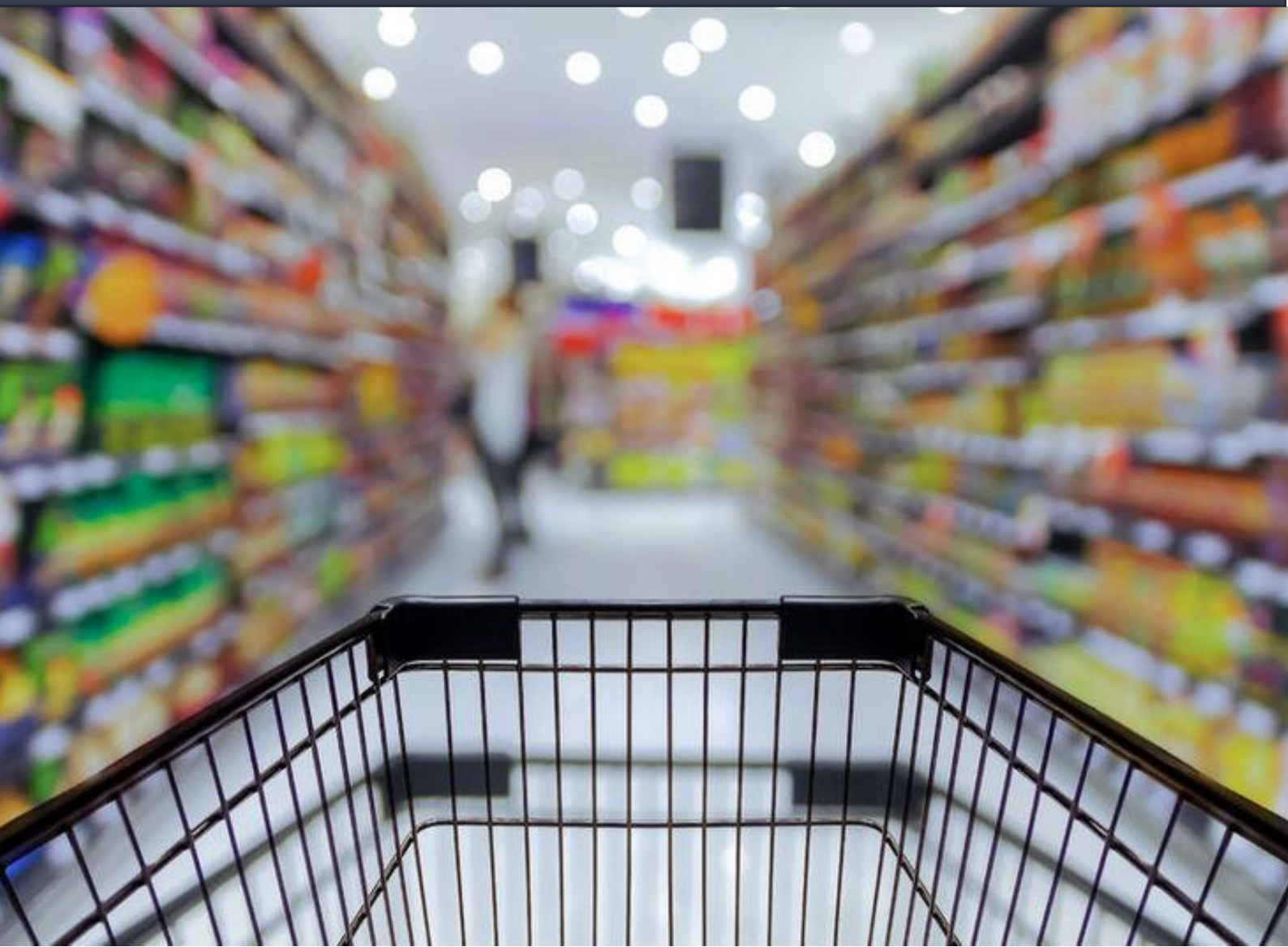
WAGENINGEN
UNIVERSITY & RESEARCH

Where can I find the cheese?

