

Nudging with light in a retail environment

A study to the impact of light and background colour on wine

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Preface

A period of intensive research on an interesting topic comes to an end. But now, this is the result of 6 months of work. I am proud to present you my MSc thesis: 'Nudging with light in a retail environment'.

I would like to take the opportunity to thank my supervisors Erica van Herpen and Daniella Stijnen for their impressive feedback that motivated me after every meeting again. Furthermore I would like to thank Rene de Wijk for his help with the eye tracker device and Mark van Doorn and Katelijn Quartier for their opinion and ideas in the expert interviews. Finally all students that participated in the experiment and everybody else who helped me in any sense with my MSc thesis I would like to be very thankful.

Enjoy reading!

Niek

Summary

For consumers it is difficult to make their choices in a retail environment. Retailers can help them with nudges. In the DONRO-project light is one of the nudging strategies that will be researched. The effectiveness of light and background colours on wine is aimed to be identified. Attention, choice behaviour and emotions are the main aspects of the effectiveness.

Literature about light in a retail environment is limited. Some studies about perceived atmosphere do exist but on a product level the amount of studies is limited.

Firstly it is important to get an understanding of light characteristics and the types of lamps. After that literature about attention, atmosphere, emotions, product specific lighting and background colours is discussed. Hypotheses about attention, choice behaviour and emotions are formulated.

The conceptual product lighting model describes the effect of light and background colours on attention and emotions and draws arrows for the effect of light on choice behaviour and attention on choice.

From the expert interviews can be concluded that the effect of light and background colours is interesting to study and created new insights in theories and setting up an experiment.

The methodology describes the design of the experiment. The experiment is set up as a simulated retail environment with four shelves, three types of products, six conditions with three intensities of light and two background colours. Bottles of organic wine are nudged, the respondents are students. The controlled stimuli are the place and label on the shelves, size and colour of the label on the product, product information and other available products. In the procedure and measures is explained how the eye tracker device and questionnaire are used in the experiment. Also a pilot study was performed.

From the results can be concluded that for light there are significantly different values found for the components of attention: 'percentage of fixations organic vs. other wines and products', 'recognition organic vs. other wines' and 'recognition organic wine'. So light increases attention on organic wine on these components. For the emotion pleasure a marginal significant difference was found for light. A blue background colour increases the choice of organic wines. Interaction effects between light and background colour were found for attention on: 'percentage of fixations organic vs. other wines and products', 'observed organic wines' and 'recognition organic vs. other wines'. For choice interaction effects were found for red wine and for white wine. For attention on choice an effect for recognition of organic wine was found.

In the conclusion all results are explained. To increase attention it is recommended to use increased light intensity, to increase choice behaviour a combination of light intensity and background colours is most suitable. Limitations of the research are linked to the group of participants, the effectiveness of the manipulations, the specific bottles of wine used, the prices of these bottles, the technical capabilities of the eye tracker device, the measurement of pleasure and arousal, the setting of the experiment and the shelf layout.

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1. Introduction

Every day, consumers are exposed to a range of choices in their environment. In the shopping environment consumers need to make these choices. Retailers want to help consumers to make choices via nudging. Nudging strategies are subtle ways of influencing consumers to the most desirable alternative (Lewis 2008). Chapman & Ogden (2012) show that manipulating the availability of an unhealthier choice leads to a shift towards the healthier option. So simple changes in the environment can influence consumers' purchases towards the choice of healthier options. The nudging strategy that will be the central topic in this thesis is light. For retailers, light is a potential tool of differentiation to take account of consumer experience (Arnold et al. 2005). In the latest years the term 'retail theatre' has arisen to describe the use of intended effects to improve retail performance by creating pleasant experiences for consumers (Baron et al. 2001). Several studies have been conducted on lighting in a shopping environment with different types of light (Briand & Pras 2010, Custers et al. 2010, Decré & Pras 2013, Freyssinier et al. 2006, McCoughan et al. 2001, Park & Farr 2007, Quartier 2011, Wansink & Ittersum 2012). Other studies have been found about light on specific products (Areni & Kim 1994, Barbut 2001-2004, Boissard et al. 2009, Summers & Hebert 2001, Quartier et al., 2009, Quartier, 2011).

This research is part of the 'DONRO-project'. DONRO means: Developer of Nudges for Retail and Out-of-Home. It is a research project in which both industry and government participate. The main goal of this project is to measure the direct effect of nudges on individual consumers to reduce time and money. Also the changes in food choice behaviour can be measured. Both retail and catering companies are involved in this project (DONRO 2013). This research will specifically zoom in to the effectiveness of nudging with light and background colours.

1.1 Background

Lighting and background colours play a crucial role in the perception of atmosphere and the retail space and it can communicate a message (Quartier 2011). Nowadays we live in an experience economy, i.e. consumer demand asks more pleasure during daily business (Quartier 2011, Van Doorn 2013). Light is an element that can contribute to this need. Several theories have been developed that can explain the effect of nudging with light. An important theory is the Stimulus-Organism-Response (SOR) model (Mehrabian and Russell 1974). This model has been used in previous research before and can give an understanding of consumer behaviour in a retail environment (Turley & Milliman 2000, Summers & Hebert 2001, Decré & Pras 2013). From the SOR model the Retail Communication (RC) model has been created by Quartier (2011). This model was created by combining the Communication model (Crilly et al. 2004) and the SOR model. In this model the stimulus is the environment, in this research: light. The consumer includes the organism and response. Organism is divided into the cognition and affect dimension. Cognition and affect can interact with each other and both cognition and affect can create response (behaviour). In this thesis the focus will be on the stimulus light that creates a response that is influenced by the organism (Quartier 2011). This will be further explained with the conceptual product lighting model in the theoretical framework.

1.2 Relevance and Aim

There is a knowledge gap in the field of light in a retail environment since the existing literature does not explain the effectiveness of nudging with light and background colours. Several studies focus on the impact of light on the perceived atmosphere of the environment, but on a product level it is not clear what the influence of light on a product can create for the consumer. Areni and Kim (1994) and Summers and Hebert (2001) stated that light can increase product interest. However, more knowledge is needed to understand how light and background colours can be used best to create a higher attention and to increase choice behaviour for a product.

It is interesting to study both light and background colours at the same time because these factors can interact with each other. Light intensity can have an effect on the appearance of the background colour. More understanding in this field is needed because scientific literature about the interaction between light intensity and background colours in a retail environment is not available. The most important parameters of the effectiveness of nudging consist of emotional responses and the attention and choice behaviour.

The companies involved in the underlying DONRO project can benefit from this thesis, since light is an interesting and up to date topic that is implemented more and more in a retail environment. By this increase in knowledge both retailers and caterers can make a better decision in their lighting strategy. Moreover, other companies that are not involved in the project but do make use of a retail environment can use this thesis as a useful contribution in their knowledge. By giving an overview of the most important papers that are published so far creates an opportunity to write a strong theoretical framework.

So this MSc thesis aims to identify the effectiveness of nudging with light and background colours on a product in a retail environment. The effectiveness will consist of the raise of emotional responses and attention and choice behaviour of a product.

1.3 Research questions

Main question: **What is the effectiveness of nudging with light and background colours in changing consumers' choice?**

Sub questions:

- Do intensity of light and background colour affect consumers' attention and choice behaviour?
- How do intensity of light and background colour affect the amount of arousal and pleasure that consumers feel?

In the next chapter the expert interviews will be discussed. In chapter 3 an overview of the studied literature will be discussed. Based on the literature overview, the 'conceptual product lighting model' has been created. In this model the hypotheses are identified. In chapter 4 the methodology describes how the hypotheses will be tested. In chapter 5 the results of this research will be discussed. Finally chapter 6 presents the conclusions and discussion.

2. Light in a retail environment

There are several models that can explain consumer behaviour influenced by light and background colours. When light is studied in consumer psychology; attention, cognition, emotions, behaviour and attractiveness are the main components that can be studied.

The aim of this chapter is to formulate a conceptual model with corresponding hypotheses. The chapter is structured based on specific topics. First of all, literature will be presented about light in a retail environment. Light and perceived atmosphere and emotions and product specific lighting will be discussed afterwards. These topics are relevant since these include the content of the hypotheses and the conceptual model. In paragraph 2.5 an overview of the hypotheses is given and in the last paragraph the conceptual model will be discussed.

2.1 Light as stimulus

The characteristics of this stimulus and an overview of literature about the effect of light on perceived atmosphere will be discussed in this paragraph.

2.1.1 Light characteristics

Correlated colour temperature

For the 'temperature' of light a distinction between warm and cool is made: warm and cool lighting. Specific numbers are expressed in the correlated colour temperature (CCT) in Kelvin (K). In general; warm light is situated below 3000K. For example, a candle has a CCT of 1700K. Above 5000K the temperature of light is called cold (Quartier 2011). In a study by Park & Farr (2007) a distinction is made between a CCT of 3000 and 5000K. In congruence with Quartier; these temperatures were perceived as respectively warm and cold. In a study of Decré and Pras (2013) this distinction is also made. In this study the focus was also on the illuminance level.

Illuminance

Illuminance is the amount of light, coming from direct and indirect light sources, which falls on a surface divided by the area of the surface, measured in lux. It is also called light level and is mainly dependent on distance and type of the light source. In retail spaces, the general light level is very diverse, it can differ from 400 to 1500 lux. It is also dependent on the product that needs to be lighted. A dark product absorbs a lot of light, so the light level needs to be higher than for a white product. Luminance is the amount of light that really reaches our eye and is also dependent on its surroundings (Quartier 2011).

Kruithof's curve

The Kruithof's curve (figure 1) shows the preferred combination of illuminance and colour temperature. The purple and yellow parts of the curve are perceived as unpleasant (Decré & Pras 2013). Warm light needs higher lux levels compared to cold light when the level of brightness needs to be perceived the same (Park & Farr 2007).

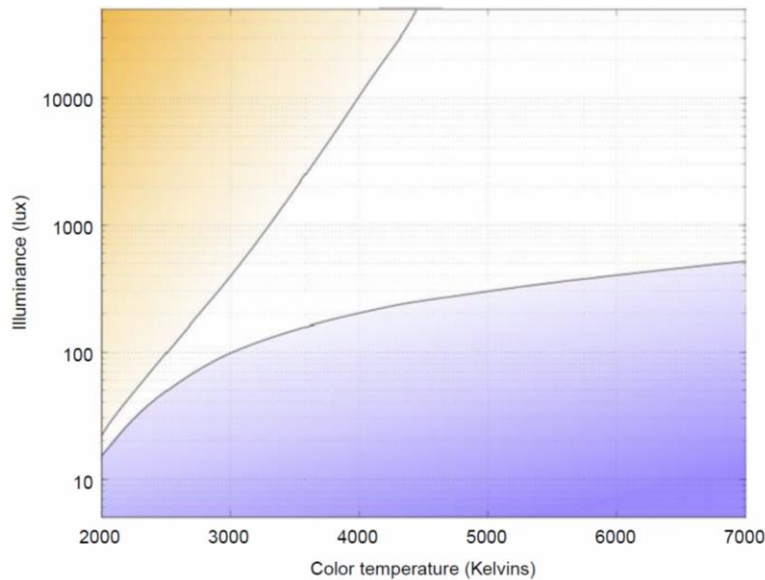


Figure 1: Kruithof's curve: The white part between the two curves indicates pleasant conditions (Decré & Pras 2013).

2.1.2 Types of lamps

In literature a categorization is made between lighting that has influence on the perceived atmosphere and product-specific lighting (i.e. Briand & Pras 2010 and Areni & Kim 1994). Most papers contain an experiment conducted with lamps, the abbreviations about the type and intensity of the lamps that will be relevant can be found in table 1.

Table 1: Explanation on lamp characteristics

Type of lamp		Intensity of lamp	
abbreviation	meaning	abbreviation	meaning
FL	Fluorescent	W	Watt
IC	Incandescent	CRI	Colour rendering index
MH	Metal halide	CCT (in (K)elvin)	Correlated colour temperature
B	Bulb (unknown type)		
H	Halogen		
S	Sodium		

The intensity of a lamp is distinguished in three forms, by Watt, CRI and CCT. For Watt can be assumed that the intensity of light increases when the amount of Watt increases. This number changes in literature from 30 to 75 (i.e. Freyssinier et al. 2006 and Quartier 2011). The CRI describes to what degree a colour is represented on a scale from 0 to 100. Daylight has a CRI of 100. CCT describes warm and cool light in Kelvin changing from 2500 to 4200 in literature (i.e. Boissard et al. 2009 and McCoughan et al. 2001).

For general lighting in stores fluorescent lamps are most commonly utilized because of long life and energy efficiency (Park & Farr 2007). On specific product categories other types of lights are often used.

2.2 Perceived atmosphere and emotions

This research focuses on consumers' perceptions of lighting. This could lead them to evaluate the product as more approachable, to stimulate the amount of items purchased of healthy and sustainable drinks.

In this paragraph, atmosphere, attention and evoked emotions by light (pleasure and arousal) are discussed. Types of products, background colours and attractiveness are the other topics. Also, based on this literature, the hypotheses on this topic will be presented.

2.2.1 Atmosphere

In literature there has been made a distinction if the main focus of the research was on cognition, affect and/or behaviour of consumers (Quartier 2011). In this paragraph, the perceived atmosphere will be discussed.

There are several types of retail environments. Restaurants, pubs, clothing shops and supermarkets are all part of retail. The behaviour of a consumer in a retail environment is especially dependent on the type of atmosphere. Light is important in creating an atmosphere (Quartier 2011). An atmosphere can be defined as the quality of the surrounding space (Kotler 1973). The quality of space can be influenced by light and background colours. Dependent on the type of retail environment there exist several preferences for the type of light used to create a better atmosphere. According to Wansink & Ittersum (2012) less light creates a better perceived atmosphere in a restaurant. Another study concludes that ambient lighting increases the attractiveness for window displays (Freyssinier et al. (2006)). Other articles are written in a more general form and conclude that the light plays an important role in creating an atmosphere (Custers et al. (2010)).

2.2.2 Attention

The stimulus light can influence the parameter attention. Light can affect this by being present in a certain amount, e.g. by putting a spot light on a product. In a retail environment, attention is important for a product to get into the consideration of a consumer in a shop. When a product display is visually outstanding from competing product displays i.e. by the use of light, the probability of consumers' attention being drawn to that display is higher (Solomon et al. 2010).

H1 The presence of light increases the attention of consumers for a product.

In the theory of attention to visual marketing (Wedel & Pieters 2008) luminance is one of the features of the visual marketing stimuli. This means that light is a component of the stimuli that influences the relationship between a firm and a consumer to establish and maintain a mutually profitable relationship. Moreover, according to Van Doorn (2013) the most important utility of light in a shop is attention for a product. By increasing the attention with light it can lead to increased product interest and possibly, choice behaviour (Summers & Hebert 2001).

H2 Attention increases the choice behaviour of consumers.

2.2.3 Pleasure and arousal

This paragraph will focus on the affective responses. Mood and emotions are close to each other. However there are some differences between these in psychology. According to McCoughan et al.

(2011) mood is defined as the core feelings of a person's subjective state at any given moment. Emotions are intense feelings that are directed at someone or something. In this research the focus is on emotions. Emotions will have a bigger influence on nudging since this is action oriented in nature whereas mood is more cognitive and will not directly lead to behaviour (Lewis & Haviland 1993). In nudging with light and background colours, the emotional states pleasure and arousal are important elements to discuss. These elements are part of the PAD-model. The PAD-model is a model that makes a distinction between pleasure, arousal and dominance (Mehrabian & Russell 1974). This model would predict approach/avoidance responses via environmental stimuli that create these emotional states. In figure 2 a model of elements of pleasure and arousal is given. Russell and Prat (1980) use this model to describe the emotional quality of an environment in which dominance does not play a role. According to Donovan et al. (1994) the dominance dimension has been deleted caused by a lack of empirical support. Moreover, in my opinion dominance does not make sense since people feel less controlled or guided when they are choosing on their own. These factors are more important in group processes.

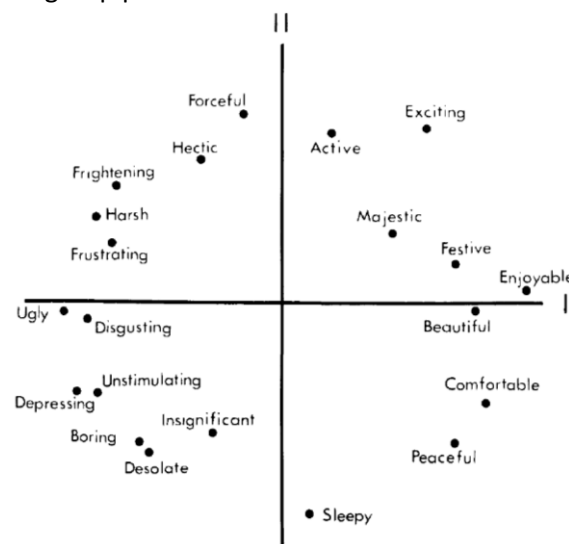


Figure 2: Emotional states in Pleasure I and arousal II (Russell & Prat, 1980).

Pleasure

Pleasure can be defined as a feeling of happy satisfaction and enjoyment that can predict behaviour (Mehrabian & Russell 1974). In my opinion it is important to create positive emotions in a retail environment to nudge consumers by creating an atmosphere.

Quartier et al. (2010) did research with light in three types of supermarkets: a high quality supermarket, a discounter and a hard discounter. Especially the differences between the high quality supermarket and the two discounters were most notable. The lighting in a high quality supermarket increased positive emotions most compared to the other two retail settings. Scores for the perceived pleasure were clearly increased for the high quality supermarket. Pleasure was experienced when cosiness and liveliness scores increased.

In a study of Andreu et al. (2006); positive relations among consumers' perceptions, emotions, satisfaction and behavioural intention were found. In this study, a retail environment was compared with a shopping centre. The lighting was tested in the internal atmospherics. A specific result is that internal perceived environment (e.g. lighting) had a positive effect on positive emotions. These emotions led to satisfaction.

H3a Positive emotions arise by the presence/increased intensity of light in a simulated retail environment.

Arousal

The study of McCoughan (2011) showed that sensation seeking (arousal) was significantly higher under low than under high illuminance. So the arousal increased under soft lighting. This is in contrast with other literature (Summers & Hebert (2001), Quartier et al.(2009) and Varrarco et al. (2008)), the reason for this can be that the bright lighting condition with the lowest colour temperature (3000K) was outside the pleasant conditions of the Kruithof's curve.

Bright and soft lighting is a distinction that is often made in literature. Bright light has a positive correlation with tenseness and a negative correlation with cosiness (Custers et al. 2010). This result is interesting for this study, because Areni & Kim (1994) contradict to that extent that consumers handle and examine more products under bright light. It is possible that the elements of cosiness (viz. cosy, intimate, pleasant and safe) together do not have a direct effect on the willingness to buy. Tenseness increases the excitation, which is in congruence with arousal. So it is possible that the arousal will increase under bright lighting. Summers & Hebert (2001) state that bright lighting increases the amount of products touched in a store. In a study of Quartier et al.(2009) was found that for green vegetables white bright light was preferred more than a warm white light. Varrarco et al. (2008) state that brighter lighting has a significant relationship with product involvement and more positive store image.

H3b Arousal is created in situations with increased light intensity in a simulated retail environment.

Pleasure and arousal lead to the behavioural approach and avoidance intentions (Park & Farr 2007). Especially the approach intentions are interesting to see that are caused by different light intensities and background colours. This model will support the 'conceptual product lighting model' to explain the effectiveness of nudging with light.

Table 2 gives an overview of literature on the effects of lighting on the retail atmosphere. Most literature about lighting in retail environments discusses the perceived atmosphere of a retail environment. By showing the results and relevancy of these papers a better understanding about the possible light conditions and responses of consumers is created.

