scale consisted of six items included "The store in the video is..." "low quality-bad quality", however this item reduced the reliability of the total scale and is therefore considered separately as a single item variable called Perceived quality of the store.

Attitude towards the shopping environment was measured in the same manner as Attitude towards the store (1) adjusting the scale of Chattopadhyay and Basu (1990) with one item: "I think this is a nice shopping environment".

The dimensions arousal, pleasure and dominance were measured based on the scale of Mehrabian and Russell (1974). Each dimension was measured with six statements on a five point Likert scale (1: Not at all, 5: Very much so). Pleasure was measured for example by: "I feel happy in this shopping environment" and "I feel relaxed in this shopping environment". The scale was reliable ( $\alpha=.89$ ). Arousal was measured for example by: "I feel stimulated when I see this store" and "I feel dull when I see this store". The reliability was also reliable ( $\alpha=.78$ ). Dominance was measured by for example: "I feel autonomous in this shopping environment" and "I feel controlled in this shopping environment". This reliability was acceptable ( $\alpha=.72$ ).

Finally approach behaviour was measured by adjusting the scales of Van Rompay et al. (2008) and Matilla & Wirtz (2001) with 6 items on a five point Likert scale (1:Not at all, 5: Very much so), for example: "This store would attract my attention", and "I would consider to enter this store", on a seven point Likert scale (1: Not at all, 5: Very much so). Three items were negatively formulated to reduce acquiescent bias. The scale was reliable ( $\alpha=.86$ ).

### 3. Results

#### 3.1 Manipulation checks

As regards the manipulation of density, 46.1% participants rated the high density condition as crowded, 43.1% as non-crowded and 9.8% could not recall whether the environment was crowded or not. For the low density condition, 91.3% rated it as non-crowded, 1% as crowded and 6.8% could not recall it. This was measured with a control question at the end of the questionnaire: "Did you think the shopping area was crowded?"

What concerns the manipulation of colour, in the cold condition 47.1% of the participants noticed the lights were coloured, 32.4% did not notice that the lights were coloured and 20.6% could not recall whether the lights were coloured. For the warm condition, 16.5% noticed the lights were coloured, 69.9% did not notice that the lights were coloured and 13.6% could not recall it. Despite the fact that in the cold condition more participants noticed that the lights were coloured, in the warm condition they could better recall which colour it actually was. This was measured with a control question at the end of the questionnaire: "Did the lights of the shopping windows have colour?" and "If you answered yes, what colour did the lights have?".

#### 3.2 Multivariate analysis of covariance

To detect differences between the four experimental groups, to reduce type 1 errors and to incorporate the correlations a two way between subjects MANCOVA was conducted with Attitude towards the store (1), Attitude of the environment, Attitude towards the store (2), Perceived quality of the store, Arousal, Pleasure, Dominance, Approach behaviour as dependent variables, colour of the lights in the shopping window and human density as fixed factors. The model controlled for age and gender by using age as a covariate and gender as a fixed factor, because these variables had quite some consequences for the analysis. Only the variable compulsive shopping was removed from the model, because it did not have consequences for the results. Preliminary assumption testing was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, multicollinearity, homogeneity of regression slopes and reliable measurement of the covariate with no serious violations noted.

##### 3.2.1 Density

There was a significant main effect for density on the combined dependent variables:  $F(8,188)=4.28$ ,  $p<=.000$ ; Wilks' Lambda=.85; partial eta squared=.15. When the results for the dependent variables were considered separately, three variables reached statistical significance, using a Bonferroni alpha level of .01: Attitude towards the shopping environment, Perceived quality of the store and Arousal.

Attitude towards the shopping environment:  $F(1, 195)=20.00, p=.000$ , partial eta squared=.09. An inspection of the mean scores indicated that the attitude towards the shopping environment in the high density conditions ( $M=3.41, SD=.97$ ) reported higher levels than in the low density conditions ( $M=2.71, SD=1.04$ ), see table 1. Perceived quality of the store:  $F(1,195)=4.63, p=.033$ , partial eta squared=.02. The perceived quality of the store was higher in the low density conditions ( $M=3.50, SD=1.05$ ) compared to the high density conditions ( $M=3.15, SD=1.20$ ), see table 2. Arousal:  $F(1,195)=3.74, p=.055$ , partial eta squared=.02. It appeared that participants were slightly more aroused in the high density conditions ( $M=2.84, SD=.57$ ) than in the low density conditions ( $M=2.68, SD=.62$ ), see table 3.