Table 2: Overview of literature: effects of lighting on retail atmosphere

Author	Result	Relevancy	Type of lamp	C	A	B
Briand & Pras (2010)	Bright and cool light influences the simulative evaluation of a store environment. Cognitive evaluation of a store would be influenced more by lighting than by temperature.	Upmarket positioning is influenced by light intensity, type of retail outlet, temperature*light and temperature*type of retail outlet.	Unknown	X	X	
Custers et al. (2010)	Tenseness positively related to brightness and negatively to contrast. Cosiness inversely related to brightness and detachment was positively related to brightness. Brightness contributed positively to tenseness The more legible the environment was, the more formal and businesslike the atmosphere.	Lighting does play an important role in creating an atmosphere.	Unknown	X		
Decré & Pras (2013)	Bright cool light has a positive influence on perceived store environment and improves the intention to buy. A soft warm light negatively influences the intention to spend time in the retail environment.	Simulated lighting influences the perceived stimulated dimension and behavioural responses 'intention to buy' and 'intention to spend time'.	photographs	X		X
Freyssinier et al. (2006)	The addition of coloured lighting to the display window background creates positive effects.	Ambient lighting can increase attractiveness at least for window displays.	FL 45 & 50-60 W	X		X
McCoughan et al. (2001)	Sensation seeking was higher under low illuminance. Hostility was greater under warm CCT.	There are systematic influences of lighting on mood from lighting parameters within the range of those encountered in everyday conditions.	FL 3000/4000 K 58W.		X	
Park & Farr (2007)	5000K more arousing, brighter and approachable (overall best), 3000 K more pleasure and attractive, CRI of 95 more liked than 75.	Cold light increases arousal, light increases pleasure and attractiveness. When CRI is equal warm light is perceived as less bright than cold light.	FL 32 W 4100 K	X	X	X
Quartier (2011)	A difference in lighting gives a different atmosphere Atmospheres can be perceived in terms of cosiness, liveliness, tenseness and detachment.	Results indicate the value of creating an atmosphere for food products. Lighting has an influence on the perception of atmosphere.	8 lamps: CRI: 80-100, CCT: 2500-4200,	X	X	X

	Only extreme lighting settings are recognised by consumers. 480 lux/2750 K scores best on cosiness and 630 lux/3000 K scores best on pleasure.		W: 30-50			
Quartier, Vanrie & V. Cleempoel (2010)	Perceived atmosphere seems to have an influence on elicited emotions for pleasure, but not for the intensity of that feeling.	Respondents are able to recognise different atmospheres and are able to score them concerning quality and price perception.	FL 3000/4000K, MH 3000/4200K, B 2500/3000K	X	X	X
Wansink & Ittersum (2012)	In the fine dining restaurant with indirect lights people ate for 4.7% longer than those in the main eating area.	Less light can create a more fine dining environment.	Unknown			X

FL: fluorescent, IC: incandescent, MH: metal halide, B: bulb, H: halogen, S: sodium, W: Watt, CRI: Colour Rendering index, CCT: Correlated colour temperature, K: Kelvin.
C: cognition, A: affect, B: behaviour

2.3 Product specific lighting

In this paragraph an outline of lighting on specific product(categories) is given. Also the hypothesis on this topic will be presented.

Different lighting conditions with belts and tools are researched by Summers and Hebert (2001). This research did not focus on the most applicable type of lighting on the product, but on the differences between products under the same lighting conditions. They found that a belt is picked and touched more under additional lighting. So when the light was switched on, the willingness to buy a belt was higher than when the light was switched off.

Barbut (2001-2004) did four studies on the effects and acceptability of different types of products. In the study on several types of meat it became clear that different types of light cause a variable willingness to buy for these types of meat. Incandescent lamps raises a significant willingness to buy for beef, pork and chicken whereas fluorescent and metal halide lamps only raise a significant willingness to buy for beef. The colour of the product will influence how a product can be presented by light. For fruits and vegetables Boissard et al. (2009), found that red and multi-coloured displayed fruits and vegetables were more attractive when these were lighted. Attractiveness and naturalness are two components in lighting conditions that are important in presenting a product. For some products it will be important to make the product as attractive as possible, for other products a natural view fits best. Boissard et al. (2009) found that cooler light (3950K) was preferred for naturalness and warmer light (3050K) for attractiveness. This is in congruence with the study of Briand & Pras (2010) who argue that cool light influences the simulative dimension of a store evaluation under which attractiveness is a component of this variable. So it will depend on the (colour of the) product itself to find the best fitting light conditions for a specific product.

In a research about vegetables Quartier et al. (2009), found that lighting has influence on consumers' product preference in retail stores. In this study the product that was lighted with different types of lamps were green vegetables. It became clear that cool white light fits best for this product. An important product that was studied in different lighting settings is wine. This study of Areni and Kim (1994) was conducted in a wine cellar. The setting afforded the opportunity to examine the impact of in-store lighting on consumer reactions, and purchase behaviour. Respondents were asked to choose a bottle of wine, influenced by light. From this research, the first outcome was that consumers examined and handled more merchandise when the lighting was bright rather than soft. Secondly, they thought that the effect of lighting on the number of items examined and handled would be observed for merchandise on the high and low level shelves, but not for merchandise on the eye level shelves. This was not as expected, consumers examined and handled more items on eye level. They also found that consumers spend less time in the cellar when the lighting was soft rather than when it is bright.

So we can assume that product preference increases by light and consumers examine and handle more items under bright lighting conditions than under soft lighting conditions.

H4 Choice behaviour of consumers increases in bright lighting conditions compared to soft lighting conditions.

In table 3 an overview of literature on product specific level is showed. When possible, the product on which the research was conducted is mentioned in the results.

Table 3: Overview of literature: effects of lighting on a product

Author	Result	Relevancy	Type of lamp	C	A	B
Areni & Kim (1994)	Under bright light, more bottles of wine touched and handled, only on middle shelf.	Light can stimulate product interest, depending on the location on the shelf.	B 50 W 75 W			X
Barbut (2001, 2002, 2003, 2004)	The spectrum of the lamp should be consistent with the colour of the product presented. I.e. for meat.	Tested on isolated products, difficulties when clustered products are presented.	FL, IC, MH.	X		
Boissard et al. (2009)	A warm coloured light (3050 K) is more attractive than cool coloured light (3950 K). Amber is not attractive and red and multi-coloured displayed fruits and vegetables are attractive.	The attractiveness of products is dependent of the colour.	H: 3050 K FL: 3950 K		X	
Quartier (2011)	Different lighting can change the visual appearance of a product. Lighting can affect the product preference and choice behaviour of consumers. Lighting that increased aesthetic impression and influenced consumers' choice behaviour did not lead to increased purchases.	The attractiveness of products changes under different lighting conditions and this affects product preference in a simulated supermarket setting.	8 lamps: CRI: 80-100, CCT: 2500-4200, W: 30-50	X	X	X
Quartier, Christiaans & Van Cleempoel (2008)	Attractiveness, freshness and tastiness correlate with the willingness to buy. The correlation between freshness and willingness to buy is strongest. I.e. for bread, vegetables, juice.	Attractiveness is correlated with willingness to buy.	H: 50W, FL: 3000/4000K, MH:3000/4200K 50 W S: 2500K, 50 W	X	X	
Quartier, Van Cleempoel & Nuyts (2009)	For green vegetables cool white light was preferred above the warm reddish light. The routing had more influence on respondents' choice behaviour than extra-lit products with the shelf lighting did.	The routing of the consumers, seems to determine the choice behaviour, despite any initiative to attract consumers by extra-lit shelves.	MH, B	X		X
Summers & Hebert (2001)	More belts were touched and picked up under additional lighting, no results for tools	Depending on the type of product, additional light can stimulate product interest	FL 60 vs 75-W			X

FL: fluorescent, IC: incandescent, MH: metal halide, B: bulb, H: halogen, S: sodium, W: Watt, CRI: Colour Rendering index, CCT: Correlated colour temperature, K: Kelvin.
C: cognition, A: affect, B: behaviour

2.4 Background colours

A background colour is a colour that can be placed behind the item that needs to get the main attention. Background colours can be created by coloured lights and by a coloured background, i.e. a wall. In a study of Freyssinier et al.(2006), a combination of blue coloured lights and coloured and white walls were used. In this study, blue lighting on a white wall vs. a blue wall without lighting was used to see differences in preferences between display windows. Four conditions were evaluated. The study shows that positive effects arise when blue lighting is used. The most important positive effect that appears from this study is an increase in attractiveness of the display window. In the display window several products were presented. As the study of Freyssinier et al. (2006) made clear the use of blue lighting on a white wall has increased positive effects.

No literature exists about the direct effect of a coloured background on the attention of products, however the attention will be higher when images are unusual or out of context (Seva et al. 2011). Normally, consumers are not exposed to background colours, so a background colour can increase the attention by its unusualness. A study of Metha and Zhu (2009) found that blue (versus red) colour induces an approach motivation. So it is likely that the attention for products with a blue background colour will be higher.

H5 Attention is higher for a blue background colour than for a red background colour.

Kaya & Epps (2004) did a study on the relationship between coloured light and emotions. This research showed that the colours yellow and green create more than 90% positive emotions. When combined colours or achromatic (white, black, grey) colours are used the emotions are less positive. It is clear that colours can arouse positive emotions a colour as a background can be used to increase these positive emotions.

Colours were classified as cool and warm colours. Cool colours are considered as restful and quiet like blue, green and purple whereas warm colours are seen as active and stimulating: red, yellow and orange (Ballast 2002).

Bellizzi & Hite (1992) stated that in previous research was found that the colour blue has been identified as calm, cool, and positive. Red is perceived as physically arousing. They also found in their experiments that with the colour blue more simulated purchases took place, fewer purchases postponements and a stronger inclination to shop and browse. According to Shi (2012) fruits and vegetables with brighter colours are regarded as fresher, and consequently more appealing. They also say that the colour blue is perceived to be relaxing and pleasant. This would increase the favourability of a product to a buyer.

Quartier (2013) explains that a red background colour scores high on arousal. A blue background colour scores high on pleasure.

H6a Arousal is higher for a red background colour than for a blue background colour.

H6b Pleasure is higher for a blue background colour than for a red background colour.

2.5 Hypotheses

In this paragraph an overview of the hypothesis is outlined (table 4). In paragraph 2.5 the conceptual model will be discussed in which all the hypotheses can be found.

Table 4: Overview of hypotheses

1	The presence of light increases the attention of consumers for a product.
2	Attention increases the choice behaviour of consumers.
3a	Pleasure arises by the presence/increased intensity of light in a simulated retail environment.
3b	Arousal is created in situations with increased light intensity in a simulated retail environment.
4	Choice behaviour of consumers increases in bright lighting conditions compared to soft lighting conditions.
5	Attention is higher for a blue background colour than for a red background colour.
6a	Arousal is higher for a red background colour than for a blue background colour.
6b	Pleasure is higher for a blue background colour than for a red background colour.

2.6 Conceptual model

Figure 3 explains the actual behaviour of consumers influenced by presence and intensity of light and background colour on a product. Light and background colour are the stimuli that can create pleasure and arousal and attention by consumers.

Presence and intensity of light and background colour have influence on how a product is presented. Differences in light intensity can increase the level of attention and creates a new consideration for the consumer. Background colour can also increase the attention of a product as discussed in paragraph 2.4 Especially in interaction with light intensity it will be interesting to see what kind of emotions and behaviour arise from background colours. Light intensity can also reinforce the background colour. Attention can lead to the actual (buying) behaviour. This can be seen as the response as has been presented in the SOR model. So background colour and presence and intensity of light will be the two independent variables.

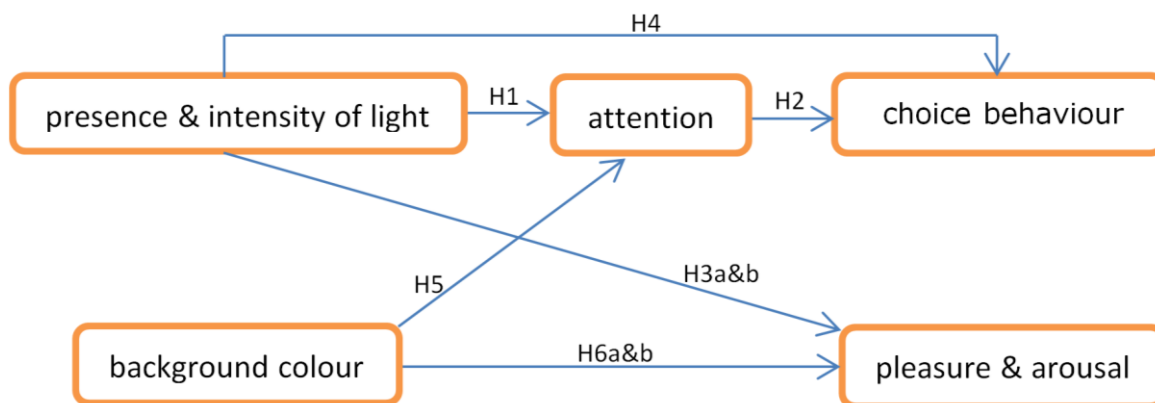


Figure 3: Conceptual product lighting model

3. Expert interviews

In this chapter an outline of the most important elements of the expert interviews is discussed. The expert interviews were conducted during the literature study so these contributed to the conceptual product lighting model. Moreover the interviews were used to get ideas how to set up an experiment.

3.1 Aim and methodology

The objective of conducting the interviews was to get more insight in the real world of research and lighting in a retail environment. One interview was performed with a specialist on light in retail environments. This person would be able to explain technical aspects of light and give an insight to the use of light from a corporate perspective. The other person was chosen because of the specific scientific expertise on the topic and she should be the best fitting person to support or discourage theoretical insights. This person was also found many times in literature.

The method that has been performed is a semi-structured interview. Beforehand a topic list was made. This list consists of: a general introduction about themselves, light in supermarkets, light on products and background colours. These topics were chosen to keep in line with the already existing knowledge on light in literature and to make it more clear or to go deeper into the topic.

The interviews were recorded to make it possible to elaborate the complete interviews. The interviewees were contacted via email and informed about the topic of this research. The complete interviews can be found in appendix A.

3.2 Mark van Doorn

During a visit to Philips Retail Lighting on the 9th of October 2013, retail experience technology consultant, an expert interview was conducted with Mark van Doorn. He is experienced in doing research in simulated retail environments with light.

Role of physical shops

Firstly Van Doorn stated that nowadays the role of shops is shifting. It is not necessary anymore to go to a physical shop to buy your products. You can buy everything from your computer on every moment of the day. Therefore it is necessary for physical shops to invest more. A physical shop should be a place where you can meet people and discover and experience things. An example of a shop is located at Schiphol Airport. By the light people were attracted at the sides of the shop. Moreover, in the middle of the shop a special light is present that attracts people as well.

Utility of light

The most important utility of light in shops is attention for products. For example, if you make parts of a shop more dark or more light you can control the attention of people. Dynamic light even works better, because people are very sensitive for changes. Light does not really have the utility to provide information. It is very dependent on the type of shop if light influences the willingness to buy of a product. The atmosphere needs to fit. Light can influence this as well.

Light is especially important for products like furniture and fashion. The colour rendering needs to be good.

Difference supermarkets and other retail

Light in supermarket is more 'necessity shopping' oriented. The light is more for efficiency than for atmosphere. However atmosphere is still important. Also energy-efficiency is important for

supermarkets. However it also depends on the country, in England there are more high-end supermarkets, that is compared to Albert Heijn a lot more luxurious and in this segment light is also more important for the atmosphere.

Light in supermarkets

In supermarkets, lamps are more and more used to light the green colour of vegetables or the freshness of fish. This can create a feeling of freshness of the products. The type of lamps that are used are mostly metal halide (CDM) and LED.

Wine

For wine it can be possible to create an atmosphere with background colours. Most likely is that there is not much knowledge about this. Van Doorn thinks that most supermarkets do not implement this, because they do not want to take the risk that it fails.

For white wine cool white lamps can be applicable to emphasize the freshness. Warm light should fit better for red wine.

Conclusions

Light is important in retail. It became clear that a focus on attention is suitable, because that is the most important utility of light. Moreover, light in supermarkets is relevant because knowledge in this field is limited. So this interview supports the literature about lighting in a retail environment. Wine can be an interesting product to test in an experiment.

3.3 Katelijn Quartier

Another interview with Katelijn Quartier of the University of Hasselt took place on the 9th of October. She is one of the most important researchers in the topic of retail lighting, she wrote a PhD defence on this topic.

Research of Quartier

The researcher explains that in her research, she tried to simulate existing retail chains like Aldi, Carrefour and Delhaize in Belgium to get a better understanding of light in supermarkets. It is difficult to mention the most important differences between product-specific and atmospheric lighting. At this moment there is not much knowledge about the influence of light on image.

Emotions

Pleasure is the most important emotion that raises by lighting. Arousal and dominance are also emotions that are influenced by light.

Light intensity

In the test in the Carrefour supermarket was found that with the highest light intensity people stayed there for the shortest time. It is necessary to measure the light intensity as well as the colour temperature in doing research.

Products

For fruits and vegetables light can have an impact. For products in bottles of glass like wine it is also important to look to the label. Light will have an impact on that as well. When you choose for red wine, light will not have a big impact because a dark colour does not reflect light. A bottle with a big

label will reflect light.

Background colours

When you use background colours it is probably possible to get more results than with lighting. Red and dark blue are two colours that you can test against each other. Red can score high on arousal and blue can score high on pleasure.

Attractiveness

Attractiveness is the most important aspect to create willingness to buy. It is more important to show a product that is attractive than to influence the emotions of consumers. When you see a product that is not attractive you will never buy it whereas I can see product that feel good for me but I will not buy those.

Conclusions

It became clear that light on products is interesting to study. Besides light, background colours can be used, because this is a new dimension and can probably lead to more results on emotions. Red and blue are fitting colours because these colours are opposites of each other and can increase pleasure and arousal. When literature also supports these colours, hypotheses for pleasure and arousal can be formulated.

4. Methodology

In this chapter the methodology will be discussed. The design, controlled stimuli, procedure, measures and pilot will be explained.

4.1 Design

In the Consumer research room of the main building of the Social Sciences Group of the Wageningen University an experiment was set up. In this room, 32 types of wines were presented. From these wines a number of 8 wines are more sustainable and have an organic certification. The other 24 types of wine do not have an organic certification. The bottles were presented on two shelves to make it possible to light organic products in the same condition as not lighting non organic products. The product wine is chosen since literature of Areni and Kim (1994) showed promising results on this product. Moreover consumers do not have the specific brand preferences for wine as for many other products. For most products in the supermarket there is an order of preference on the basis of A-brands, private-labels and B-brands. This is not applicable for wine. The most important aspects for wine are the country of origin and the year of production, these preferences are in general less strong than brand preferences. For meat and vegetables consumers do not have brand preferences as well. These products were not chosen since light can give an effect shining through the glass of the bottles of wine. Moreover a practical problem with the conservation and changing appearance of these products during several days was expected.

A distinction between organic and non-organic products is made since an increased demand for more sustainable and thus organic products takes place, so this type of product is suitable to nudge. The respondents get the instruction to buy products for a party in a simulated supermarket. Respondents will be influenced by several stimuli, light and background colour are manipulated, the other stimuli are under control. These stimuli will be explained in paragraph 4.2.

First a pilot study was conducted, that is described in this chapter as well, before the real experiment took place.

In the experiment, eye-tracking software will be used. An eye tracker measures all the eye movements of a respondent in the research room. This software is called iView ETG and works together with SMI Eye Tracking Glasses 1.0. More relevant information about the eye tracker will be discussed in paragraph 4.4.1.

4.1.1 Conditions

A two (background colour blue vs. background colour red) by three (no vs. soft vs. bright intensity of light) between subjects design is used to conduct the experiment. Six conditions are thus identified to research the effect of light intensity and background colours. Table 5 shows an overview of the six conditions to test the hypotheses.

Table 5: Six experiment conditions

Condition number	Light condition	Background colour
1	No	Red
2	Soft	Red
3	Bright	Red
4	No	Blue
5	Soft	Blue
6	Bright	Blue

The light conditions are set in such a way that it will give a realistic view of a bright and a soft light. This will be explained in paragraph 4.1.4. All the conditions will be tested. The amount of respondents per condition have been kept as equal as possible.

4.1.2 Products

An equal distribution is made between white and red wines, 16 red wines and 16 white wines. The bottles are tested in the different conditions on the same places on the shelves. Moreover, other products will be presented in the research room to fill empty spaces, these are 15 types of fruit juices and 12 types of tea. These products were chosen since the respondents needed to buy drinks for a party, so these products fit to the outlined scenario.

The names of the wines that are placed in the shop are displayed in table 6, the brands and names of the fruit juices and tea are mentioned in table 7.

Table 6: Names of displayed wines

white wine	red wine
Mooi Fonteyn Steen	Cape Cab
Kroon van Oranje Chardonnay	Santa Carolina
Nugan Chardonnay	Domaine Saint-Jean
Oveja Negra Chardonnay-Viognier	African Treasure
Montenay Chardonnay	Cono Sur
Chilensis Chardonnay	Villa Marianna
Kumala Colombard-Chardonnay	Colombella salento
Jaja de Jau Sauvignon Blanc	Undurraga
Hardys Chardonnay	Temprano de Chile Cabernet Sauvignon
Volupta Soave	Sicilia Nero d' Avola Rosso Salento
Die Kroon Droe wit	Cata Rosa Shiraz
Collecion Especial Baida	Vistana Cabernet Sauvignon
Inycon Organic Grillo (organic)	Cono Sur (Cabernet Sauvignon) (organic)
Nuevo Mundo (organic)	Saint Roche (organic)
Panul Chardonnay(organic)	Bordeaux (organic)
La natura (organic)	Château Coulon (organic)

Table 7: Names of fruit juices and tea

fruit juices	'Pickwick' tea
Fair Trade Sinaasappelsap	Minty Morocco
Fair Trade Appelsap	Turkish Apple
Appelsientje Goudappel	Green Tea
Appelsientje Sinaasappelsap	Sterrenmunt
Appelsientje Mild Sinaasappel	Rooibos
Appelsientje Mild Mandarijn	Mild English
Appelsientje Mild Appel Troebel	Bosvruchten
Appelsientje Mild Multifruit	Citroen
Appelsientje Multi Vitamientje Appel Peer	Aardbei
Roosvicee Multivit Kiwi Sinaasappel	Dutch
Roosvicee Multivit Appel Rode Vrucht	Kamille
Roosvicee Multivit Bosvruchten	Earl Grey
Appelsientje Dubbel Drank Sinaasappel & Perzik	
Appelsientje Dubbel Drank Bessen & Druiven	
Appelsientje Dubbel Drank Passie & Peer	

4.1.3 Layout shelves

Four shelves have been used in the six conditions. The upper shelves are divided in two parts: right and left. The lower shelves consist of one part. The upper shelf is lighted in condition 2,3,5 and 6. The products from table 7 and 8 are all placed on the shelves.

A picture of the layout is given in figure 4.



Figure 4: Layout of simulated retail environment

On the upper shelf the eight bottles of organic wine were placed. These bottles (four red and four white) were placed in the middle of the shelves where the lamps were focussed on. Four non-organic bottles of white and red wine were placed on the extreme right and left of the upper shelf. On the upper middle shelf the other non-organic bottles of red wine were placed on the left and white wine on the right. On the lower middle shelf all packages of fruit juices were placed. On the lower shelf the boxes of tea were placed.

4.1.4 Light characteristics

Four shelves were used. The upper shelf was lighted by lamps in condition 2, 3, 5 and 6.

The soft lamps that were used are the 'High-power LED Teun' lamps and have the following characteristics: LED 62 lumen, 3 W. This lamp was installed two times at the middle of the shelf and shined at the back of the products. Especially the light was visible through the bottles of white wine. The bright lamps that was used are the 'Balthazar Transparent' lamps and have the following light characteristics: Halogen 200 lumen (20 W). This lamp was installed two times at the middle of the shelf and shined on the front of the products.

In the soft lighting condition only the soft lamps were switched on and in the bright lighting condition both lamps were switched on. In table 8 the light measurements of the simulated supermarket in three lighting conditions are displayed for three different places on the shelves. The measurements are performed with digital lux meter '91003' on a distance of one meter from the shelves.

Table 8: Light measurements in lux

In the middle of the shelves				
condition / shelf	1	2	3	4
No	250	300	260	230
Soft	450	400	300	250
Bright	650	450	400	400
On the left of the shelves				
condition / shelf	1	2	3	4
No	210	210	210	210
Soft	250	200	200	200
Bright	350	320	310	300
On the right of the shelves				
condition / shelf	1	2	3	4
No	550	350	300	250
Soft	650	400	300	250
Bright	750	480	340	300

1= Highest shelf, 2=Second highest shelf, 3=Second lowest shelf, 4=Lowest shelf

The right part of the shelves was more lighted than the left part of the shelves. This is caused by the standard fluorescent lighting equipment of the room. It was possible to switch of the fluorescent lights above the shelves, however still some light was present from the fluorescent lamps at the right part of the shelves. At the left part of the shelves the fluorescent lamps were completely switched off so no light was present from that side.

The colour temperature of the soft and the bright intensity conditions is around 4000 K. This is the average amount of Kelvin and will give a neutral CCT.

4.1.5 Respondents

Students from Wageningen University were recruited in the Consumer research room. Only Dutch students were allowed to participate in the study to prevent cultural differences. These students were recruited by several ways of promotion: flyers at the canteen cash desks, an announcement on the TV screens in the University building and an announcement via e-mail to a group of about 900 students that wants to be informed about researches. During the experiment flyers were also provided to students in the building. The respondents got a reward: a candy product of their own choice. The flyer can be found in Appendix B. A target number of 20 respondents per condition is needed to do a good research because in previous studies comparable criteria were used as well.

4.2 Controlled Stimuli

In this paragraph, all controlled stimuli (place on the shelves, label on the shelves, size and colour of label on product, product information and other available products) will be discussed.

4.2.1 Place on the shelves

Products were placed on four separate shelves with equal lengths. Wine is presented only on eye-level so the choice of wine will not depend on this stimulus.

4.2.2 Label on the shelves

On the labels of the shelves product information was mentioned. When a product is organic, it was mentioned on the label in the upper left corner of the label. Also a sticker was put on the bottle of wine with a logo to make it recognisable that the product is organic. For the wines the name and if possible year of production were mentioned. Moreover, the country of origin, taste and 'tastes good with' were mentioned. Also the current price was provided. For the tea, the amount of tea bags was mentioned.



Figure 5: An example of a label on the shelf (in Dutch)

4.2.3 Size and colour of label on product

The size and colour of a label influences the amount of light that is observed by the eyes. The sizes of the label on the bottles of wine are as equal as possible in size and colour.

4.2.4 Product information

For wines the following information was provided on the labels:

- Organic/non-organic: It will be obvious to the respondents if a product is organic or non-organic by reading the front of the bottle or the label on the shelf.
- Country of origin: On all bottles of wine a country of origin can be found. This is a type of product information that can be observed by the respondents.

- Year of production: The year of production is another type of product information that is mentioned on the package, when known, that can be observed and use as a trade-off to choose a bottle of wine.
- Taste and tastes good with: The taste of the wine is described in a (few) word(s) and the type of food which it tastes good with is mentioned.
- Price: The current price of the product is displayed.

4.2.5 Other available products

The other available products are products that can be bought in Dutch supermarkets. It can be the next product category in a supermarket. The other products used are fruit juice and tea. For these products no product information about the country of origin, year of production and tastes good with suggestion were mentioned.

4.3 Procedure

When a respondent arrives a short introduction to the study was given with instructions on paper. This consent form can be found in Appendix C. When the respondent is ready he/she walks with the researcher to the back of the room where the shelves with the (lighted) products are situated. At that place the respondent is helped with putting the eye-tracking glasses securely on their head to prevent any disturbances. It is necessary that the respondent does not see the shelves before the eye-tracking device is switched on otherwise, important data will be lost. When the eye movements are calibrated with the 3-point calibration the respondent was provided with a shopping list (see in consent form (Appendix C)) and a basket to put in the products started choosing the products that needed to be bought.

The respondents needed to buy wine, red and white, tea and fruit juice. The respondent is obliged to choose one bottle of red wine, one bottle of white wine, one package of tea and one package of fruit juice. After the respondent choose the products, the shopping basket was given back to the researcher. He sent the respondent to the questionnaire on a computer. During the filling out of the questionnaire the researcher wrote down which products were chosen and put the products back on the shelves. The goal of the questionnaire is to get an understanding of the decisions the respondent took in the simulated supermarket on several aspects. The complete questionnaire can be found in Appendix C. When the respondent finished the questionnaire, the respondent signed the signature list and a reward can be picked up at the exit of the research room.

4.4 Measures

Two measures were used in this research: the eye tracker and a questionnaire.

4.4.1 Eye tracker

The respondents will make use of an eye-tracker to follow the eye movements. They will be provided with glasses that follow these movements. These glasses are connected with a laptop computer to save the tapes of the glasses. Respondents need to do a 3-point calibration to make it possible to start the tape of the eye-tracker. Infra-red radiation that is focussed on the eyes can follow the eye movements.

Semantic gaze mapping technology was used to analyse the data. The results of this tool will be analysed with the program 'Be Gaze'. In this program, specific zones of attention (Areas of interest) are created to make distinctions on the types of information that can be relevant to research. E.g the

view on organic wines will be distinguished from the view on non-organic wines. For all the movies that are taped with the eye tracker 3 different Areas of interest (AOIs) were made: the organic wines, the non-organic wines and the other products.

With the eye-tracker, data were collected for attention. Four types of attention-based AOIs were coded for data analyses, two for organic wines (red and white), one for the other wines and one for the other products (tea and juices). Two constructs were taken to measure attention. The first measure of attention is the number of fixations. This is an appropriate way of measuring attention because Wedel and Pieters (2000) argue that attention and information extraction can be measured by fixation frequency. The other construct that is taken was dwell time. This can be described as the sum of all fixations and saccades within an AOI (BeGaze Manual, 2013). Dwell time is a usual way in measuring attention in marketing (Wang & Day 2007).

4.4.2 Questionnaire

The goal of the questionnaire was to get an understanding of the decisions the respondents took in the simulated supermarket environment. The questionnaire is composed on wur.qualtrics.com which is an often used scientific tool to make a questionnaire online. The scale used is a seven point Likert scale. The aspects that were measured are:

Attractiveness of chosen wine

For each bottle of wine chosen three questions were asked to measure attractiveness of the wines.

Involvement with organic wine

Four questions were asked to measure involvement with organic wine.

Pleasure & arousal

To measure the emotional states pleasure and arousal; the PAD Emotion Scale Measurement is used as in Quartier (2011). This scale is used because several studies showed to offer the most suitable tools in measuring emotions in retail environments.

Familiarity with organic wine

One question about familiarity with organic wine was asked.

Familiarity with organic products

Another question about familiarity with organic products was asked.

Recognition of wine

In the questionnaire 16 bottles of wine were presented on a picture. Respondents were asked to answer if they recognised the bottle of wine from the shelves.

Comments of respondents

For this measure all comments are counted. The most often mentioned comments for this measure are presented in the results and used for the discussion in the last chapter. The goal is to avoid that the respondents are aware of the different conditions with light and background colours.

Demographics

In this measure questions about gender, age and study program were asked.

The complete questionnaire can be found in Appendix C.

The results of the study were analysed by the program IBM SPSS Statistics 21.

4.5 Pilot study

A pilot study has been performed to test the situation to reduce the risk of any mistakes or incomplete information. From Thursday 14th of November till Friday 15th of November, 5 pilots were conducted. The goal of this pilot study was to improve the experiment in such a way that there are no inconsistencies during the test of the research.

4.5.1 Methodology

The pilots were conducted with students from Wageningen University that were not familiar with the manipulated and controlled stimuli. The only information that was provided is that the research is about products in a retail environment. Different conditions were tested with all the three lighting conditions.

From this pilot study it became clear that the consent form was clear for all the pilot respondents. However, on the consent form itself the list of groceries was mentioned, so for the pilot-respondents it was not clear if they should take the form with them to the shelves. To overcome this problem a separate shopping list was provided to the respondent to prevent that the consent form was taken with them on which information is provided that is not relevant anymore.

After that the pilot-respondents were sent to the eye-tracker to calibrate their eyes on the wall. One time the calibration needed to be repeated, because the connection was lost after the recording started. So the eye-tracker device is a risk factor in this research. Therefore also measures of attention are implemented in the questionnaire, so the dependence of these data is spread.

After the calibration the respondents were provided with a shopping basket. It is important for the researcher as well as the respondent to be careful with the wire of the eye-tracker glasses during the measurement. A longer wire was tried but this wire did not work in combination with the eye tracker glasses. When the respondent finished the decision making process, the questionnaire was filled out.

When they finished the experiment, the respondents were asked as much information as possible about things that were obvious for them to improve the quality of the experiment. The three questions I always asked were:

1. What was most obvious when you looked for the first time to the shelves?
2. Did you see the extra lamps/lights added at the upper shelf?
3. Did you see the manipulated background colour at the upper shelf?

Furthermore, as much feedback as possible was asked for.

4.5.2 Results

The most important result is that the light was striking in one of the five cases. However, in this case the light was not perceived as disturbing. In the other four cases, the answer to my question about seeing the light led to a negative response.

The answer to my first question was different for every respondent. One respondent explained that

he was mostly focussed to the middle of the shelf. Another respondent told that he did not like the short wire of the eye tracker device. Another respondent immediately told about the fair trade products. He also said that he is more familiar with wine on the lower shelves and explained that he found the information provided for the wines is a huge amount. The last respondent explained that it was unusual that all the tea boxes are on the lowest shelf.

None of the pilot-respondents told that the background colour was striking. All the respondents kept the same sequence of picking the products as was stated on the grocery list.

There was no obvious trend in the choice of products. Some pilot-respondents chose the organic wines but it is difficult to estimate for a larger scale if there will be a trend. This will become clear from the real experiment.

The feedback on the questionnaire was very limited. None of the respondents had any difficulties in finishing the questionnaire.

On the question 'What was most striking?' at the questionnaire a two times mentioned answer was that the amount of choice of products was big. I think this is a positive point, because it simulates a real supermarket well. One respondent told that the eye tracker can increase pressure, as well as the supervisor of the research.

The total time spend during the pilot experiment was about 10-15 minutes per respondent excluding the time of the exit-questions.

4.5.3 Conclusion

So in the real experiment the soft light that shines from the back of the products is focussed more downwards. The light is not too striking for the respondents in this way. About the layout of the shelves there was nothing changed. The comments of the pilot respondents were all different. There was no congruency in the answers. A shopping list was made after a comment of a respondent. The way of putting the background colour at the shelf is kept the same, this was not striking. In the questionnaire also nothing was changed after the pilot, because it was clear. To avoid pressure the researcher tries to be as absent as possible, by saying to respondents that they should behave as in a real supermarket, as is also stated in the consent form.

5. Results

In this chapter the results of the experiment will be discussed. Firstly, the respondents and dataset will be described. Outcomes for attention, choice, emotions and attractiveness will be discussed afterwards. The last part of the chapter will present an overview of all results.

The main analyses were focussed on the effect of light and background colours on organic wines vs. non organic wines but also effects of red vs. white wine were analysed and will be discussed.

5.1 Respondents & dataset description

In this paragraph the respondents and dataset will be described. For instance demographic data of the respondents and reliability analyses of the questions from the questionnaire will be discussed.

5.1.1 Withdrawn respondents

A number of 139 respondents participated in the experiment. All respondents completed the questionnaire successfully. Concerning the eye-tracker data, the equipment was not able to calibrate the eyes of 3 respondents. During 1 tape, the eye-tracker glasses were disconnected from the laptop computer. So for 4 respondents no sufficient eye-tracker tape was collected, so these data were withdrawn from the analysis.

For the other 135 respondents the entire shopping time was taped. The mean shopping time was 111.39 seconds (SD: 43.39). When looking at the number of fixations it was important that there were at least some fixations in the area of organic wines and in the other AOI's, otherwise a comparison between these AOI's does not make any sense. Therefore 11 respondents were withdrawn from the analysis. Moreover during the tape the equipment was not always able to measure all fixations. By doing a visual inspection on all tapes another 12 respondents were withdrawn from the analysis. These data were not sufficiently measured. In appendix D an overview of the distribution of the number of fixations is given.

So from 112 respondents the eye-tracker data were evaluated. In table 9 an overview of the number of respondents per condition in the two measures is given.

Table 9: Respondents per condition

Light	Background colour	# respondents with eye tracker data	# respondents in questionnaire
No	Red	18	21
Soft	Red	14	21
Bright	Red	17	21
No	Blue	19	24
Soft	Blue	23	28
Bright	Blue	21	24

5.1.2 Striking elements mentioned by the respondents

In the questionnaire the respondents were asked about the most striking elements during their visit to the simulated retail environment. The most striking element appeared to be choice. 31

Respondents answered that there was a lot of choice in the simulated supermarket (table 10). Other elements that appeared to the respondents were that the respondents recognised that the red and white wine were not sorted on one row but on two rows (24 times), the price of products (20 times),

that there was only one brand for tea (17 times) and the eye tracker glasses (16 times). There were no comments on the use of light. The use of a background colour on the upper shelf was mentioned only two times. So it can be assumed that the respondents were not aware of the fact that the subject of the experiment was the influence of light and background colour on choice behaviour and emotions. Some examples of answers are: 'It was clear if a product was organic or not.' and 'The description was leading my choice.' Based on these answers it can be concluded that the elements that needed to be striking to the respondents were in fact striking (organic and description).

Table 10: Summarized table of striking elements in experiment mentioned by respondents

Element	choice	sorting wine	price	one tea-brand	eye-tracker glasses
# mentioned	31	24	20	17	16

In Appendix E an overview of all striking elements is displayed.

5.1.3 Age & gender

The average age of respondents was : 22.15 years (SD: 3.97). Age is not significantly different for light (Between Subjects $F(2,133)=.143$, $p= .867$), background colour ($F(1,133)= 2.463$, $p= .119$) and the interaction of light and background colour ($F(2,133)= .292$, $p= .747$). So randomisation on age between the conditions has been performed successfully.

A total of 42 men (30,2%) and 97 (69,8%) women participated in the study. A Chi-square test between gender and condition shows a value of $\chi^2(5)=2.15$, $p= .829$. The distribution of men and women over the conditions is not significantly different, randomisation has been performed sufficiently. In table 11 an overview is given of the number of men and women per condition.

Table 11: M/W ratio

Light	Background colour	Men	Women
No	Red	8	13
Soft	Red	4	17
Bright	Red	6	15
No	Blue	8	16
Soft	Blue	8	20
Bright	Blue	8	16

5.1.4 Study program

Recruited students in several study programs participated in the experiment. 56,8 % Of the respondents (79 students) were studying social sciences like 'Management and Consumer studies' or 'International Development studies'. 55 Respondents (39,6%) were studying beta study programs i.e. 'Nutrition and Health' or 'Biology'. 5 Respondents (3,6%) were not following a fixed study program. Both Bachelor as well as Master students participated in this study.

5.1.5 Experience with buying wine

In the questionnaire respondents were asked how often he or she buys wine. For this variable the mean is 3.58 with a standard deviation of 1.79. This means that the respondents buy on average at least once in 4.5 months wine in the supermarket. A between subjects test was conducted to test

whether experience with buying wine does significantly differ for light, background colour and the interaction. For light, values of $F(2,133) = .460$, $p = .632$ were found, for background colour values of $F(1,133) = .180$, $p = .672$ were found and for the interaction the outcome is $F(2,133) = .085$, $p = .918$. So randomisation on experience with wine has been performed successfully.

5.1.6 Experience with buying organic products

Another question was about the experience with buying organic products. There is a mean of 3.83 with SD: 2.12. This means that the respondents buy on average at least once in 3.5 months organic products in the supermarket. A between subjects test was conducted to test if this item does significantly differ for light, background colour and the interaction. For light values of $F(2,133) = .242$, $p = .786$ were found, for background colour values of $F(1,133) = .064$, $p = .801$ were found and for the interaction these outcomes were found: $F(2,133) = 2.367$, $p = .098$. Only the interaction is marginally significantly different. The values for light and background colour are not significantly different. So randomisation on experience with organic product has been performed successfully. Experience with buying organic products is spread for light and background colour.

5.1.7 Involvement with organic products

Respondents' involvement with organic products is spread between the conditions. The mean is 4.05 with a SD of 1.60. Testing on significance for light a value of $F(2,133) = .618$, $p = .540$ was found, for background colour a value of $F(1,133) = .060$, $p = .806$ was found and for the interaction a value of $F(2,133) = 0.701$, $p = .498$ is the outcome. This means that involvement with organic wine is not significantly different between the conditions. Randomisation on this variable has been performed sufficiently.

5.1.8 Factor analysis

Factor analysis was conducted to test if the variables of the components involvement with organic products, attractiveness of red wine and attractiveness of white wine really reflect a single component. For pleasure and arousal a principal component analysis was conducted with direct oblimin rotation, because it is expected that there are correlations between the components. For involvement with organic products, attractiveness of red wine and attractiveness of white wine scree plots were displayed. An extraction based on eigenvalues above the nod in the scree plot show that for each component one construct can be defined (Appendix F). For pleasure and arousal a scree plot shows that 2 constructs can be defined (pleasure and arousal). Interpreting the pattern matrix and structure matrix component 1 represents pleasure and component 2 represents arousal. The correlation between pleasure and arousal is $-.065$ so there appears to be no clear relationship between these constructs.

5.1.9 Reliability

The reliabilities of the scales are displayed in table 12.