*Table 1. Mean scores of Attitude towards the shopping environment as a function of density (High vs. Low)*

Density	M	SD	N
High	3.37**	.97	99
Low	2.71**	1.04	105
Total	3.03	1.05	204

Note: means with \* differ significantly in the row: \* $p<.001$

*Table 2. Mean scores of Perceived quality of the store as a function of density (High vs. Low)*

Density	M	SD	N
High	3.13*	1.20	99
Low	3.50*	1.05	105
Total	3.32	1.14	204

Note: means with \* differ significantly in the row: \* $p<.05$

*Table 3. Mean scores of Arousal as a function of density (High vs. Low)*

Density	M	SD	N
High	2.85#	.57	99
Low	2.69#	.62	105
Total	2.77	.60	204

Note: means with # differ significantly in the row: # $p<.1$

### 3.2.2 Colour

No significant main effect was found for the manipulation colour,  $F(8,188)=1.71, p=.098$ , partial eta squared=.07, *ns*.

### 3.2.3 Gender

There was a significant main effect for gender on the combined dependent variables:

$F(8,188)=2.51, p=.013$ ; Wilks' Lambda=.90; partial eta squared=.10. When the results for the dependent variables were considered separately, the five differences to reach statistical significance, using a Bonferroni alpha level of .01, were Pleasure, Attitude towards the store(1), Attitude towards the store(2), Arousal and Approach behaviour.

Pleasure:  $F(1,195)=10.89, p=.001$ , partial eta squared=.05. The means indicate higher levels of pleasure in the shopping environment for females ( $M=3.11, SD=.73$ ) in comparison to males ( $M=2.66, SD=.66$ ), see table 4. Attitude towards the store(1):  $F(1,195)=10.01, p=.002$ , partial eta squared=.05. An inspection of the mean scores indicated that females reported higher levels of attitude towards the store ( $M=2.96, SD=1.04$ ) than males ( $M=2.42, SD=.99$ ), see table 6. Attitude towards the store (2):  $F(1,195)=3.55, p=.061$ , partial eta squared=.02. In line with the previous variable females reported higher levels of attitude towards the store (2) ( $M=3.15, SD=.87$ ) than males ( $M=2.91, SD=.89$ ), see table 5. Arousal:  $F(1,195)=4.23, p=.041$ , partial eta squared=.02. Females felt more aroused ( $M=2.85, SD=.60$ ) than males ( $M=2.67, SD=.58$ ) in the shopping environment, see table 7. Approach behaviour:  $F(1,195)=13.52, p=.000$ , partial eta squared=.07. Females ( $M=3.19, SD=.94$ ) showed higher levels in approach behaviour than males ( $M=2.54, SD=.82$ ), see table 8.

Table 4. Mean scores of Pleasure as a function of gender (Male vs. Female)

Sex	M	SD	N
Male	2.77**	.66	84
Female	3.15**	.73	120
Total	3.00	.73	204

Note: means with \*\* differ significantly in the row: \*\* $p<.001$

Table 5. Mean scores of Attitude towards the store (2) as a function of gender (Male vs. Female)

Sex	M	SD	N
Male	2.87#	.89	84
Female	3.18#	.87	120
Total	3.05	.89	204

Note: means with # differ significantly in the row: # $p<.1$



Table 6. Mean scores of Attitude towards the store (1) as a function of gender (Male vs. Female)

Sex	M	SD	N
Male	2.49*	.99	84
Female	3.00*	1.04	120
Total	2.79	1.05	204

Note: means with \* differ significantly in the row:  $*p < .05$

Table 7. Mean scores of Arousal as a function of gender (Male vs. Female)

Sex	M	SD	N
Male	2.66*	.60	84
Female	2.82*	.67	120
Total	2.80	.64	204

Note: means with \* differ significantly in the row:  $*p < .05$

Table 8. Mean scores of Approach behaviour as a function of gender (Male vs. Female)

Sex	M	SD	N
Male	2.72**	.82	84
Female	3.24**	.94	120
Total	3.03	.93	204

Note: means with \*\* differ significantly in the row:  $*p < .001$

### 3.2.4 Interaction density (gender) and colour

No statistical significant two-way interaction was reached for the manipulations density and colour,  $F(8,188)=.67, p=.71$ , partial eta squared=.03, *ns*. Neither for the manipulation colour and gender,  $F(8,188)=.76, p=.64$ , partial eta squared=.03, *ns*.