Table 12: Reliabilities

Component	Cronbach's alpha	Number of items
Involvement organic products	.926	4
Pleasure	.847	6
Arousal	.617	6
Attractiveness red wine	.734	3
Attractiveness white wine	.879	3

Table 12 shows that the values for cronbach's alpha are all higher than .6. A standard of .7 is maintained (Kline 1999), but in this research the value of .617 is accepted, because the PAD scale used for measuring arousal is a suitable tool in measuring emotions in retail environments (Quartier 2011).

5.2 Attention

In this paragraph the results for attention will be discussed. Paragraph 5.2.1 contains the results for attention of organic wine, in paragraph 5.2.2 'observed organic wines' will be discussed and in paragraph 5.2.3 recognition of organic wines will be elaborated.

5.2.1 Attention of organic wine

Attention was measured by the eye-tracker device by number of fixations and by dwell time. The mean number of fixations on the products on the shelves was 223.71 (SD: 114.19, n=112). When comparing this mean with the mean shopping time on average more than 2 fixations occur every second. In literature there is no standard guideline of the number of fixations per minute. However, comparable studies have an equal relationship between the total scan time and the number of fixations (Thomsen & Fulton 2007). Moreover fixations that were outside the area of the presented product were not taken into account in this research.

A histogram was made of the mean values of the number of fixations to see if these values are normally distributed. This was not the case, therefore the values were converted to logarithms. From the histogram of the logarithms can be concluded that these values were normally distributed. In table 13 an overview of the means, standard deviations and number of observations of the logarithms of the number of fixations is given for the different conditions.

Table 13: Means number of fixations for organic wine

Light condition	Background	Mean	SD	Mean log	SD log	N
No	Red	22.50	16.85	2.81	.84	18
Soft	Red	36.21	26.00	3.30	.84	14
Bright	Red	39.12	38.25	3.30	.88	17
No	Blue	29.58	19.84	3.16	.74	19
Soft	Blue	30.87	18.53	3.19	.82	23
Bright	Blue	31.33	23.40	3.12	.90	21

A One way Anova test was conducted. For light the outcomes are $F(2,106) = .997$, $p = .373$, for background colour the outcomes are $F(1,106) = .015$, $p = .904$ and for the interaction the outcomes are $F(2,106) = 1.048$, $p = .354$. So no significant differences were found by this analysis.

A histogram was made of the mean values of dwell time to see if these values are normally distributed. This was not the case, therefore the values were converted to logarithms. From the histogram of the logarithms can be concluded that these values were normally distributed.

In table 14 an overview of the means, standard deviations and number of observations of the dwell time in ms. and logarithms of dwell time is given for the different conditions. Dwell time was measured in milliseconds.

Table 14: Means dwell time for organic wine in ms. & logarithms

Light condition	Background	Mean	SD	Mean log	SD log	N
No	Red	5378.83	3978.64	8.26	.93	18
Soft	Red	10627.91	7137.31	9.00	.82	14
Bright	Red	12147.67	13253.34	8.89	1.07	17
No	Blue	7257.16	5393.57	8.58	.91	19
Soft	Blue	8510.49	5403.46	8.76	.92	23
Bright	Blue	10243.11	9836.93	8.69	1.22	21

A One way Anova test was conducted. For light the outcomes are $F(2,106) = 2.200$, $p = .116$, for background colour the outcomes are $F(1,106) = .045$, $p = .832$ and for the interaction the outcomes are $F(2,106) = .932$, $p = .397$. So no significant differences were found by this analysis.

In table 15 Mean % OW is the percentage of fixations on organic wines compared to the other wines and Mean % OP is the percentage of fixations on organic wines compared to other wines and other products.

Table 15: Fixations on organic wines as a % of other wines (OW) and other wines and other products (OP)

Light condition	Background	Mean % OW	SD	Mean % OP	SD	N
No	Red	22.50	13.55	10.44	4.73	18
Soft	Red	37.43	23.52	25.86	19.93	14
Bright	Red	32.24	19.76	21.71	15.61	17
No	Blue	27.05	14.31	14.79	6.85	19
Soft	Blue	26.22	11.75	15.43	7.37	23
Bright	Blue	31.33	20.61	19.67	14.23	21

For the percentage of fixations on organic wines compared to the other wines the outcomes for light are $F(2,106) = 2.015$, $p = .138$, for background colour the outcomes are $F(1,106) = .579$, $p = .449$ and for the interaction the outcomes are $F(2,106) = 1.907$, $p = .154$. So no significant differences were found by this analysis.

A graphical overview of the results on the percentage of fixations on organic wines compared to other wines and other products is given in figure 5.

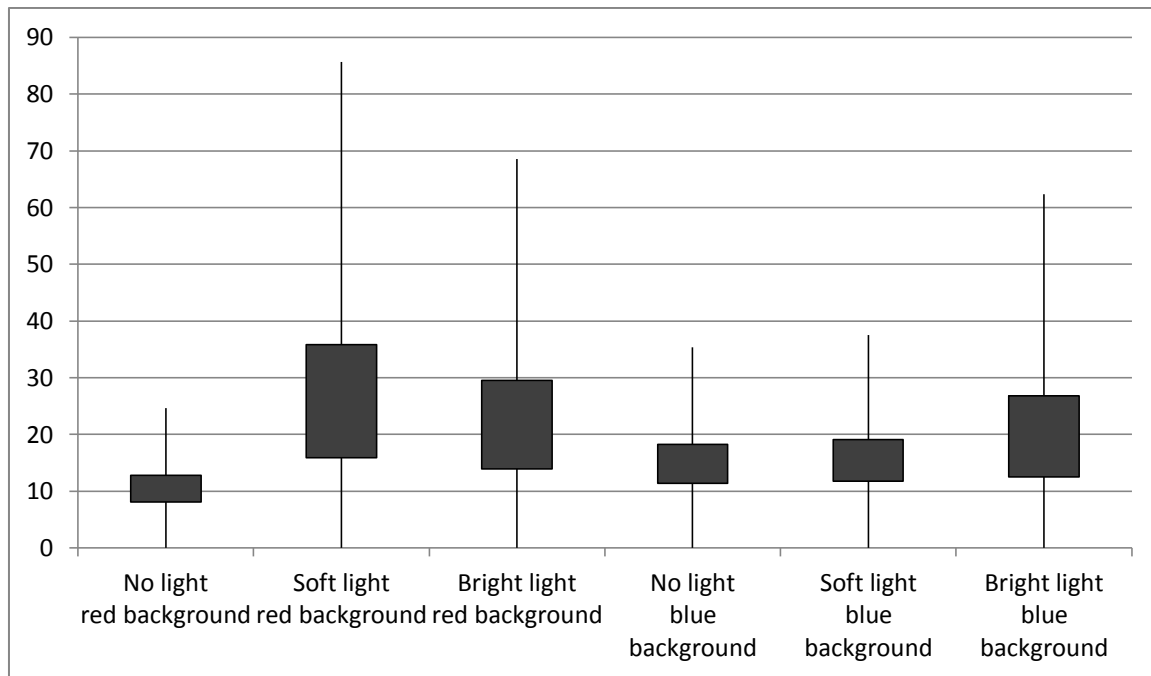


Figure 5: Fixations on organic wines as a percentage of other wines and other products

For the percentage of fixations on organic wines compared to the other wines and other products the outcomes for light are $F(2,106) = 5.411$, $p = .006$, for background colour the outcomes are $F(1,106) = 1.364$, $p = .245$ and for the interaction the outcomes are $F(2,106) = 3.348$, $p = .039$.

Significant differences for light and the interaction of light and background colour were found for the percentage of fixations on organic wines compared to the other wines and other products. With a post-hoc Least Significant Differences (LSD) test it was investigated between which light conditions significant differences exist. For the no light vs. the soft lighting condition a value of $p = .019$ was found and for the no lighting vs. the bright lighting condition a value of $p = .006$ was found. No significant difference for the soft vs. the bright lighting condition was found ($p = .668$). So the percentage of fixations on organic wines vs. other wines and other products increases by the presence of light.

For the interaction effect no post hoc test was possible. However a planned comparison test gives a value of $p = .001$ for the interaction of a red background colour with the no lighting vs. soft lighting condition and a value of $p = .007$ for the interaction of a red background colour with the no lighting vs. bright lighting condition. So the presence of light with a red background increases the percentage of fixations on organic wines vs. other wines and other products.

A value of $p = .013$ was found for the interaction of soft lighting with a red vs. a blue background colour. So a red background colour fits best for the percentage of fixations on organic wines vs. other wines and other products in the soft lighting condition.

5.2.2 Observed organic wine

Respondents were asked whether they thought organic wine was available on the shelves in the simulated retail environment. Table 16 shows how many times organic wine was observed in the six conditions with the corresponding percentages.

Table 16: No. of times organic wine observed

Light	Background colour	# Yes	percentage	# No/I don't know	Percentage
No	Red	7	33.3 %	14	66.7 %
Soft	Red	9	42.9 %	12	57.1 %
Bright	Red	7	33.3 %	14	66.7 %
No	Blue	6	25.0 %	18	75.0 %
Soft	Blue	6	21.4 %	22	78.6 %
Bright	Blue	11	45.8 %	13	54.2 %

In figure 6 a graphical overview of the results on the number of times organic wine observed is presented.

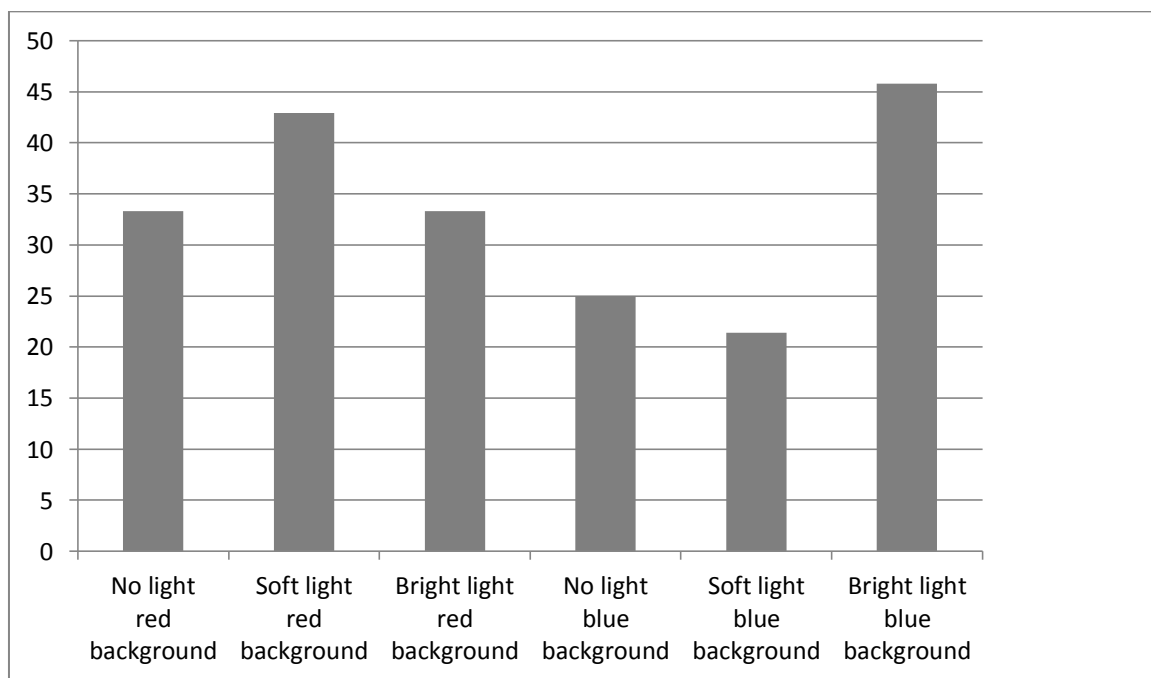


Figure 6: No. of times organic wine observed

To test the effect of light on the number of observed organic wines a Chi-square test was conducted for light. From this test a value of $\chi^2(2) = 1.47$, $p = .481$. So there is no significant difference for the effect of light on observation of organic wine.

To test the effect of background colour on the number of observed organic wines a Chi square test was conducted. From this test a value of $\chi^2(1) = .607$, $p = .436$ was found. So there is no significant difference for the effect of background colour on observation of organic wine.

With the Chi-square test it is not possible to measure the interaction effect. Therefore a logistic regression was conducted. The values are displayed in table 17. In the analysis light, background colour and the interaction were entered as categorical covariates with a simple coding and the observed organic wine as a dependent variable.

Table 17: Logistic regression organic wine observed

Covariates	B	S.E.	Wald	df	Sig.	Exp(B)
Light no vs. bright	-.466	.452	1.060	1	.303	.628
Light soft vs. bright	-.363	.444	.670	1	.413	.695
Background colour red vs. blue	.297	.369	.648	1	.421	1.346
Light (no vs. bright)*background colour (red vs. blue)	.932	.905	1.060	1	.303	2.538
Light (soft vs. bright)* background colour (red vs. blue)	1.538	.888	2.998	1	.083	4.654
Constant	-.706	.184	14.666	1	.000	.493

From this test a marginally significantly different result was found for 'light (soft vs. bright)* background colour (red vs. blue)' $p=.083$. An interaction effect between soft vs. bright light and red vs. blue background colour takes place. This implies that when the light level increases the number of times organic wine observed in the blue background condition is higher than in the red background condition.

5.2.3 Recognition of organic wine

In the questionnaire respondents were asked whether they recognised a displayed (organic) wine from the simulated retail environment, presenting them 16 bottles of wine (asked: 12 available (8 organic and 4 non organic), 4 not available).

In table 18 an overview of the means of the mean number of recognised organic wines is given (range 0-8).

Table 18: Means number of recognised organic wines

Light condition	Background	Mean	SD	N
No	Red	2.81	1.37	21
Soft	Red	3.86	1.56	21
Bright	Red	3.48	1.66	21
No	Blue	2.83	1.47	24
Soft	Blue	3.00	1.33	28
Bright	Blue	3.79	1.50	24

In figure 7 a graphical overview of the means and standard deviations of the number of recognised organic wines is displayed.

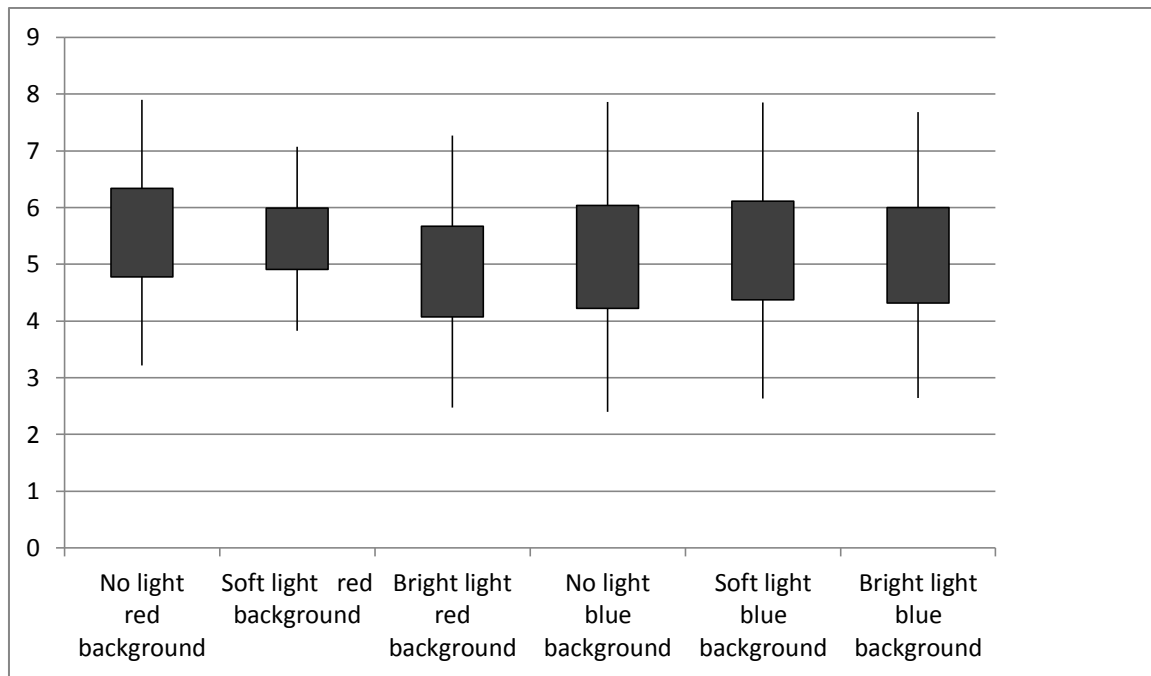


Figure 7: Number of recognized organic wines

To test if there are significant differences for the mean numbers of recognised organic wine a between subjects analysis was performed for light, background colour and the interaction. Results show a significant difference for light: $F(2,133) = 3.676$, $p = .009$.

For background colour values of $F(1,133) = .469$, $p = .495$ were found and for the interaction values of $F(2,133) = 4.357$, $p = .140$ were found. So for these dependent variables no significant differences were found.

With the results of a post hoc Least Significant Differences (LSD) test can be concluded between which light conditions exist significant differences. So, it can be concluded that the soft lighting condition does not differ significantly from the bright lighting condition ($p = .365$). The no lighting differs marginally significant from the soft lighting condition ($p = .076$) and the no lighting condition differs significantly from the bright light condition ($p = .009$). Thus the availability of light increases the mean number of recognised organic wines.

In table 19 an overview of the mean percentages of correct responses on recognised organic wines is given versus the other wines (4 available and 4 not available) that was asked for in the questionnaire.

Table 19: Recognised organic wines vs. other wines in mean %

Light condition	Background	Mean %	SD	N
No	Red	35.67	12.62	21
Soft	Red	51.10	11.75	21
Bright	Red	45.76	13.84	21
No	Blue	39.21	12.40	24
Soft	Blue	40.46	10.19	28
Bright	Blue	44.88	13.40	24

A graphical overview of the mean percentages and standard deviations is presented in figure 8.

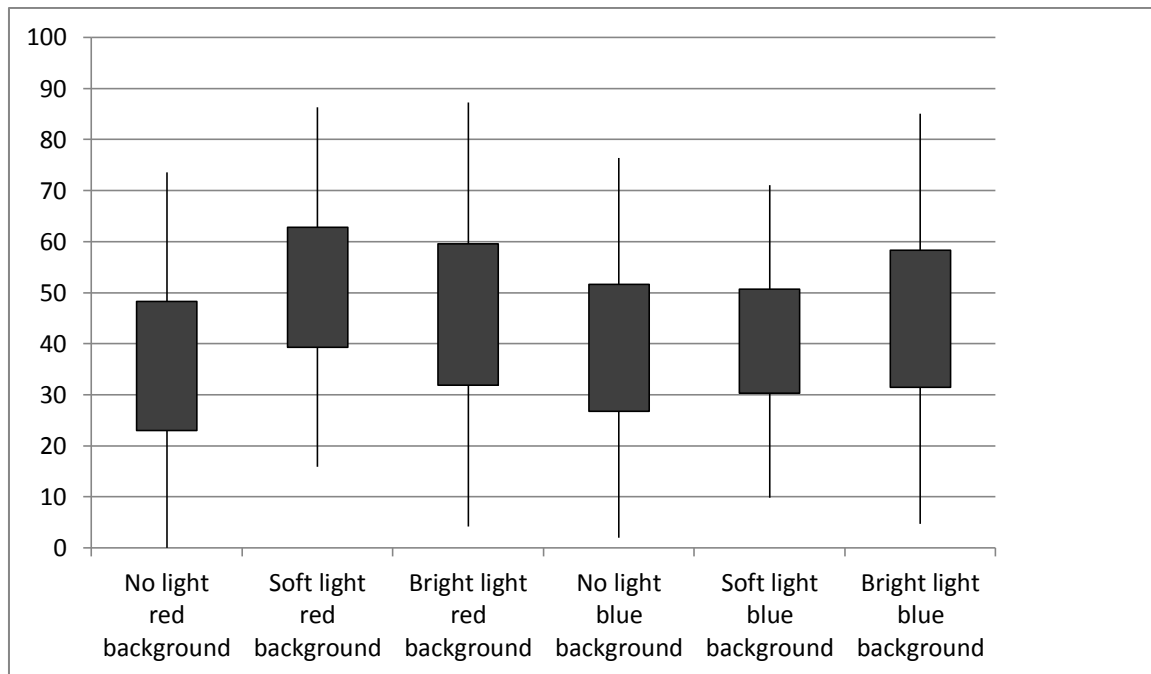


Figure 8: Recognised organic wines vs. other wines in mean percentage

A One way Anova test was conducted. From this test for light the outcomes are $F(2,133) = 6.561$, $p = .002$, for background colour the outcomes are $F(1,133) = 1.596$, $p = .209$ and for the interaction the outcomes are $F(2,106) = 4.032$, $p = .020$.

From a post hoc test can be concluded that for the soft lighting versus the bright lighting condition a value of $p = .916$ was found. For the no lighting versus the soft lighting condition a value of $p = .004$ and for the no lighting versus the bright lighting condition a value of $p = .003$ was found. So for light it can be concluded that the availability of light increases the recognisability of organic wines significantly.

From a planned comparison test conclusions for the interaction effects were drawn. A value of $p = .003$ was found for the interaction between a soft lighting condition with a red vs. a blue background colour. So a red background colour increases the percentage of recognised organic wines vs. other wines in the soft lighting condition.

A value of $p < .001$ was found for the interaction between a red background colour with the no lighting condition vs. the soft lighting condition. A value of $p = .009$ was found for the interaction between a red background colour with the no lighting condition vs. the bright lighting condition. So the presence of light increases the percentage of recognised organic wines vs. other wines with a red background colour.

5.3 Choice

In this paragraph choice of wines will be discussed. This paragraph is about the choice of organic wine, the next paragraph about the choice of red/white wines and the third paragraph about choice and attention.

5.3.1 Choice of organic wine

During the shopping time in the simulated retail environment respondents were requested to choose two bottles of wine. For each bottle of organic wine that was chosen it was evaluated in which

condition this bottle was chosen. In table 20 an overview of the number of times organic wine was chosen per condition is displayed with the corresponding percentages.

Table 20: No. of times organic wine chosen

Light condition	Background colour	# Yes	percentage	# No	percentage
No	Red	6	28.6%	15	71.4%
Soft	Red	9	42.9%	12	57.1%
Bright	Red	9	42.9%	12	57.1%
No	Blue	7	29.2%	17	70.8%
Soft	Blue	7	25.0%	21	75.0%
Bright	Blue	5	20.8%	19	79.2%

A Chi-square test was conducted to test if there are effects of light on the number of times organic wine chosen. The outcome of this test is $\chi^2(2) = .157$, $p = .925$. So it can be concluded that there are no significant differences between the different light conditions for the choice of wines.

A Chi-square test was conducted to test if there are effects of background colour on the number of times organic wine chosen. The result is a value of $\chi^2(1) = 2.765$, $p = .096$. This effect is marginally significant, which implies that a blue background colour increases the number of times that organic wine is chosen compared to a red background colour.

To measure a possible interaction effect a logistic regression was conducted. In the analysis light, background colour and the interaction were entered as categorical covariates with a simple coding and the observed organic wine as a dependent variable. The values are displayed in table 21.

Table 21: Logistic regression organic wine chosen

Covariates	B	S.E.	Wald	df	Sig.	Exp(B)
Light no vs. bright	-.090	.470	.037	1	.847	.914
Light soft vs. bright	.118	.456	.067	1	.796	1.125
Background colour red vs. blue	.610	.375	2.641	1	.104	1.840
Light (no vs. bright)*background colour (red vs. blue)	-1.076	.939	1.313	1	.252	.341
Light (soft vs. bright)* background colour (red vs. blue)	-.236	.912	.067	1	.796	.789
Constant	-.802	.188	18.280	1	.000	.448

No interaction effect between light and background colour for the choice of organic wines was found.

5.3.2 Choice of red/white wine

In the simulated retail environment respondents were requested to choose one bottle of red wine and one bottle of white wine. In this paragraph the effect of light and background colour on the choice for organic red wine vs. organic white wine will be discussed. In table 22 an overview of the choice of organic red wine in the different conditions is given.

Table 22: No. of times organic red wine chosen

Light condition	Background colour	# Yes	percentage	# No	percentage
No	Red	2	9.5%	19	90.5%
Soft	Red	6	28.6%	15	71.4%
Bright	Red	7	33.3%	14	66.7%
No	Blue	6	25.0%	18	75.0%
Soft	Blue	4	14.3%	24	85.7%
Bright	Blue	2	8.3%	22	91.7%

A graphical overview of the number of times organic red wine chosen is presented in figure 9.

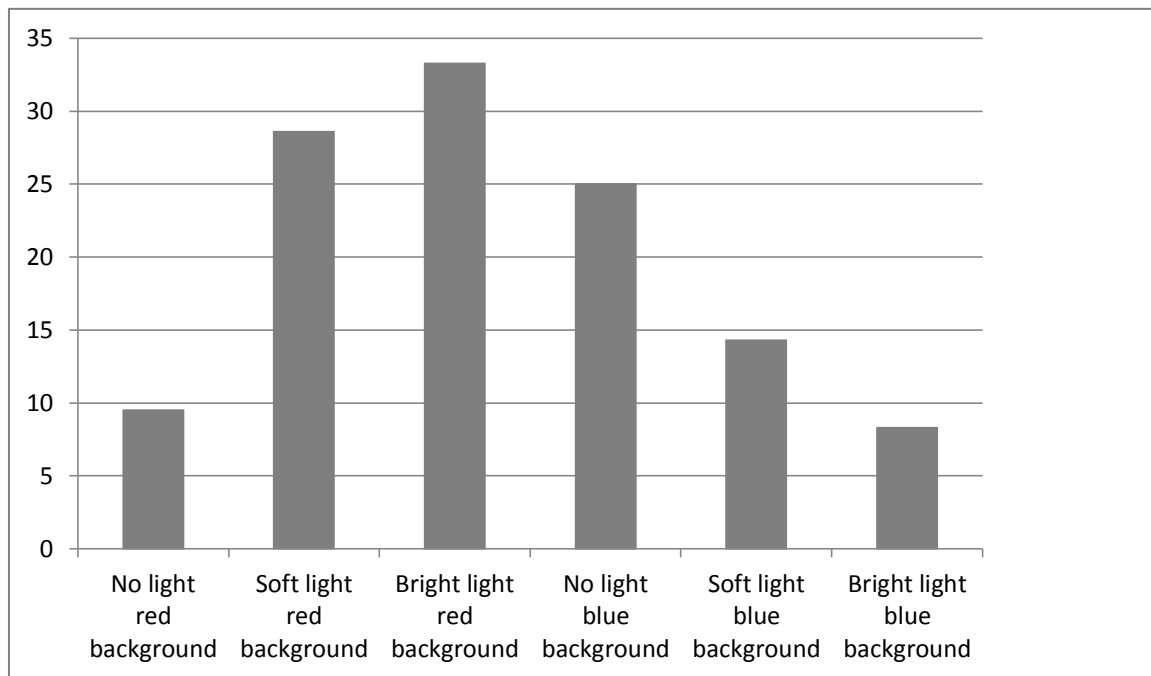


Figure 9: No. of times organic red wine chosen

To test if there are effects of light and background colour on these two types of wine, Chi square tests were conducted. For the effect of light on organic red wine a value of $\chi^2(2) = .023$, $p = .989$ was found. So it can be concluded that there is no significant effect of light on the choice of organic red wine. For the effect of background colour a value of $\chi^2(1) = .002$, $p = .965$ was found. Therefore it can be concluded that there is no significant effect of background colour on the choice of organic red wine.

A logistic regression was conducted to measure a possible interaction effect of light and background colour on the choice of organic red wine (table 23).

Table 23: Logistic regression organic red wine chosen

Covariates	B	S.E.	Wald	df	Sig.	Exp(B)
Light no vs. bright	.126	.921	.019	1	.891	1.134
Light soft vs. bright	.067	.800	.007	1	.933	1.069
Background colour red vs. blue	-.140	.705	.040	1	.842	.869
Light (no vs. bright)*background colour (red vs. blue)	-4.143	1.842	5.059	1	.024	.016
Light (soft vs. bright)* background colour (red vs. blue)	-1.253	1.600	.613	1	.434	.286
Constant	.488	.353	1.914	1	.167	1.629

From this analysis a value of $p=.024$ was found for the interaction between light (no vs. bright) and background colour (red vs. blue). This implies that the presence of bright lighting increases the number of organic red wine chosen for a red background colour compared to a blue background colour.

In table 24 an overview of the choice of organic white wine in the different conditions is given.

Table 24: No. of times organic white wine chosen

Light condition	Background colour	# Yes	percentage	# No	Percentage
No	Red	4	19.0%	17	81.0%
Soft	Red	3	14.3%	18	85.7%
Bright	Red	3	14.3%	18	85.7%
No	Blue	1	4.2%	23	95.8%
Soft	Blue	4	14.3%	24	85.7%
Bright	Blue	4	16.7%	20	83.3%

A graphical overview of the number of times organic white wine chosen is presented in figure 10.

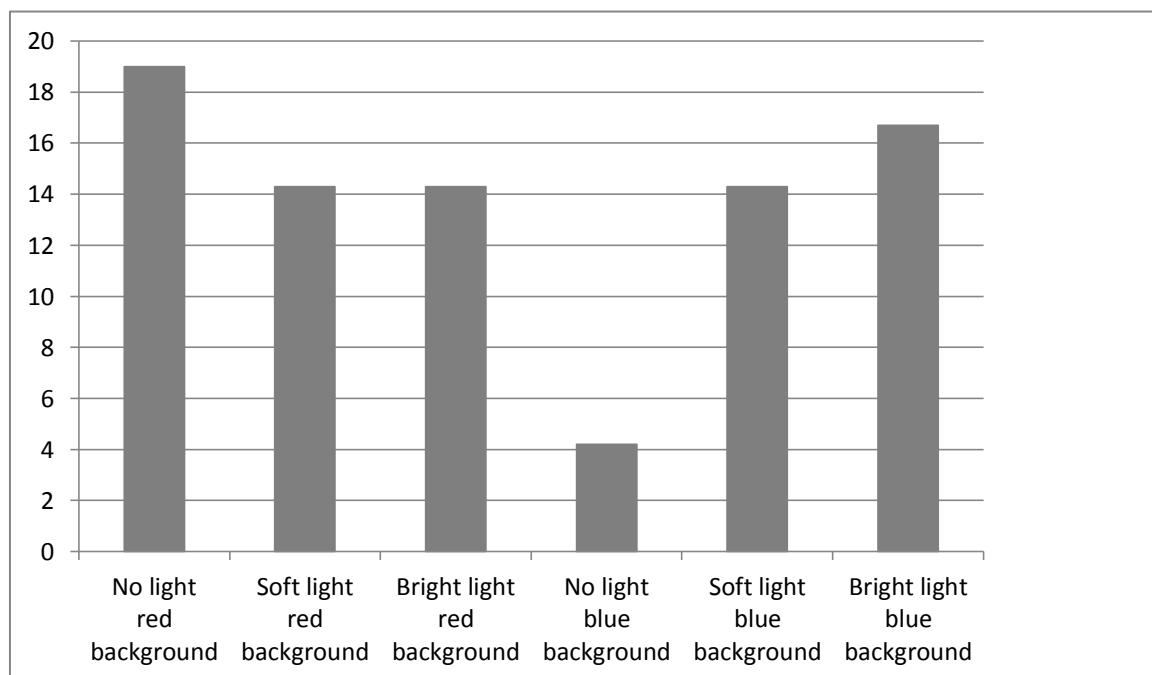


Figure 10: No. of times organic white wine chosen

For the effect of light on organic white wine a value $\chi^2(2)=.366$, $p=.833$ was found. Thus there is no significant effect of light on the choice of organic red wine. For the effect of background colour a value of $\chi^2(1)=.140$, $p=.708$ was found. So there is no significant effect of background colour on the choice of organic white wine.

A logistic regression was conducted to measure a possible interaction effect of light and background colour on the choice of organic white wine (table 25).

Table 25: Logistic regression organic white wine chosen

Covariates	B	S.E.	Wald	df	Sig.	Exp(B)
Light no vs. bright	-.896	.957	.876	1	.349	.408
Light soft vs. bright	-.549	.842	.426	1	.514	.577
Background colour red vs. blue	-.192	.726	.070	1	.792	.825
Light (no vs. bright)*background colour (red vs. blue)	4.564	1.915	5.682	1	.017	96.000
Light (soft vs. bright)* background colour (red vs. blue)	1.099	1.683	.426	1	.514	3.000
Constant	-.135	.363	.138	1	.710	.874

This analysis shows a value of $p=.017$ for the interaction between light (no vs. bright) and background colour (red vs. blue). This implies that the presence of bright lighting increases the number of organic white wine chosen for a blue background colour compared to a red background colour.

5.3.3 Attention and choice of organic wine

Attention can influence the choice of wines. The values for fixations were taken in a logistic regression analysis as non-categorical covariate. The dependent variable is the dichotomous variable 'organic wine chosen'. The values of this test are displayed in table 26.

Table 26: Logistic regression: fixations and choice of wines

Covariates	B	S.E.	Wald	df	Sig.	Exp(B)
Fixations	.080	.201	.158	1	.691	1.083
Constant	-1.006	.634	2.517	1	.113	.366

The same analysis is conducted for the values of dwell time displayed in table 27.

Table 27: Logistic regression: dwell time and choice of wines

Covariates	B	S.E.	Wald	df	Sig.	Exp(B)
Dwell time	.079	.166	.227	1	.634	1.082
Constant	-1.442	1.434	1.011	1	.315	.236

Based on the analyses displayed in table 26 and 27 no significant differences for the effect of attention on choice of organic wines were found.

5.3.4 Recognition and choice of organic wine

For recognition effects were found on the effect of light and the interaction. Tests were conducted for the effect of recognition on choice. The values for recognised organic wines vs. other wines in mean % and mean number of recognised organic wines were taken a logistic regression analysis as

non-categorical covariate. The dependent variable is the dichotomous variable 'organic wine chosen'. The values of these tests are displayed in table 28 and 29.

Table 28: Logistic regression: Recognised organic wines vs. other wines and choice of wines

Covariates	B	S.E.	Wald	df	Sig.	Exp(B)
% Recognised organic wines vs. other wines	-.012	.014	.706	1	.401	.988
Constant	-.296	.626	.224	1	.636	.744

Table 29: Logistic regression: Mean number of recognised organic wines and choice of wines

Covariates	B	S.E.	Wald	df	Sig.	Exp(B)
Number of recognised organic wines	.375	.128	8.584	1	.003	1.455
Constant	-2.087	.492	18.014	1	.000	.124

From these tests can be concluded that the effect of mean number of recognised organic wines on the choice of organic wine is significantly different, a value of $p=.003$ was found. So when the number of recognised organic wines increases the choice for organic wines increases as well. No significant difference was found for the effect of recognised organic wines vs. other wines on choice.

5.4 Emotions

After discussing the aspects attention and choice the focus in the next 2 paragraphs will be on the effects of light and background colour on the emotions pleasure and arousal of the respondents. The emotions were tested with the PAD-scale in the questionnaire.

5.4.1 Pleasure

The first emotional state that will be discussed is pleasure. In table 30 the means, standard deviations and number of observations for pleasure are given for all conditions.

Table 30: Means pleasure

Light condition	Background	Mean	SD	N
No	Red	5.56	.78	21
Soft	Red	5.45	.54	21
Bright	Red	4.87	.80	21
No	Blue	5.13	.91	24
Soft	Blue	5.24	.87	28
Bright	Blue	5.16	.84	24

A graphical overview of the means and standard deviations for pleasure is presented in figure 11.

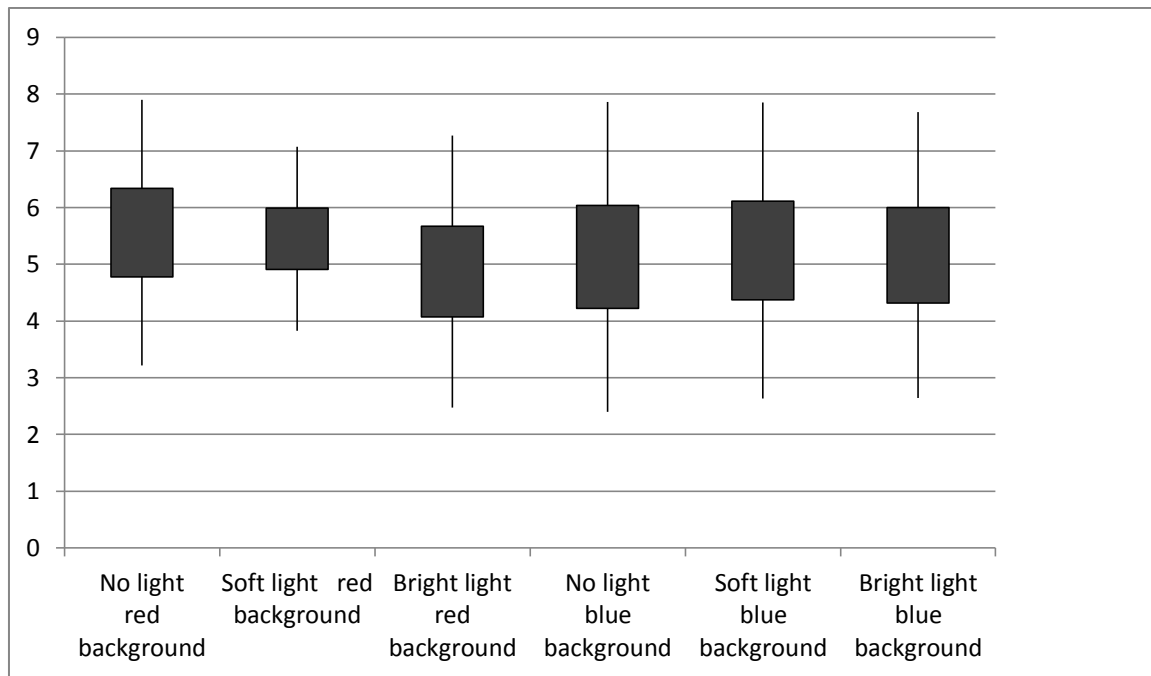


Figure 11: Means pleasure

To test if light and background colour and the interaction have an effect on pleasure a between subjects test was conducted. For light the outcomes are: $F(2,133) = 2.498$, $p = .086$. For background colour the outcomes are: $F(1,133) = 0.723$, $p = .397$. For the interaction effect the outcomes are: $F(2,133) = 1.496$, $p = .105$. Therefore it can be concluded that for light a marginally significant difference was found for pleasure.

With the results of a post-hoc Least Significant Differences (LSD) test can be concluded between which light conditions exist significant differences for pleasure. This test shows a value of $p = .999$ for the no vs. the soft lighting condition, a value of $p = .070$ for the soft lighting vs. the bright lighting condition and a value of $p = .077$ for the no light vs. the bright light condition. So two marginally significant differences were found. This implies that bright lighting causes a lower mean for pleasure.

5.4.2 Arousal

The other emotional state that will be discussed is arousal. In table 31 the means, standard deviations and number of observations for arousal are given all conditions.

Table 31: Means arousal

Light condition	Background	Mean	SD	N
No	Red	4.23	.75	21
Soft	Red	4.03	.69	21
Bright	Red	4.28	.72	21
No	Blue	4.33	.62	24
Soft	Blue	4.30	.77	28
Bright	Blue	4.16	.55	24

To test if light and background colour and the interaction have an effect on arousal a between subjects test was conducted. For light based on the between-subjects test it can be concluded that

there is no significant difference: $F(2,133) = .319$, $p = .727$. For background colour the outcomes are: $F(1,133) = .533$, $p = .467$. The interaction effect is also not significantly different: $F(2,133) = .934$, $p = .395$. So the effect of light, background colour and the interaction on arousal is not significantly different between the conditions. This implies that light and background colour and the interaction do not have a significant effect on arousal.

5.5 Attractiveness of red/white wine

In this paragraph the focus will be on the effect of light and background colour on attractiveness of red and white wine, a variable that is influenced by a combination of attention and emotions. It was expected that the effect of light and background colour will be possibly different for red wine vs. white wine so these types of wine were compared.

In table 32 an overview of the means of attractiveness of red wine for the different conditions is displayed.

Table 32: Attractiveness red wine

Light condition	Background	Mean	SD	N
No	Red	5.43	.91	21
Soft	Red	5.11	.62	21
Bright	Red	5.08	.77	21
No	Blue	5.01	.80	24
Soft	Blue	5.26	.73	28
Bright	Blue	5.22	.70	24

A between subjects test was conducted to test the effects of light, background colour and the interaction on attractiveness of red wine. The test shows for light values of $F(2,133) = .097$, $p = .908$, for background colour: $F(1,133) = .097$, $p = .756$ and for the interaction: $F(2,133) = 2.074$, $p = .130$. No significant different differences were found for the attractiveness of red wine. So the attractiveness of red wine does not differ significantly between the conditions. This implies that light, background colour and the interaction do not have an effect on the attractiveness of red wine.