### 3.2.5 Interaction density and gender

There was no statistical significant two-way interaction for density and gender:  $F(8,188).95, p=.4$ ; partial eta squared=.04, *ns*.

### 3.1.6 Interaction density, colour and gender

The main effects of density and gender were qualified by a significant three-way interaction between density, colour and gender on the combined dependent variables:  $F(8,188)=2.40, p=.017$ ; Wilks' Lambda=.91; partial eta squared=.09.

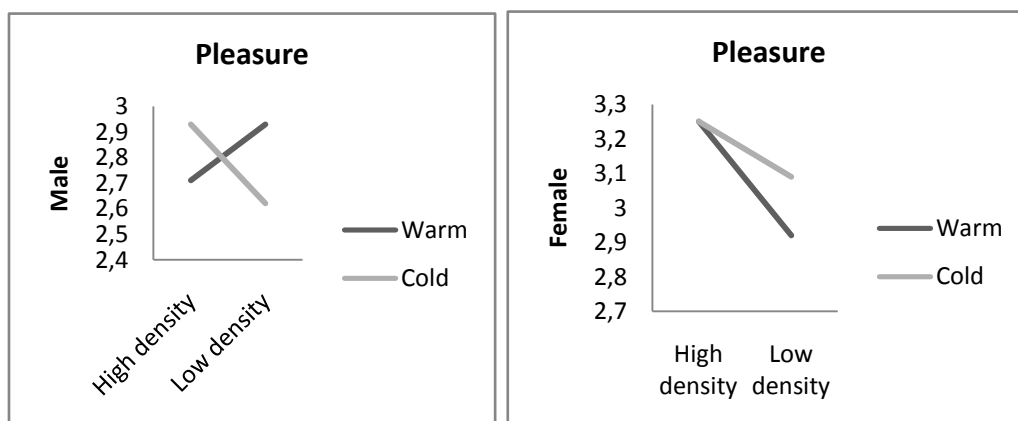
Considered separately using a Bonferroni alpha level of .01, four differences reached statistical significance: Pleasure, Attitude towards the store(1), Attitude towards the shopping environment and Perceived quality of the store.

Pleasure:  $F(1,195)=3.17$ ,  $p=.077$ , partial eta squared=.02. ns. For males, pleasure in the shopping environment was higher in the low density condition combined with warm light than cold light and in the high density condition combined with cold light than warm light. For females, pleasure was higher in the high density conditions than in the low density conditions. In the high density conditions colour did not have consequences for their pleasure, but in the low density condition pleasure was higher with cold coloured lights in the shopping windows than warm coloured lights.

Table 9. Mean scores of Pleasure as a function of density (High vs. Low), colour (Warm vs. Cold) and gender (Male vs. Female)

Colour	Sex	High density			Low density			Total		
		M	SD	N	M	SD	N	M	SD	N
Warm	Male	2.65	.80	19	2.93	.59	25	2.81	.70	44
	Female	3.30	.57	33	2.93	.79	29	3.13	.80	62
Cold	Male	2.81	.68	20	2.67	.60	20	2.74	.63	40
	Female	3.29	.63	27	3.09	.67	31	3.18	.66	58
Total		3.07	.71	99	2.93	.74	105	3.00	.73	204

Figure 3. Three-way interaction between density, colour and gender on the pleasure in the shopping environment