In table 33 an overview of the means of attractiveness of white wine for the different conditions is displayed.

Table 33: Attractiveness white wine

Light condition	Background	Mean	SD	N
No	Red	4.92	1.14	21
Soft	Red	5.00	1.03	21
Bright	Red	5.25	.98	21
No	Blue	4.82	.97	24
Soft	Blue	5.36	.82	28
Bright	Blue	5.28	.70	24

A between subjects test was conducted to test the effects of light and background colour and the interaction on attractiveness of white wine.

For light $F(2,133)= 2.204$, $p=.114$, so this effect is not significantly different. Background colour has outcomes of $F(1,133)= .338$, $p= .562$. So background colour does not have an effect on the attractiveness of red wine. The values for the interaction are: $F(2,133)= .743$, $p= .478$. An interaction effect does not take place.

So no significant differences were found with this test, which means that the attractiveness of white wine does not differ significantly between the conditions. This implies that light, background colour and the interaction do not have an effect on the attractiveness of white wine.

5.6 Final outcomes

Finally it can be concluded that most hypotheses were not supported by the obtained data. Only results relevant for hypothesis 1, 2 and 4 were found. In table 34 an overview of all findings from this research is presented. Discussion of these results will take place in chapter 6.

Table 34: Overview final outcomes

		Light	Background colour	Interaction
Attention	Fixations			
	Dwell time			
	% Fixations organic wines			
	% Fixations organic vs. other wines and products	**		*
	Observed organic wines			†
	Recognition organic wine	**		
	% Recognition organic vs. other wines	**		*
Choice	Organic wine		† (blue)	
	Red wine			*
	White wine			*
Emotions	Pleasure	†		
	Arousal			
Attractiveness	Red wine			
	White wine			
Attention on choice		Choice		
	Fixations			
	Dwell time			
	% Recognition organic vs. other wines			
	Recognition organic wine	**		

**= $p<.01$
 *= $p<.05$
 †= $p>.1$
 No symbol = $p>.1$

Based on table 34 it can be concluded that for light four (marginally) significant effects were found, three for *attention* and one for *emotions*. Light increases the percentage of fixations on organic wines compared to other wines and other products. Moreover recognition of wines increases in total value and compared to other wines. Light has also an marginal effect on pleasure. Increased availability or availability of light decreases the perceived pleasure.

One effect for background colour was found: a blue background colour (vs. red) has an marginal effect on the *choice* of organic wines.

Five interaction effects were found. An interaction effect takes place for *attention* on the percentage of fixations on organic wines vs. other wines and products, the recognition of organic wines and a marginal interaction effect for the number of observed organic wines. Interaction effects for *choice* were found for red wine and white wine.

One effect of *attention on choice* was found: when the number of organic wines recognised well increased the choice for organic wines increased significantly.

6. Conclusion and discussion

6.1 Conclusion

The aim of this research was to identify the effectiveness of nudging with light and background colours on a product. The effectiveness of nudging is reached if the moderators light and background colour influence the mediator attention to find the predictors choice behaviour and pleasure and arousal. Effects that were expected for these predictors were partly found. Effects on non-expected variables that have a strong relationship with the predictors were also found. In this paragraph an answer to the main question 'What is the effectiveness of nudging with light and background colours in changing consumers' choice?' will be formulated.

6.1.1 Attention organic wine

No significant results were found for dwell time and fixations on the organic wines as absolute values, the number of observed organic wine and the percentage of fixations on organic wines vs. other wines.

However interpreting the results of the percentage of fixations on organic wines vs. all other products the effect of light on attention shows a significant difference for increased intensity of light. It is striking that the percentage of fixations on organic wines vs. other wines is not significantly different. The reason for this is that light extracts the attention from the other products. More promising results are that light intensity has an effect on the recognition of bottles of wine. If consumers watched a bottle of wine in a soft or a bright lighting condition, these bottles of organic wine were recognised more afterwards. This result is in congruence with the hypothesis about the influence of the intensity of light on attention. The increase of attention by the use of light was affected by tests on the percentage of fixations organic vs other wines and products, recognition organic vs other wines and recognition of organic wine. On the other tests no significant differences were found. This raises the question why recognition of organic wines is increased by light, but the attention in terms of fixations and dwell time does not increase. These results sound illogical, because a product needs to get attention from consumers to make it possible to become recognised. The difference can be explained by the fact that light does not influence the direct attention in fixations and dwell time but does influence the brain process in saving and recognising. Another possibility is that the area of the shelves that was lighted was only a quarter part of the total wine shelf space. This might be the main cause of the limited amount of results on fixations and dwell time. Interaction effects were found on the percentage of fixations on organic vs. other wines and products, observed organic wines and recognition of organic wines. The interaction effect on the percentage of fixations on organic vs other wines and products explains an increase in fixations with certain combinations of light and background colours. The ideal combination is a soft or bright light intensity in combination with a red background colour. The interaction effect on 'recognition of organic wines' results in exactly the same combinations of light and background colour as was found for the percentage of fixations on organic vs. other wines and products: soft or bright lighting combined with a red background colour. From these two interaction effects together can be concluded that a red background colour in combination with soft or bright lighting is most effective. For 'observed organic wine' a marginally significant interaction effect was found. Thus asking the question if the respondents saw the organic wine an effect results from the increased intensity of light in combination with a blue background colour. So for all three interaction effects a combination of bright light with a blue background colour is most effective.

6.1.2 Choice

For the component choice this study shows that organic wine was chosen more in the blue background condition compared to the red background colour. This result was marginally significantly different. It is interesting to find a reason for this effect. When making the relationship with the literature discussed about emotions there is a logical explanation. It is possible that a red background colour deterred the respondents from choosing bottles of organic wine compared to the blue background colour because the colour red scores high on arousal. However, there were no significant results found for the effect of a red background colour on arousal in this research. It is likely that this deterrent effect did not take place for the blue background colour, since this colour was expected to score high on pleasure and low on arousal. So the conclusion is that a blue background colour is most effective for the choice component of organic wine without any influence of light intensity.

For the choice of red wine a significant interaction effect was found. This effect was present for the combination of bright light with a red background colour. So bright light intensity with a red background colour is most effective to increase the choice behaviour of red wines.

For the choice of white wine a significant interaction effect was found as well. The effect took place in the bright lighting condition with a blue background colour.

So to increase the choice of organic (white) wine a blue background colour is most effective and for organic red wine a combination of bright lighting and a red background colour is most effective.

6.1.3 Attention and choice of organic wine

For the effect of attention on the choice of organic wines no significant results were found. This result was predictable since the results for fixations and dwell time were not significantly different as well. So it can be concluded that there is no direct influence of attention on the final choice of organic wines. For red and white wines no conclusions can be drawn since the attention of red and white wine was not measured. Combining the conclusions on attention and choice of organic wine light is very important for attention and less important for choice. It is difficult to give the most effective intensity of light and type of background colour since there is no optimal result.

For the effect of recognition on the choice of organic wines a significant result was found on the number of recognised organic wines. So recognition of organic wines increases the choice for organic wines. No significant effect was found for the percentage of recognition organic wines vs. other wines. The reason for this is that it is possible that respondents that chose organic wine recognised the organic wines better than the non-organic wines.

6.1.4 Emotions

Pleasure seems to be sensitive for an increased light intensity. A marginally significant difference was found for light, for background colour and the interaction no significant results were found. The bright lighting condition is most effective in a simulated retail environment. This is a confirmation that the bright light intensity level was not too high, because decreased pleasantness was not created which is possible according to literature (Quartier 2011). So bright lighting is effective to increase pleasure in a simulated retail environment.

For the effect of light and background colour on arousal no significant differences were found between the conditions. A reason for this can be that it was difficult to measure the perceived

arousal afterwards. From the questionnaire it was less clear for respondents how to describe their own state of arousal compared to pleasure.

6.1.5 Attractiveness of red/white wine

For the effect of light and background colour on attractiveness of red and white wine no significant differences were found between the conditions. Literature showed that light influences the attractiveness (Freyssinier et al. 2006, Park & Farr 2007). It is possible that the effect of light and background colours on attractiveness is not strong enough for this product category compared to other product categories. For bottles of wine no previous studies were conducted for attractiveness. However, by doing more research on the differences between product categories a conclusion can be given for the attractiveness of bottles of wine influenced by light and background colours.

6.1.6 Final conclusion

Taking all results together the following answers on the sub research questions were formulated. Attention is affected in number of fixations on the lighted bottles of wine compared to the other wines and products. Moreover the recognition increases for organic wines increased. Choice behaviour for organic wines increased with the presence of light in combination with a red background colour. Recognition of organic wine increased choice of organic wine as well. Pleasure was only marginally influenced by the use of a blue background colour. Arousal was not affected by light and background colours.

The use of different light intensities and background colours influences attention, recognition and choice behaviour for organic wines in a simulated retail environment. There is no overall optimal intensity of light, the presence of light is most important. Light is more important than background colour since there were no results for the effect of background colour on attention recognition and choice. A combination of light and background colour works well for attention, recognition and choice for attention and recognition only with a red background colour. So in this study presence of light and a combination of light and background colour are the most effective manipulations to nudge organic wine.

6.2 Practical Implications

Retailers are advised to assess the value of light and background colours in their shop. Light and a combination of light and background colours can increase the attention, recognition and choice behaviour for organic wines so retailers should take this opportunity to nudge their products. Light increases attention for products and extracts attention from other products. A retailer can make use of this effect of light in such a way that the important products or brands (i.e. A- brands, organic products) get more attention than other products. From the results on recognition can be advised that retailers should use light and background colours to increase recognition of products or brands by consumers. Consumers will recognise a product during their next visit or the image of a store will improve. The results on choice can be implemented in a retail environment by using a combination of bright light and a background colour. It is expected that a fitting background colour is dependent for every type of product, because already a difference was found between red and white wine. So an advice is to study the best fitting background colour for every product category. However, more research in a real life environment will result in more and better implications for retailers.

6.3 Theoretical Implications

The influence of the effect of light and background colours on products in the supermarket has not been researched extensively so far. Some results were in line with the hypotheses, especially attention and choice numbers increased for certain tests. However this research increased knowledge in a lot of aspects of nudging in a retail environment that have not been researched so far. For other researchers it is useful to know which aspects did create significant differences and which aspects did not. This research is a starting point for doing more research on this topic. There can be built on the written literature overview and the results to get more understanding on this topic.

6.4 Limitations and future research

Certain elements had an influence on this research. In this paragraph an elaboration about the aspects that influenced the research and implications for future research will be presented.

6.4.1 Participants

When looking to the demographics of the group of respondents the average age is low. This is likable since most of the respondents are students. This fact has a negative effect on the external validity of the research since general population of a Dutch supermarket has a higher average age. However the distribution of the respondents on experience with buying wine and organic products was spread between the conditions. Moreover the group of respondents is an important target group of supermarket retailers.

6.4.2 Manipulations

The fact that the amount of expected results found was limited can imply that the manipulations for light and background colour did not work sufficiently. However during the pilot study differences between the light intensities and background colours were clearly observed. Also the data of the lux levels imply that the differences between the conditions for light were present. There was some disturbance by the fluorescent lamps but differences between the light conditions were still sufficient.

The use of light was difficult to determine. There are no specific guidelines for the Correlated Colour Temperature. More research is necessary in the use of warm and cold light to determine which values fit best in a retail environment.

6.4.3 Bottles of wine

The product wine was chosen since previous research was conducted on wine with light. However a disadvantage is that red wine does not reflect light (Quartier 2013). Other products without a dark colour reflect light better and could be useful for future research with light. Moreover, it is doubtful if food products are best applicable in a study to the effect of light, since experts (Van Doorn and Quartier) expect more effects on other products like fashion or furniture. So these types of products are interesting to use in future research.

In this research the decision was made to use the already available bottles of red wine that were used in previous research and to buy the bottles of white wine based on price and availability to limit the costs of the research. For future research it can be helpful to coordinate the bottles of organic and non-organic even better. It is difficult to do this, however with a pre-test the composition of the bottles of wine can be set. The bottles of wine which score best in the pre-test can be used in the experiment.

6.4.4 Price

To keep the simulated supermarket as realistic as possible the choice was made to keep the real prices of the products. It is likable that when students behave as they do in a real retail environment, they will have a lot of attention to the price of products. This is supported by the often mentioned answer 'price' on the question: 'What was most striking during this research?' The implication of an effect was raised by this result. The implied effect became the truth, because for the bottles of wines the cheapest bottles of wine were taken most times (Appendix H). The organic wines sometimes were equally priced as some non-organic wines, but these were never the cheapest ones, especially the cheapest bottles of wine were taken most times. During the design of the experiment it was a trade-off to keep equal prices for all the bottles of wine or to adjust the prices. The choice was made to keep the real prices. The reason for this is that it preserves the imitation value of the simulated supermarket. So, it is likeable that a stronger effect of light and background colours would be found by equal prices for the lighted as well as the non-lighted bottles of wine.

6.4.5 Eye tracker device

Another effect that could have influenced the results is that during the experiment, respondents were obligated to wear the eye tracker glasses. The wire of these glasses to the accompanying laptop computer was just long enough to reach the whole area of products. However it is possible that respondents were somewhat disturbed by this short wire (looking to paragraph 5.1.2: 'striking elements by respondents'). The freedom of movement of the respondents was reduced, therefore participant were not able to see all shelf spaces in one view easily. However, the respondents were able to take all products from the shelves easily.

The eye-tracker equipment worked quite well, however there are some doubts about the reliability of this device. There were big differences between the amount of fixations of the respondents. This can be due to the technical capabilities of the equipment. It is possible that the eye tracker equipment was not always able to measure all the fixations of the eyes. Another striking element is that there are incentives that the exact place of the fixations did just differ a little bit from the real place of the fixation. For instance, when a respondent already finished choosing a package of juice, there were still some fixations on the upper side of these packages. It would be more logical that the fixations were just a little bit more higher, at the bottles of wine. These small deviations could have influenced the results. So therefore an advice for future research would be to use an improved version of the eye-tracker, without a wire for the glasses and with increased technical capabilities to measure the fixations of the eyes more precisely.

6.4.6 Measuring pleasure and arousal

The results on emotions were limited. It was expected that emotions would lead earlier to behaviour than mood and would therefore be more interesting to study. The measurement method of a questionnaire was used but there are better possibilities to measure emotional states with technological devices. For instance, for arousal it is possible to use a sensor to measure skin conductance. For future research these kind of tools are advised.

With the PAD-scale pleasure and arousal were measured. Dominance was not taken into account. In future research with an eye-tracker dominance is advised to measure since people do not always feel free during an eye-tracker measurement.

Since light and background colours influenced the cognitive part of the brain via recognition mood was possibly more interesting to measure than emotions. So an advice for future research is to

measure mood as well.

6.4.7 Realistic setting

The light setting was not exactly the same as in a real supermarket. During the design of the experiment a lot of attention was paid to the possible disturbance of the lamps of a realistic setting and the light intensity of the lamps. However, it was difficult to maintain the same light intensity level over the shelves from left to right. This was because of the fluorescent lamps on the ceiling of the room that were switched on at the right of the room. So the light intensity level at the right of the shelves was in general slightly higher than at the left of the shelves. This could have influenced the respondents, however, it is not likeable that this effect is very strong.

To build a simulated supermarket a small replaceable shelf space was used. According to the respondents the design looked realistic, however it is doubtful if consumers behave equal to that situation compared to a real environment. The design of the simulated supermarket was a limitation of the research. In a next research the environment should be even more realistic or should even be conducted in a real supermarket. In that situation consumers behave exactly the same as they would normally do, because their goal is to do their groceries and not to participate in a research and receive a present.

Comparing this research with the study of Areni & Kim (1994) the setting is different. A wine cellar creates an atmosphere that is not comparable with a supermarket. This research is more comparable with a real supermarket since other products were presented as well.

6.4.8 Shelf layout

The shelf layout was quite logically arranged. The most striking element according to the respondents was the distribution of red and white wine on two different shelf heights (Appendix E). Both types of wine were placed on the upper shelf and the upper middle shelf, whereas some respondents thought it would be more logically if all bottles of the same type of wine are on the same shelf height. Due to practical considerations (it was only possible to place the lamps on the upper shelf) it was not possible to do this. This aspect cannot be explained as a large limitation of the research but the shelf layout can have influenced the results. It is possible that when placing the bottles of wine on the lower shelves it would create a better result. It was striking that the respondents often looked down to their grocery list, so their eyes always passed the products on the lower shelves before they looked down to the list in their one of their hands. Also when placing a product in their shopping basket the respondents looked down and passed the lower shelves with their eyes. For future research it would be a good solution to use different formats of shelf layouts to make sure that the place of the products on the shelves does not create any difference between these conditions. For example, next to placing bottles of wine on the upper shelves also the lowest shelves should be studied. With these two situation an average can be calculated.

6.4.9 Final words

This research has contributed to the small available amount of knowledge about the effect of light and background colour on attention, choice behaviour and emotions. It will be very useful for the companies involved in the DONRO-project, but also for other companies that want to nudge their products with i.e. light or background colours. Moreover the research will increase the scientific knowledge in the field of nudging with light and background colours in a retail environment. Furthermore the research can be used as a guideline to set up a simulated supermarket environment.

There are differences between types of supermarkets. Especially for a high end supermarket lighting is important, so for these supermarkets it is advised to study lighting. For future research it is strongly recommended to set up a real life test to measure the effects in a real supermarket. Several limitations of this study will be avoided and the results will be directly applicable for the company itself.

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Appendix A: Detailed expert interviews (in Dutch)

Interview Mark van Doorn: Philips Retail Lighting

Eindhoven, 9 oktober, 10.00 uur.

Zou u iets over uw achtergrond kunnen vertellen?

Afgestudeerd in informatica, daarna ben ik gaan werken bij Philips research als onderzoeker. Ik heb eerst gekeken naar hoe internet en consumentenelektronica met elkaar konden samenwerken, met het zoeken in multimedia-archieven en dat soort dingen en later ben ik steeds meer naar onderzoek richting intelligente omgevingen in de context van retail gaan kijken. We hadden bijvoorbeeld een Shoplab, dat is een nagebootste winkel omgeving waarin onderzoekers allemaal experimenten konden doen. Nieuwe applicaties konden we gebruiken met zowel shoppers als retailers om te kijken welke concepten wel/niet werkten. Uit het onderzoek van Shoplab bleek dat van de bedachte concepten mensen altijd een combinatie van deze concepten wilden. Of er stond bijvoorbeeld vanuit het oogpunt van de retailer net niet in het concept wat zij interessant vonden. Daaruit is retail solutions als Business Unit bij Philips ontstaan. Het is bedoeld om interactieve en multi-zintuigelijke beleving voor winkels te creëren. Ik ben nu meer als customer experience consultant betrokken bij de retail solutions om merken en winkeliers te helpen met technologieën die ze kunnen toepassen in hun winkel om meer beleving te creëren.

Doet u dat op nationaal niveau of internationaal?

Op internationaal niveau. Er zijn best veel projecten in België bijvoorbeeld. Het is wel voornamelijk in Europa.

Heeft Philips vaste contacten met winkelketens op dit gebied?

We hebben inderdaad veel contacten met allerlei retailers, maar wat je ziet is dat die contacten vaak op inkoopniveau liggen. Voor onze oplossingen moet veel meer met marketing mensen in retail worden gepraat. Dus daar ligt af en toe wel een verschil.

Hoe lang bent u al werkzaam bij retail solutions?

Retail solutions bestaat nu ongeveer negen tot tien jaar. Ik ben bij de oprichting betrokken geweest. Het is een soort startup/venture binnen Philips. Nu begint deze startup steeds meer geïntegreerd te worden binnen Philips.

Bij welke projecten bent u op dit moment betrokken?

Dat zijn een aantal leuke projecten. Iets wat ik recent gedaan heb is een winkel voor Philips Lighting in België, een 'lightgallery' daar heb ik met mensen duidelijk proberen te krijgen wat licht met je kan doen. Hierin konden we zelf uitproberen hoe licht verandert en hoe je lichteffecten kunt creëren, geïnspireerd door wat je kunt uitproberen. Maar er is ook een applicatie ontwikkeld waarmee je bij wijze van spreken je eigen huiskamer kunt inladen. Zo kun je hierin lampen plaatsen in een virtuele omgeving en op die manier kun je zien wat voor effect deze hebben op de omgeving. Dit kan dan in de winkel gedaan worden samen met een lighting consultant en op die manier krijg je als consument een veel beter idee over wat licht voor jou thuis kan betekenen. Het is echt de beleving die hiermee sterk verbeterd wordt. Beleving is in onze ogen niet alleen iets leuks of attractiefs, het kan ook iets

educatief zijn dat veel dieper gaat. Bijvoorbeeld een lampje dat oplicht. Dat is wel belangrijk, want vaak wordt technologie ingezet door een designbureau als een soort 'gimmick', een soort sausje tegen de muur. Niet als een echt gain chain, een element dat echt fundamenteel beleving kan inzetten terwijl we dat wel allemaal kennen van online en mobiel, een manier waarop de winkel de norm heeft veranderd. Maar winkels zijn best traag in het implementeren van technologieën in instore omgevingen.

Is met name het entertainment dan belangrijk in winkels?

De rol van winkels gaat veranderen. Je hoeft niet meer naar de winkel te gaan om producten te kopen, je kunt thuis altijd en overal alles kopen wat je wil dus waarom zou je de moeite nog nemen om met de auto naar de stad te rijden en daar 10 euro voor parkeren te betalen en dan drukke winkelstraten doorlopen en geholpen worden door personeel wat eigenlijk weinig kennis heeft. Dus de winkeliers moeten daar echt meer in gaan investeren, om het weer leuk te maken om te gaan winkelen. Winkelen moet weer een sociale ontmoetingsplek worden waarin je nieuwe dingen kunt ontdekken en beleven. Mensen hebben ook steeds minder tijd. Die tijd willen ze zo goed mogelijk indelen. Dus ik denk dat er wel grote veranderingen gaan komen.

Wat denk u dat het belangrijkste nut is van licht in retailing als nudge?

Ik denk dat licht er is om aandacht te trekken op producten. Daar zie je dat als je bepaalde delen van een winkel donkerder of lichter maakt en je gaat daarmee spelen je de aandacht van mensen kunt sturen. Dynamische verlichting werkt soms zelfs beter omdat mensen erg gevoelig zijn voor veranderingen. Licht heeft bijvoorbeeld veel minder het nut om informatie te geven. Daarvoor wordt vooral beeld gebruikt.

Denkt u dat de bereidheid om te kopen zal toenemen als licht wordt gebruikt op een product?

Dat hangt van een heleboel dingen af. Er zijn wel studies bekend dat je met licht prijsperceptie kunt beïnvloeden. Als je een discount Aldi winkel hebt dan hoort daar een bepaalde beleving bij. Je kunt daar niet aankomen met luxe warme verlichting. Daar hoort een meer koude harde verlichting bij. Als je diezelfde verlichting zou gebruiken in een luxe winkel dan zou daar een disconnect optreden.

Licht in paskamers is ook een belangrijk deel van een winkel waar licht echt helpt. Want een paskamer is het laatste moment waarin mensen besluiten het product wel/niet te kopen dus daar moet je mensen niet meer verleiden om nog allerlei andere producten te gaan bekijken, maar meer het gevoel geven dat de keuze die ze gemaakt hebben goed is. De mood van het artikel moet passen bij de mood waarbij je het gaat dragen. Dit soort verlichting lijkt ook wel goed te werken. Dus een belangrijk nut van licht is ook wel om sfeer te bepalen.

Wordt er nog gebruik gemaakt van daglicht in retail?

Ja dat is ook wel heel belangrijk voor bijvoorbeeld meubels. Daar zien de kleuren er toch vaak heel anders uit als je het meubelstuk buiten zet. De rendering moet goed zijn. Dus verlichting is best wel iets belangrijks in retail, het is niet iets waar je zomaar overheen kunt stappen. Met name voor artikelen als meubels en kleding moet de kleurweergave echt goed zijn.

Wordt er ook nagedacht over emoties die licht opwekken bij consumenten?

Ja bijvoorbeeld in de paskamers kan licht helpen om in de juiste mood te komen. Ik denk bijvoorbeeld ook in binnensteden aan sfeerverlichting om events te ondersteunen. Of er is ook

looplicht om mensen harder te laten lopen, dus het is ook een manier om passagiersstromen te beïnvloeden. We hebben bijvoorbeeld bij Schiphol hiermee een winkel ontwikkeld. In een model kan ik laten zien hoe dat precies werkt. Mensen worden min of meer de winkel ingetrokken door het licht aan de zijkant van de winkel. In het midden van de winkel is een centraal punt dat mensen ook aantrekt, op deze plek werden typisch Nederlandse producten gepresenteerd met bijpassende muziek. Het moest een beetje het gevoel geven van een haven uit de 16^e eeuw. Het is heel multi zintuigelijk.

Wat denkt u dat het belangrijkste verschil is tussen licht in supermarkten en andere retail?

Ik denk dat supermarkten veel meer het principe van necessity shopping hanteren. Dus ik denk dat de verlichting daar minder voor sfeer is maar meer voor efficiency, zorgen dat de paden goed verlicht zijn, dat de verlichting energiezuinig is. In kleding is sfeercreatie veel belangrijker. Het belangrijkste verschil is dat supermarkten minder inspelen op emotie. Het ligt een beetje aan het soort supermarkt, een high-end supermarkt doet wel veel meer met sfeer. In Engeland heb je bijvoorbeeld een segment boven AH waarin licht wel beter tot zijn recht komt.

Kunt u zeggen hoe licht in zijn algemeenheid in supermarkten wordt toegepast? Ik zie bijvoorbeeld dat er steeds meer verlichting direct op de producten wordt gezet.

Klopt dat is iets wat supermarkten inderdaad ook doen. Wat ook kan is om lampen te maken die het groen van groenten of de versheid van vis extra verlichten. Zo kun je het gevoel creëren dat de vis verser lijkt en het brood wat warmer, net vers gebakken. Je moet hier wel mee uitkijken dat je mensen niet te veel voor de gek gaat houden.

Wat voor soort lampen worden er gebruikt in supermarkten?

CDM lampen, gasontladingslampen, worden nog heel veel gebruikt. Maar er is een overgang gaande naar steeds meer led-verlichting, want LED wordt ook steeds goedkoper, het heeft een veel lagere levensduur, en is ook dimbaar. Je kunt de omgeving veel beter veranderen met LED dan met halogeen. Er wordt nog niet zoveel gebruik gemaakt van het tunen van licht afhankelijk van het tijdstip van de dag.

Zijn jullie ook bezig om levendigheid en gezelligheid te creëren in supermarkten?

Ik denk dat het nog best wel tegenvalt. Als ik in Nederlandse supermarkten kijk dan zie ik daarmee niet veel gebeuren. Er worden af en toe wel producten uitgestald of er valt iets te proeven maar qua beleving vallen er nog wel wat stappen te zetten. De Nederlandse mentaliteit is vooral gericht op lage prijs en hoge kwaliteit.

Met betrekking tot soft en bright lighting, wat zou volgens u het beste werken in een supermarkt?

Dat zou ik niet durven zeggen aangezien het optimum ergens in het midden ligt en er nog veel andere factoren zijn die invloed hierop hebben.

Denkt u dat de achtergrondkleur bij bijvoorbeeld een product als wijn effect heeft op de consument?

Ik denk wel dat het effect heeft en helpt om sfeer te creëren. Ik denk dat het ook te weinig gedaan wordt. Ik denk echter dat supermarkten moeite hebben om de stap te nemen om dit te gaan uitproberen omdat ze bang zijn dat het niet voldoende op zal leveren.

Wat voor verlichting zou het meest passend zijn voor verschillende soorten wijn?

Koele witte verlichting zou bijvoorbeeld passend kunnen zijn voor witte wijn om de frisheid te benadrukken. Warmere verlichting zou passend zijn bij rode wijn. Maar het is gewoon interessant om dat soort dingen te testen. Het is ook belangrijk om de zintuigen op mekaar af te stemmen, dus passende muziek erbij zou ook werken. Je zou ook kunnen denken aan verlichting vanaf de onderkant. Dan heb je weer een heel ander effect dat heel verassend kan uitpakken.

Heeft u nog andere tips voor mijn onderzoek?

Voor het experiment zou ik standaardverlichting nemen maar je zou een beetje kunnen spelen met verschillende soorten licht, bijvoorbeeld warm en koud licht.

Hartelijk bedankt voor dit interview

Interview Katelijn Quartier: Universiteit Hasselt: Assistant Professor in Retail Design

Wageningen-Hasselt (Bel.) via Skype: 9 okt 15.00 uur

Opm: Eerste gedeelte moeilijk verstaanbaar door slechte verbinding.

Uw achtergrond

Zou u heel kort iets over uw achtergrond kunnen vertellen?

Ik ben begonnen als interieurarchitect. Daarna heb ik een opleiding gedaan in Rotterdam aan het Piet Zwart Instituut. Tussendoor heb ik gewerkt in de architectuur. En daarna heb ik mijn doctoraal gedaan in Hasselt richting licht. Op dit moment ben ik hier present en doe ik onderzoek. Betreffende mijn doctoraal ben ik heel breed begonnen. Daarna heb ik nagedacht hoe ik een experimenteel onderzoek zou kunnen opzetten. Dat is niet allemaal evident en best lastig om eruit te halen. Daarna ben ik me gaan focussen op verlichting als aspect van de hele omgeving. Dat heb ik allemaal uitgewerkt en ik heb een supermarkt nagebouwd waarin vier elementen zijn toegepast. Aan het eind heb ik experimenten in een echte supermarkt gedaan om te kijken of daar resultaten uit kwamen betreffende de verlichting.

Wat heeft u tot nu toe gedaan met betrekking tot licht in een retail omgeving?

Ik heb echt geprobeerd verschillende lichtsettings te maken, voor mij was het niet zozeer dat het bright of soft was. Ik heb de verlichting van een Aldi proberen na te bootsen, de verlichting van Carrefour en Delhaize (vergelijkbaar met Albert Heijn in Nederland). Ik heb ook gekeken naar verschillende soorten verlichting, koude en warme verlichting

Wat zijn de belangrijkste verschillen tussen product specifieke en atmosferische verlichting?

Dat is een heel ander uitgangspunt. Het is erg moeilijk te vergelijken zoals je hebt kunnen lezen in mijn doctoraalschrift.

Waar zit op dit moment voor u het grootste 'knowledgegap' in de literatuur met betrekking tot licht in een retail omgeving?

Er is weinig bekend over de invloed van licht op imago. Ook zijn er amper richtlijnen die zeggen: bekijk het op die manier of kijk naar de warme tinten of juist de koude tinten. Blijkbaar ontstaat dit resultaat zelden. Zelf heb ik ook geen specifieke richtlijnen gevonden.

Emoties

Wat zijn de belangrijkste emoties die worden opgewekt door licht?

Plezier zit er wel in en verbondenheid met mekaar.

U heeft het aspect 'dominance' ook meegenomen in het emotion experiment in het doctoraalschrift, in hoeverre denkt u dat dit aspect van invloed is op consumenten?

We wilden dominance gewoon meten en dan zouden we kijken of we het wel of niet zouden gebruiken. Bovendien is het zo dat de arousal dimensie ook niet volledig consistent is dus ook daar kunnen vraagtekens bij gezet worden.

Dus pleasure is de meest geschikte emotie met betrekking tot licht?

Ja, dat klopt.

In uw onderzoek in 2009 heeft u gezegd dat licht niet de verwachte kracht had om consumenten te beïnvloeden. Toch heeft u hier in 2011 een doctoraalschrift over geschreven, bent u hierna tot een ander inzicht gekomen?

Op dat moment kun je al niet meer terug als je besluit om iets met verlichting te gaan doen dan moet je ook verder. Maar geen resultaat is ook een resultaat. Het is weliswaar moeilijker te publiceren in wetenschappelijke tijdschriften maar dit soort resultaten zijn ook gewoon waardevol. Wij kunnen dan bijvoorbeeld tegen fabrikanten zeggen dat ze geen verlichting moeten kopen maar zich eerder richten op imago. *Verbinding valt weg...* Je moet het dus niet op koopgedrag benadrukken maar op imago. In mijn vervolgonderzoek zal ik veel meer kijken naar customer loyalty.

Maar dan is het echt op supermarkten gericht.

Ja maar ik denk dat je bijvoorbeeld op fashion je nog veel sterkere resultaten kunt krijgen, of andere winkels met functionelere producten.

Intensiteit van licht

In hoeverre speelt de intensiteit van licht een rol in het keuzeproces van de consument?

Bij Carrefour was de meeste lichtintensiteit, wat daar uitkwam was dat mensen daar het minst lang binnen bleven. Dat is het enige wat we daarin gevonden hebben.

In hoeverre zijn 'koel en bright' en 'warm en soft' licht met elkaar te vergelijken?

Niet. Koele verlichting is de Kelvin, of het licht koud of warm is. Bright and soft is de lichtintensiteit, hoe fel of zacht het licht is, in lux. Je moet er wel op letten dat je de lux op je product altijd moet meten. Dat je niet een groot verschil tussen licht en donker hebt.

Hoe zou ik dat kunnen meten?

Er zijn nu lux metertjes, kleine apparaatjes die niet zo duur zijn. Als je die op de hoogte van je product zet meten die hoeveel lux en Kelvin er is en dan krijg je een resultaat.

Is het handig om in het experiment één van de twee of beide (dus bright en soft en koud en warm) te meten?

Dat hangt ervan af wat je wilt gaan onderzoeken dus het zou in principe allebei kunnen.

Mijn experiment

De voorlopige opzet van het experiment bevat de onafhankelijke variabelen geen, koel, bright (5000K) en warm, soft (3000K) licht en 2 verschillende achtergrond kleuren (rood, grijs?). Hiermee ga ik mijn hypotheses testen. Biologische wijn wordt geprobeerd om te nudgen met licht.

Wat voor effect zal koel licht hebben op biologische wijn?

Wijn is niet het meest voor de hand liggende product. Als je kijkt naar het onderzoek van Areni en

Kim dan komt daar eigenlijk weinig uit. Terwijl als je kijkt naar het onderzoek naar Summers en Hebert dan werkt het in een fashion store beter. Ook ik vind in mijn onderzoek niets bij wijn. Ik weet niet of dit de meest slimme keuze is.

Zou u nog andere suggesties hebben voor producten?

Ik heb alleen maar resultaten gevonden bij verse producten zoals groente en fruit. Het probleem met wijn is ook, het zijn glazen flessen en licht heeft daar niet zoveel impact op, eigenlijk alleen op de witte etiketten. Op bijvoorbeeld een volledig wit flesje als shampoo daar heeft licht veel meer impact op.

Zou er geen verschil bestaan in impact op witte en rode wijn?

Hangt een beetje van het type fles af denk ik, als er maar een heel klein etiketje op de fles zit ga je niet veel vinden want zwart reflecteert het licht niet. Als je een fles hebt met een groot etiket dan zal er wel wat gebeuren.

Denkt u dat verschillende achtergrondkleuren passend kunnen zijn bij een product als wijn?

Ik denk dat je daar zelfs nog meer uit kunt halen.

Welke kleuren zou ik het best tegen mekaar afzetten?

Wat wil je bereiken, dat het product meer verkocht wordt, of wil je dat de prijsperceptie hoger wordt?

Vooraf meer attention krijgen wat leidt tot een hogere willingness to buy.

Rood/oranje en dan ergens in het donkerblauwe gebied, het luxueuze blauw.

Heeft u ook onderzoeken gevonden richting attention?

Alleen die in mijn doctoraalschrift staan.

Zou attractiveness binnen pleasure en arousal kunnen vallen?

Attractiveness valt totaal buiten pleasure en arousal maar moet je ook zeker meenemen in je experiment door er enkele vragen over te stellen.

Pleasureable heeft een retailer in principe weinig aan. Dus daarom is die attractiveness erg belangrijk om mee te nemen in je onderzoek.

Wat heeft volgens u de meeste invloed op het koopgedrag, welke emoties?

Eerder de aantrekkelijkheid van het product, dan het gevoel dat je erbij krijgt. Het valt een beetje samen maar als je iets al niet aantrekkelijk vindt zul je het al niet pakken, terwijl ik me bij bepaalde producten wel goed kan voelen zonder dat ik het wil kopen.

Valt aantrekkelijkheid van het product op te splitsen in bepaalde aspecten?

Ik zou het gewoon rechtstreeks vragen in je vragenlijst, 'vind u het product aantrekkelijk?'

In de vragenlijst voor de respondenten zat ik ook te denken om de verschillende aspecten van pleasure en arousal aan bod te laten komen uit uw doctoraalschrift. Heeft u tips?

Ik zou gewoon de tool gebruiken die ik ook in mijn doctoraalschrift heb gebruikt, dit is gewoon een standaard, pleasure en arousal wordt op deze manier gemeten.

Overige vragen

Wat zijn op dit moment de nieuwste inzichten (wellicht nog niet gepubliceerd) mbt licht in een retail environment?

Ik ben nog wel met iets bezig maar daar zitten niet veel nieuwe inzichten in. Daar heb je dus niets aan.

Zou u andere personen weten die ik zou kunnen interviewen?

Malaika Brengman van de universiteit van Brussel is iemand die je nog zou kunnen interviewen. In Gent zitten nog ingenieurs maar die zijn heel technisch ingesteld.

Hartelijk dank voor dit interview

Appendix B: Flyer experiment (in Dutch)

Doe mee met een winkelonderzoek!

In de kelder op de Leeuwenborch vindt een onderzoek plaats naar productkeuze.

Je kunt meedoen van 18 nov. t/m 22 nov. van 10.00 tot 17.00 uur.

Het onderzoek duurt maximaal 10 minuten.

De beloning is een product naar keuze: bijv. Venco drop, 5-pack Mars, speculaasbrokken of chocoladeletter!



Appendix C: Consent form and Questionnaire (in Dutch)

Instructieformulier

Welkom bij het onderzoek naar productkeuze.

Je hebt nog enkele producten nodig voor een feestje dat je gaat geven. Je hebt alleen nog enkele soorten drank nodig, de rest heb je al in huis. Je kiest zo direct vier producten uit een winkelschap. Hiervoor krijg je een bril op waarmee je oogbewegingen kunnen worden gemeten. Deze worden gevolgd met infrarood licht. Deze metingen zijn volkomen ongevaarlijk, je zult er niets van merken. Als je kleurenblindheid hebt geef dit dan door aan de begeleider.

Je pakt het winkelmandje en je zet de gekozen producten in het mandje. Gedraag je zoals in een echte supermarkt.

Dit is je boodschappenlijst:

- 1 pak sap
- 1 doosje thee (de doosjes zijn leeg)
- 1 fles witte wijn
- 1 fles rode wijn

Zodra je de producten hebt uitgekozen en in het mandje hebt geplaatst geef je het gevulde mandje aan de begeleider van het onderzoek en kun je de bril afzetten. Hierna vul je een korte vragenlijst in achter de computer en krijg je je beloning.

Veel plezier!

- Je kunt je op elk moment tijdens het onderzoek terugtrekken van deelname zonder verdere gevolgen.
- Deelname duurt ongeveer 10 minuten en je krijgt een product naar keuze als compensatie.
- Het onderzoek is in het kader van het DONRO-project en wordt tevens gebruikt voor academische doeleinden, anonimiteit wordt gegarandeerd.
- Het afronden van het onderzoek en ondertekenen van de deelnamelijst wordt beschouwd als toestemming voor deelname in dit onderzoek.
- Als je vragen hebt over dit onderzoek kunt je deze stellen aan de begeleider in de zaal, of contact opnemen met Daniëlla Stijnen (FBR-CSIS).

Onderzoek naar productkeuze

Respondentnummer (in te vullen door onderzoeksleider)

...

Welkom bij deze vragenlijst. Vul alle vragen volledig en naar waarheid in, er zijn geen goede of foute antwoorden. Als je klaar bent mag je je beloning uitkiezen. Succes!

Hoe omschrijf je je gevoel op het moment dat je bij het schap stond?

(in parentheses component number (A=Arousal, P= pleasure))

ontspannen	1-2-3-4-5-6-7	gestimuleerd	(A1)
wanhopig	1-2-3-4-5-6-7	hoopvol	(P1)
ongelukkig	1-2-3-4-5-6-7	gelukkig	(P2)
niet geprikkeld	1-2-3-4-5-6-7	geprikkeld	(A2)
slaperig	1-2-3-4-5-6-7	wakker	(A3)
verveeld	1-2-3-4-5-6-7	ontspannen	(P3)
ontevreden	1-2-3-4-5-6-7	tevreden	(P4)
loom	1-2-3-4-5-6-7	uitzinnig	(A4)
rustig	1-2-3-4-5-6-7	opgewonden	(A5)
geërgerd	1-2-3-4-5-6-7	prettig	(P5)
bedrukt	1-2-3-4-5-6-7	aangenaam	(P6)
futloos	1-2-3-4-5-6-7	zenuwachtig	(A6)

Wat is er tijdens dit onderzoek opgevallen?