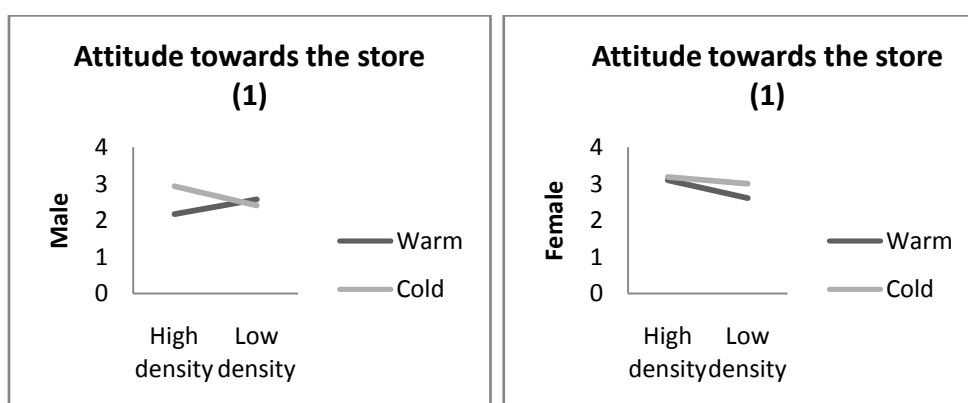


Attitude towards the store (1):  $F(1,195)=4.67$ ,  $p=.032$ , partial eta squared=.02. It appeared that for men, in the high density conditions, the attitude is higher when the lights in the shopping window are cold coloured than warm coloured and in the low density condition slightly higher when the lights are warm coloured than cold coloured. For females the attitude is higher in the high density condition than in the low density condition, regardless which colour. In the low density condition the attitude is higher with warm coloured lights than cold coloured lights.

Table 10. Mean scores of Attitude towards the store as a function of density (High vs. Low), colour (Warm vs. Cold) and gender (Male vs. Female)

Colour	Sex	High density			Low density			Total		
		<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Warm	Male	2.11	.88	19	2.56	.72	25	2.36	.81	44
	Female	3.15	.87	33	2.62	1.05	29	2.90	1.04	62
Cold	Male	2.80	1.06	20	2.45	1.23	20	2.63	1.15	40
	Female	3.22	1.05	27	3.00	1.03	31	3.10	1.04	58
Total		2.90	1.06	99	2.69	1.02	105	2.79	1.05	204

Figure 4. Three-way interaction between density, colour and gender on the attitude towards the store (1)

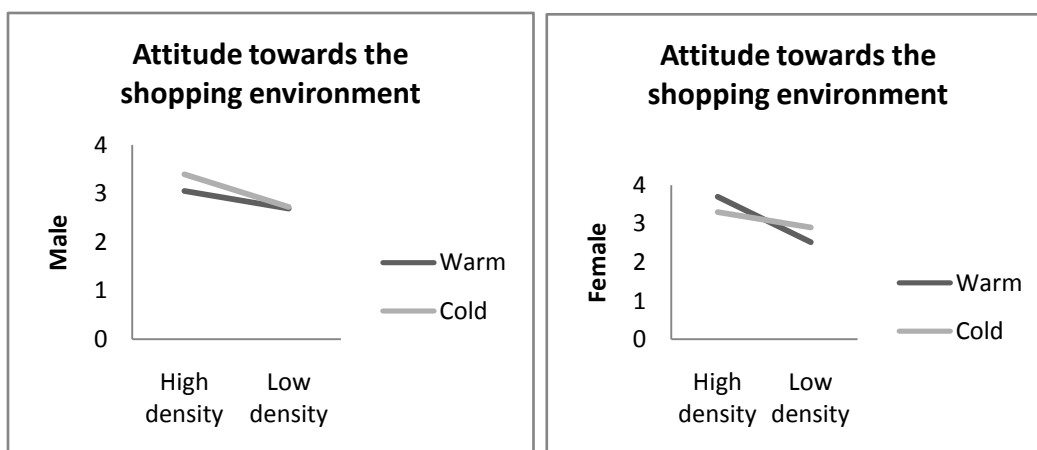


Attitude towards the shopping environment:  $F(1,195)=3.79$ ,  $p=.053$ , partial eta squared=.02. The attitude towards the shopping environment is for both men and women higher in the high density condition. The attitude for men is higher for both low and high density conditions in combination with cold coloured light. For women, the attitude is in the high density condition higher in combination with warm coloured light, but in the low density condition with cold coloured light.

Table 11. Mean scores of Attitude towards the shopping environment as a function of density (High vs. Low), colour (Warm vs. Cold) and gender (Male vs. Female)

Colour	Sex	High density			Low density			Total		
		M	SD	N	M	SD	N	M	SD	N
Warm	Male	3.00	1.05	19	2.68	.80	25	2.82	.92	44
	Female	3.79	.81	33	2.52	1.21	29	3.15	1.17	62
Cold	Male	3.30	1.08	20	2.75	1.21	20	3.03	1.17	40
	Female	3.30	.91	27	2.90	.91	31	3.09	.92	58
Total		3.37	.97	99	2.71	1.04	105	3.03	1.05	20

Figure 5. Three-way interaction between density, colour and gender on the attitude towards the shopping environment

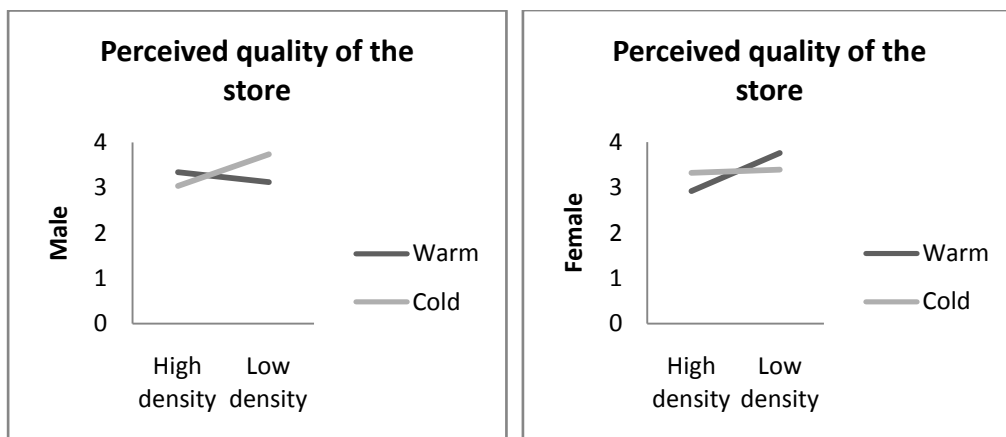


Perceived quality of the store:  $F(1,195)=6.79$ ,  $p=.01$ , partial eta squared=.03. The perceived quality of the store by men was in the high density condition higher with warm coloured lighting, but in the low density conditions higher with cold coloured lighting. By women, the quality of the store was perceived higher in the low density condition than in the high density condition. For the high density condition cold light had a positive effect on the perceived quality and for the low density condition warm light had a positive effect on the perceived quality.

Table 12. Mean scores of Perceived quality towards the store as a function of density (High vs. Low), colour (Warm vs. Cold) and gender (Male vs. Female)

Colour	Sex	High density			Low density			Total		
		<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Warm	Male	3.32	1.20	19	3.12	.88	25	3.20	1.03	44
	Female	2.94	1.17	33	3.76	.99	29	3.32	1.16	62
Cold	Male	3.00	1.38	20	3.75	.79	20	3.38	1.17	40
	Female	3.33	1.11	27	3.39	1.28	31	3.36	1.20	58
Total		3.13	1.20	99	3.50	1.05	105	3.32	1.14	205

Figure 6. Three-way interaction between density, colour and gender on the perceived quality of the store



#### 4. Discussion

This research attempts to give more insight into how colour and density interact and how they influence the attitude towards the store, the shopping environment, pleasure, arousal, dominance and approach behaviour. These two atmospheric variables have not been investigated together in exterior store design previously. By means of this study some suggestions can be made regarding the use of colour in crowded versus non-crowded environments in relation to gender.

Results showed that density had influence on the attitude towards the shopping environment, the perceived quality of the store and arousal.

More people in the shopping street led to a higher evaluation of the shopping environment. This is in line with the statement of Eroglu, Machleit and Chebat (2005) that density is a fundamental determinant of the shopping experience. Density negatively influences perceived control (Hui & Bateson, 1991) by restricting movement, lengthening of shopping time, presenting social interactions etc. Because the participants had to imagine that they were in the environment of the video, they were not actually in person limited by the density. Therefore the negative effects of the high density were probably less prominent than the positive effects (feeling of cosiness).

The level of arousal was also higher in the crowded shopping environment. Arousal relates to the extent to which a person feels excited or stimulated (Mehrabian & Russell, 1974). The people in the environment (social element) are part of the environmental elements, which can increase arousal and therefore influence the perception the shopping environment.

Moreover it was found that density affected the perceived quality of the store. The perceived quality was higher for the low density conditions in comparison with the high density conditions. A logical interpretation would be that a quiet environment may evoke feelings of a prestige atmosphere, thus a higher quality and a crowded environment may evoke feelings of a discount atmosphere, thus lower quality.