Noem zoveel mogelijk wat direct in je opkomt

...

Hoe aantrekkelijk vond je jouw gekozen rode wijn?

Helemaal niet aantrekkelijk	1-2-3-4-5-6-7	Heel aantrekkelijk	(1)
Helemaal niet mooi	1-2-3-4-5-6-7	Heel mooi	(2)
Zag er helemaal niet goed uit	1-2-3-4-5-6-7	Zag er heel goed uit	(3)

Hoe aantrekkelijk vond je jouw gekozen witte wijn?

Helemaal niet aantrekkelijk	1-2-3-4-5-6-7	Heel aantrekkelijk	(1)
Helemaal niet mooi	1-2-3-4-5-6-7	Heel mooi	(2)
Zag er helemaal niet goed uit	1-2-3-4-5-6-7	Zag er heel goed uit	(3)

Koop je wel eens wijn in de winkel (dus niet in de horeca)?

Nooit	Min. 1x per jaar	Min. 1x per half jaar	Min. 1x per kwartaal
Min. 1x per maand	Min. 1x per 2 weken	Min. 1x per week	

Heb je biologische wijn gezien?

Ja/Nee/Weet ik niet

Vind je het belangrijk dat een product biologisch is?

Helemaal niet belangrijk 1-2-3-4-5-6-7 Heel belangrijk (1)

Koop je vaak biologische producten?

Nooit Min. 1x per jaar Min. 1x per half jaar Min. 1x per kwartaal
Min. 1x per maand Min. 1x per 2 weken Min. 1x per week

Ik vind biologische producten interessant (2)

Helemaal mee oneens 1-2-3-4-5-6-7 Helemaal mee eens

Biologische producten zijn voor mij aansprekend (3)

Helemaal mee oneens 1-2-3-4-5-6-7 Helemaal mee eens

Biologische producten zijn voor mij boeiend (4)

Helemaal mee oneens 1-2-3-4-5-6-7 Helemaal mee eens

Heb je onderstaande wijn gezien? (16x in random volgorde)

Ja/Nee/Weet ik niet

Wat is je geslacht?

Man/Vrouw

Welke studie doe je op dit moment?

...

Wat is je leeftijd?

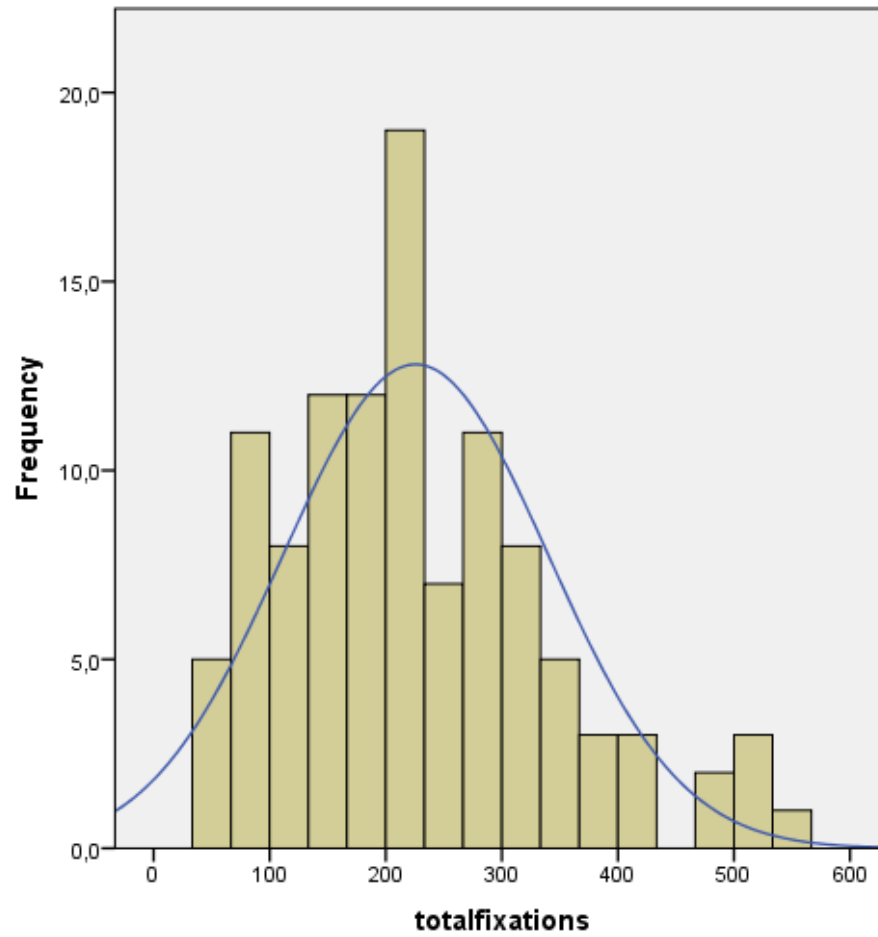
...

Dit was het einde van de vragenlijst, je kunt nu je handtekening zetten en je beloning ophalen.

Bedankt voor je deelname!

Wil je op de hoogte gehouden worden van meer onderzoeken met betrekking tot Marktkunde en Consumentengedrag, schrijf je e-mailadres dan op het daarvoor bestemde formulier.

Appendix D: Distribution of number of fixations



On the X-axis the number of respondents is mentioned, on the Y-axis the number of fixations is mentioned.

Appendix E: Striking elements in experiment by respondents

Element	Choice	Sorting wine	Price	one tea-brand	Eye-tracker glasses	Description wine	A-brands
# mentioned	31	24	20	17	16	14	12

Lot of choice in wine	Organic/ non-organic	Sorted	Juice and tea more easy to choose than wine	Same price for tea	Realistic setting	Price differences for wines	No private label
12	11	11	11	10	8	6	6

Variation in tastes	Different brands	One shelf (no real supermarket)	Different prices	Lot of colours	Short wire of eye tracker glasses	Fair trade juice	Didn't look for prices
6	5	5	5	4	4	4	4

Same brands for juices	More packages of tea of one kind	Prices equal	Sizes of juices different	Tea on lowest shelf	Wine not sorted on type	Wines origin and type not sorted	Full shelves
4	3	3	3	3	3	2	2

More wine than juices	Origin	Liked the glasses	Wine on eye-level	Price labels not realistic	Recognisable products	Clear instructions	Looked at taste
2	2	2	2	2	2	2	2

Choice in tea	No differences between products	Background colour blue	Not my favourite juice	No mixed tea	Red point on wall	Price labels printed lighter	Looked at shape of bottles
2	2	2	2	2	1	1	1

Type of tea	Influenced by what you know	Grocery list not logical	Old shopping basket	Limited choice	Faster decision than normally	Action label on tea	Looked at package
1	1	1	1	1	1	1	1

Reward	Not sorted on price	Equal products	Juice sorted on type	Silence	Real products	Price labels not consistent	Dutch products/ brands
1	1	1	1	1	1	1	1

Fair trade more expensive	Wine immediately striking	Lot of products	Choice stress	Same brands next to each other for juices	Prices clearly	Expensive wine on upper shelf	Beautiful
1	1	1	1	1	1	1	1

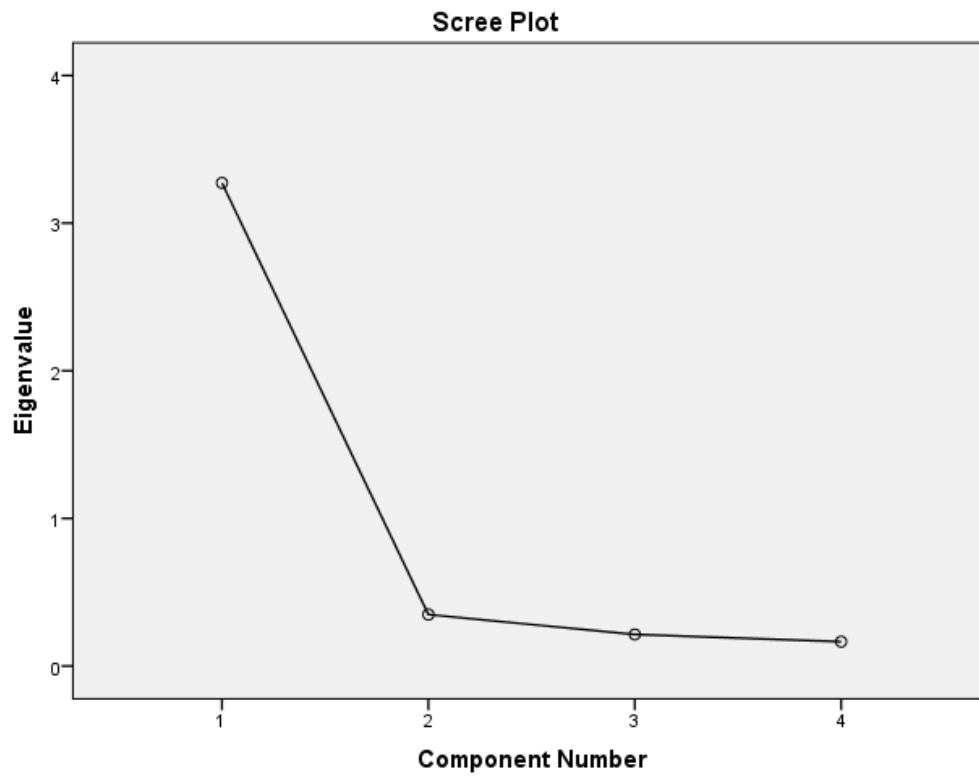
No fresh tea	No bottles of juice	Big price differences for white wine instead of red	Lot of red wines	Fair trade on the left	Juices sorted on price and brand	Variation in prices	Sizes
1	1	1	1	1	1	1	1

Upper row not seen	No familiar wines	Reason of going to shop	Appelsientje lowest price	My favourite tea	Empty boxes for tea	Variation in tastes of wine	Realistic price labels
1	1	1	1	1	1	1	1

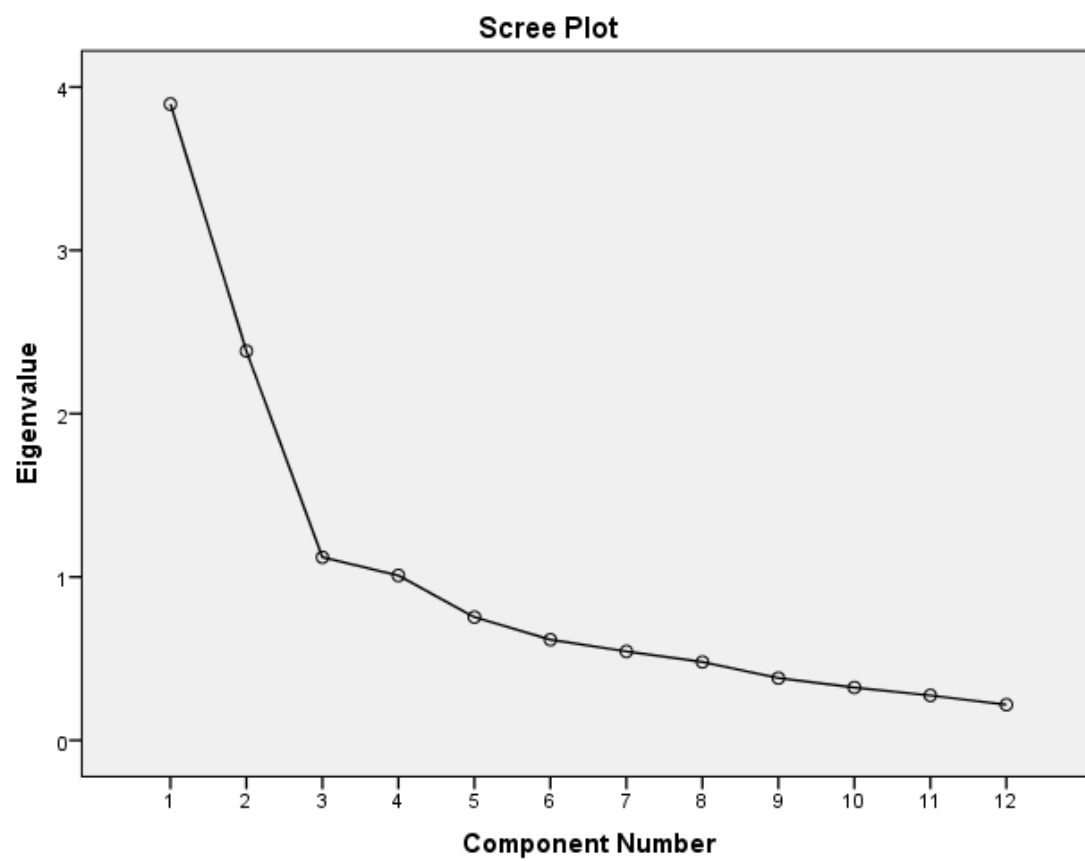
No pressure	Lot of choice in orange juice	Only one product of each type	No clear instruction	Chardonnay recognised	Nice product labels	Different brands for wine
1	1	1	1	1	1	1

Appendix F: Factor Analysis

Involvement organic products



Pleasure and arousal



Pattern Matrix

Component		1	2
ontspannen	gestimuleerd	-.378	.420
niet geprikkeld	geprikkeld	-.005	.626
slaperig	wakker	.520	.529
loom	uitzinnig	.321	.712
rustig	opgewonden	-.215	.660
futloos	zenuwachtig	-.171	.696
wanhopig	hoopvol	.651	-.160
ongelukkig	gelukkig	.750	-.044
verveeld	ontspannen	.720	.165
ontevreden	tevreden	.710	.195
geërgerd	prettig	.794	-.169
bedrukt	aangenaam	.779	-.187

Extraction Method: Principal Component Analysis

Rotation Method: Oblimin with Kaiser Normalization

Rotation converged in 17 iterations

Structure Matrix

Component		1	2
ontspannen	gestimuleerd	-.405	.445
niet geprikkeld	geprikkeld	-.046	.626
slaperig	wakker	.485	.495
loom	uitzinnig	.274	.691
rustig	opgewonden	-.258	.674
futloos	zenuwachtig	-.217	.708
wanhopig	hoopvol	.661	-.202
ongelukkig	gelukkig	.753	-.093
verveeld	ontspannen	.709	.118
ontevreden	tevreden	.697	.149
geërgerd	prettig	.805	-.221
bedrukt	aangenaam	.791	-.238

Extraction Method: Principal Component Analysis

Rotation Method: Oblimin with Kaiser Normalization

In the pattern and structure matrix the first six components belong to arousal, the next six components belong to pleasure.

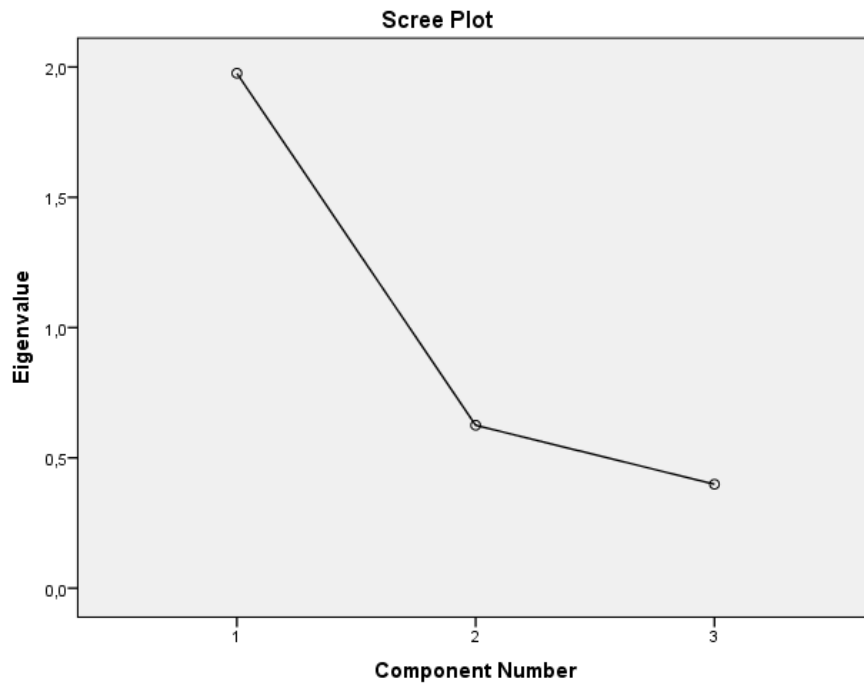
Component correlation matrix

Component	1	2
1	1	-.065
2	-.065	1

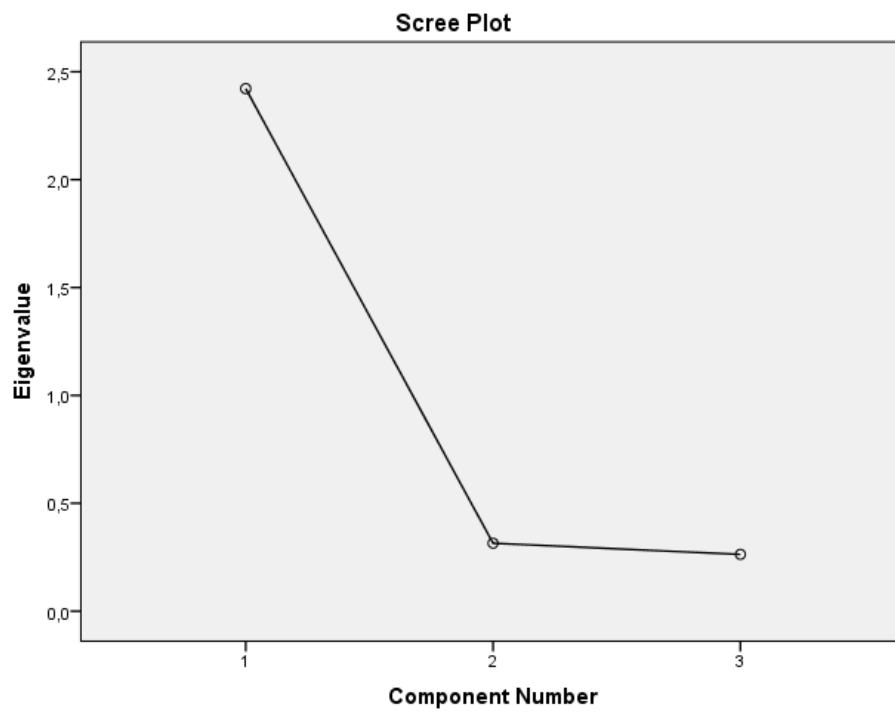
Extraction Method: Principal Component Analysis

Rotation Method: Oblimin with Kaiser Normalization

Attractiveness red wine



Attractiveness white wine



Appendix G: Chosen wines and prices

22 out of 32 bottles of wines is above a price of 4 Euros. This means: 10 bottles of wines had a price below 4 Euros. From this small amount of bottles (31.3%) most bottles were chosen (60.4%).

Wines below 4 Euros	price	# chosen
White		
Mooi Fonteyn Steen	2.99	12
Hardys	3.49	27
Volupta	3.99	11
Die Kroon	2.99	17
Red		
Cape Cab	3.99	13
Santa Carolina	3.99	23
African Treasure	3.99	16
Undurraga	3.99	6
Bordeaux (organic)	3.99	17
Temprano de Chile	3.99	26
Total		168

Wines above 4 Euros	price	# chosen
White		
Panul Chardonnay(organic)	5.75	2
La natura (organic)	6.85	4
Kroon van Oranje Chardonnay	4.99	7
Nugan Chardonnay	5.49	6
Oveja Negra Chardonnay-Viognier	5.99	6
Montenay Chardonnay	5.99	7
Chilensis Chardonnay	4.99	7
Kumala Colombard-Chardonnay	4.99	6
Jaja de Jau Sauvignon Blanc	4.99	11
Inycon Organic Grillo (organic)	6.99	1
Nuevo Mundo (organic)	6.99	12
Collecion Especial	4.99	3
Red		
Domaine Saint-Jean	4.49	2
Cono Sur	5.99	3
Villa Marianna	5.49	5
Colombella salento	5.49	2
Cono Sur (Cabernet Sauvignon) (organic)	5.99	3
Saint Roche (organic)	4.49	6
Château Coulon (organic)	4.99	2
Sicilia Nero d' Avola	5.49	6
Cata Rosa	4.99	6
Vistana	5.99	3
Total		110