Furthermore there was a main effect for gender. Women had a more positive attitude towards the store, felt more pleased and aroused in the shopping environment and showed a higher willingness or desire to move towards and explore the environment than men, regardless of what condition. These results are easily explained by the fact that, in general, women do like shopping more than men.

However, these main effects for density and gender were qualified by the interaction between gender, density and colour. This three-way interaction affected the attitude towards the shopping environment, perceived quality of the store and pleasure.

For males a quiet environment (low density) along with warm coloured lighting in the shopping window in comparison to cold coloured lighting led to more pleasure (figure 3) and a slightly higher attitude towards the store (1) (figure 4), which partially confirms hypothesis 1. This is in contrast to females, for whom a quiet shopping environment (low density) along with cold coloured lighting in the shopping window in comparison to warm coloured lighting led to more pleasure (figure 3), a higher attitude towards the store(1) (figure 4) and the environment (figure 5). For females hypothesis 1 is thus not confirmed.

For males a crowded shopping environment (high density) with cold coloured lighting in the shopping window in comparison to warm coloured lighting led to more pleasure (figure 3), a higher attitude towards the store (1) (figure 4) and the shopping environment (figure 5), which partially confirms hypothesis 2. Again this is different for females, who evaluate a crowded shopping environment more positively than a quiet shopping environment, regardless of which colour (figure 4 and 5). Pleasure is slightly higher in the crowded shopping environment (high density) with warm coloured lighting in the shopping window in comparison to cold coloured lighting (figure 3).

The influence of gender is probably caused by the fact that in general women like shopping more than men. Most men indicated that they did not like shopping and most women indicated they like shopping. It is possible that men are more utilitarian oriented and women more hedonically oriented. Hedonic shoppers like shopping more and even see it as a social activity, while utilitarian shoppers mainly see it as a goal oriented activity, that may last as short as possible (Babin, Darden & Griffin, 1994). Because utilitarian shoppers see shopping as a goal oriented activity, they probably want less arousal, while hedonic shoppers want more arousal, because they shop for fun and want to be entertained. This could explain the fact that women evaluate the crowded shopping environment higher (regardless of which colour), because a non-crowded environment causes too little arousal and thus may evoke discomfort by boredom. It could also explain the fact that men evaluate the shopping environment with moderate arousal levels higher, because the crowded environment with warm lights probably causes too much arousal and may evoke discomfort by distracting the shoppers' goal, while the non-crowded environment with cold lights causes too less arousal, which also may evoke discomfort, but in this situation by boredom.

What concerns the quality of the store (figure 6), by men in the crowded shopping environment the quality is perceived higher with warm lights and by women with cold lights. In the quiet shopping environment the quality is by men perceived more positive with cold lights and by women with warm lights. For men, quality is perceived higher when the stimuli are congruent, while for women the perceived quality is higher when the stimuli are incongruent.

Maybe when women are too bored or too excited it reduces the perceived quality, while for men the congruency of the stimuli determines the perceived quality.

Overall the three-way interaction shows that colour in combination with density has different effects on women and men. Though it cannot be confirmed that women prefer red-purple colour dimensions and that men prefer blue-green colour dimensions (Hulbert et al., 2006). Against the expectation results showed no main effect for colour and no two-way interaction between density and colour. Perhaps colour was too unconsciously processed and people focused instead more on the mannequins in the shopping windows, the entrance of the store and/or the people in the environment.

#### *4.2 Limitations and implications for research*

This research contributes to the field of consumer behaviour and in particular exterior store design. Because so little is known about these variables at present this study is a first attempt to give more insight on especially the interaction between colour and density. Though only two colours were used: Red (warm) and blue (cold). In a next research colours between cold and warm like yellow and green could be included. Besides there are more atmospheric variables of the exterior to investigate. For example the shape, cleanliness of the shopping window, with or without mannequins in the shopping window, the material of the exterior and the congruency between two or more of these atmospheric variables. Previous research about exterior store design was limited to colour and a furniture store. This current study focused on a fashion store, but the same type of research could be done in various types of stores.

During the study some participants told that they experienced some questions as difficult to answer, because they had trouble with imagining to be in the environment of the video. A longer video with more intense sounds could help, but probably with research about exterior store design people will always express the tendency to see the interior of the shop to form an opinion and attitude. It is possible that in a real shopping environment this tendency will be less. However then the brand image must be taken into account and a comparison should be made between the real shopping environment and store with manipulations and without. This is recommended in a subsequent study.

The question in the online survey about the frequency of shopping in general could have been better by making it more relevant to focus on clothing only.

In this research a distinction was made based on gender. A distinction between utilitarian and hedonic shoppers might have been better, because there will always be men who do like shopping and women that do not.



Furthermore the results of this study partially support the arousal theory of Berlyne (1976) and it is expected that the results would have supported the theory even more when the model took into account the various orientations.

#### *4.3 Practical Implications*

On basis of the results the following can be advised: In fashion stores for men the lights can be strategically deployed, to positively influence the attitude towards the store and pleasure, when it is quiet by switching the lights in the shopping window into warm colours and when it is crowded into cold colours. But if the store wants to position and distinguish itself on high quality, it is better to have colours that are congruent with the density in the environment: Cold coloured lighting when it is quiet and warm coloured lighting when it is crowded. In fashion stores for women the lights should be deployed the opposite. When it is quiet the lights should be cold to positively influence the attitude towards the environment, the attitude towards the store and pleasure and when it is crowded the lights should be warm coloured. But when the store wants to position and distinguish itself on high quality, it is better to have colours that are incongruent with the density in the environment: Warm coloured lighting when it is quiet and cold coloured lighting when it is crowded.

Important to consider for implication is how many women buy clothes for their men and what is best for fashion stores that sell both clothing for men and women. It is known that about 80% of the people in a shopping environment are female. Therefore when a store sells clothing for both women and men it could be smarter to focus mainly at women on the exterior of the shop.

Despite the limitations this study can definitely contribute to marketing practice. It is the first study that actually combined density and colour on exterior store design, while density cannot be ignored in a real environment. It is also one of the little studies in exterior store design, while, how Turley et al. (2000) point out, it is so important since the exterior first must be considered acceptable before the interior is ever experienced.

## References

- Adams, F. M., & Osgood, C. E. (1973). A Cross-Cultural Study of the Affective Meanings of Colour. *Journal of Cross-Cultural Psychology, 4*(2), 135.
- Areni, C. S., & Kim, D. (1994). The influence of in-store lighting on consumers' examination of merchandise in a wine store. *International of Research in Marketing, 11*, 117-125.
- Babin, B. J., Hardesty, D. M., & Suter, T. A. (2003). Colour and shopping intentions: The intervening effect of price fairness and perceived affect. *Journal of Business Research, 56*(7), 541-551.
- Babin, B. J., Darden, W. R., & Griffin, M. (1994). Work and/or fun: Measuring hedonic and utilitarian shopping value. *Journal of Consumer Research, 20*(4), 644-656.
- Baker, J. (1986). The role of the environment in marketing services: The consumer perspective. In John A. Czepeil, Carole A. Congram and James Shanahan (eds.), *The services Challenge: Integrating for competitive advantage*, Chicago, IL: *American Marketing Association*, 79-84.
- Baker, J., & Cameron, M. (1996). The effects of the service environment on affect and consumer perception of waiting time: An integrative review and research propositions. *Journal of the Academy of Marketing Sciences, 24*, 338-349.
- Baker, J., Levy, M., & Grewal, D. (1992). An experimental approach to making retail store environmental decisions. *Journal of Retailing, 68*(4), 445-460.
- Bellizzi, J. A., Crowley, A. E., & Hasty, R. W. (1983) The effect of colour in store design. *Journal of Retailing, 59*, 21-45.
- Bellizzi, J. A., & Hite, R. E. (1992). Environmental colour, consumer feelings, and purchase likelihood. *Psychology & Marketing, 9*(5), 347-363.
- Berlyne, D. E. (1967). Arousal and reinforcement. *Nebraska Symposium on Motivation, 15*, 1-110.
- Blackwell, R. D., Miniard, P. W., & Engel, J. F. (2006). *Consumer Behaviour*. Mason, USA: Thomson South-Western.
- Buttle, F. (1992) Shopping motives constructionist perspective. *Services Industries Journal, 12*, 349-67
- Campbell, C. (1997). Shopping, Pleasure and the Sex War, 166-175. In *The Shopping Experience*. Falk, P., & Campbell, C. (eds). London: Sage
- Chattopadhyay, A. , & Basu, K. (1990). Humor in advertising: The moderating role of prior brand evaluation. *Journal of Marketing research, 27*, 466-476.
- Dholakia, R.R., Pedersen, B. and Hikmet, N. (1995). Married males and shopping: Are they sleeping partners? *International Journal of Retail and Distribution Management, 23*(3), 27-33.
- Eroglu, S. A., Machleit, K. A., & Chebat, J. C. (2005). The interaction of retail density and music tempo: Effects on shopper responses. *Psychology & Marketing, 22*, 57-589.

- Eroglu, S., & Harrel, G. D. (1986). Retail crowding: Theoretical and strategic implications. *Journal of Retail*, 62(4), 346-363.
- Gifford, R. (1988). Light, decor, arousal, comfort and communication. *Journal of Environmental Psychology*, 8, 177-189.
- Hui, M. K., Bateson, J. E. G. (1991). Perceived control and the effects of crowding and consumer choice on the service experience. *Journal of Consumer Research*, 18, 174–184.
- Hurlbert, A., Ling, Y., & Robinson, L. (2006). Sex differences in colour preference. In NJ Pitchford, CP Biggam, (Eds). *Progress in Colour Studies 2: Cognition. Amsterdam: John Benjamins.*
- Jacobs, K. W., & Suess, J. F. (1975). Effects of four psychological primary colours on anxiety state. *Percept Mot Skills*, 41(1), 207-210.
- Kotler, P. (1973). Atmospherics as a marketing tool. *Journal of Retailing*, 49, 48-64
- Machleit, K. A., Eroglu, S. A. , & Mantel, S. P. (2000). Perceived retail crowding and shopping satisfaction: What modifies this relationship? *Journal of Consumer Psychology*, 9(1), 29-42.
- Matilla, A. S., Wirtz, J. (2001). Congruency of scent and music as a driver of in-store evaluations and behaviour. *Journal of Retail*, 77(2), 273-289.
- Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology. Cambridge, MA: MIT Press*
- Michon, R., Chebat, J. C., & Turley, L.W. (2004) Mall atmospherics: The interaction effects of the mall environment on shopping behaviour. *Journal of Business Research*, 58(5), 576-583.
- Miwa, Y., & Hanyu, K. (2006). The effects of interior design on communication and impressions of a counselor in a counseling room. *Journal of Environment and Behaviour*, 38, 484-502.
- Roberts, M.L., & Wortzel, L.H. (1979). New Life-Style Determinants of Women's Food Shopping Behaviour. *Journal of Marketing*, 43(3), 28-39.
- Schaninger, C.M., & Allen, C.T. (1981). Wife's Occupational Status as a Consumer Behaviour Construct. *Journal of Consumer Research*, 8(2), 189-196.
- Slama, M. E., & Tashchian, A. (1985). Selected socioeconomic and demographic characteristics associated with purchase involvement. *Journal of Marketing*, 49, 72-82.
- Summers, A.T., & Hebert, P.R (2001). Shedding some light on store atmospherics Influence of illumination on consumer behaviour, *Journal of Business Research*, 54, 145-150.
- Turley, L.W., & Milliman, R. E. (2000). Atmospheric effects on shopping behaviour: A review of the experimental evidence. *Journal of Business Research*, 49, 193–211.
- Valdez, P., & Mehrabian, A. (1994). Effects of colour on emotions. *Journal of Experimental Psychology General*, 123(4), 394-409.

- Van Rompay, T. J. L., Tanja-Dijkstra, K., Verhoeven, J. W. M., & van Es, A. F. (In press). On store design and consumer motivation: Spatial control and arousal in the retail context. *Journal of environment and Behaviour*.
- Van Rompay, T. J. L., Galetzka, M., Pruyn, A. T. H., & Moreno-Garcia, J. (2008). Human and spatial dimensions of retail density: revisiting the role of perceived control. *Journal of Psychology and Marketing*, 25, 319-335.
- Van Rompay, T. J. L., Krooshoop, J. Verhoeven, J.W.M., & Pruyn, A. T. H. (2011). With or without you: Interactive effects of retail density and need for affiliation on shopping pleasure and spending. *Journal of Business Research*, 65(8), 1126-1131

Appendix A: English version of the questionnaire (PDF)

Appendix B: Dutch version of the questionnaire (PDF)

Appendix C: Video's of the manipulated conditions (CD)