*Consumers' cognitive, emotional and beha*vioural responses towards varying degrees *of spatial freedom in a supermarket environment*



Student	Gaia Dione Postma
Student number	940618667040
Study programme	MSc. Management, Economics & Consumer studies
Specialisation	Consumer Behaviour
Course code	
Chair group	Marketing & Consumer Behaviour Group
Supervisor	Dr. Erica van Herpen
2nd reader	Prof. Dr. Ir. Hans van Trijp
Date	July 5th, 2019

WAGENINGEN
UNIVERSITY & RESEARCH

Preface

Before you is the end product of my research for my master thesis as final part of the Master programme Management, Economics and Consumer studies at Wageningen University and Research. It is titled 'Where is the cheese?' and looks into consumers' emotional, cognitive and behavioural responses towards different degrees of spatial freedom in a supermarket environment.

Before starting with this master programme at WUR, I completed a bachelor in hospitality management in Maastricht. Consumer experience was a common thread running through the educational programme. To deepen my understanding of consumer experiences, especially in the light of more sustainable practices, I enrolled for this master. Consumers experience is also a re-occurring theme in this thesis and is analysed with academic understanding of existing literature on consumer behaviour and related fields of science.

The psychological reasoning and specifically the emotional and cognitive systems that work together resulting in consumer behaviour was very interesting to me. And although this is a small piece of the big puzzle of consumer behaviour, I feel proud that I was able to contribute to expanding the academic knowledge in this field just a little.

To be able to do so, I owe a big thanks to Dr. Erica van Herpen for guiding me throughout the entire process and giving me the right tools to dig a little deeper and giving useful feedback. Also, I would like to thank my study partner Evie Roos for our close partnership and the fun moments we've had. I also want to thank Prof. Dr. Ir. Hans van Trijp for being my second reader and the constructive feedback you have given. And lastly, I would like to thank Ellen Vossen for helping Evie and me with all the necessities for conducting our research.

Enjoy reading my thesis, it is my proudest academic achievement.

Gaia Postma
Wageningen, July 2019

Abstract

In the current economy where retailers face growing competitiveness, managing productivity and efficiency have become of greater importance (Sellers-Rubio & Mas-Ruiz, 2006). Consumers sometimes experience shopping as a frustrating experience and therefore chose to shop online, increasing the pressure on traditional retailers (Taylor, 2018; Vogel, 2018). The layout of a store can help consumers guide through the store and orientate better, while also expose them to the product offering (Levy et al., 2012; van Rompay et al. 2012). Using the appraisal theory, this research looks into the cognitive and emotional response that lead to specific consumer behaviour in a supermarket environment (Johnson & Stewart, 2005). In the experiment the layout of the store was manipulated by varying in degrees of spatial freedom using VR technology. In this research spatial freedom refers to the extent to which consumer have the choice to move freely in a store environment without any obstruction from the layout that could limit them in reaching their goals. As for the cognitive response this research specifically looks into expected shopping efficiency and perceived control. Following, for the emotional response this research included the emotions of satisfaction and frustration as positive and negative affects towards the shopping environment. Store satisfaction and repatronage intentions are the two forms of behavioural response measured in this research. Also, consumers' ability to form cognitive maps based on the store layout and perceived efficiency was measured.

All in all, the manipulation with three types of store layouts to represent spatial freedom was not proven successful, yet some effects of spatial freedom were found. The cognitive responses in the framework did have the expected effects on the emotional responses. In turn, the results indicated that the expectations for effects of the emotion of satisfaction on the two forms of consumer behaviour could be supported. Yet for the emotion of frustration only the effect on store satisfaction was proven. As for the types of consumer behaviours, results confirmed the positive effect of store satisfaction on re-patronage intention. The expected role of cognitive mapping ability in this framework was not supported by the results.

Keywords: Consumer behaviour, store layout, appraisal theory, cognitive and emotional responses, perceived control, consumer emotions, expected shopping efficiency, cognitive mapping ability, store satisfaction, repatronage intentions.

Table of content

1. Introduction

That traditional brick and mortar stores are losing sales to online stores is not a new phenomenon. According to research in the U.S., 74% of consumers indicated that convenience - including easy product search - was a main reason for shifting to online grocery shopping (Vogel, 2018). This trend is also seen in Europe, where in the U.K. 20% of consumers was frustrated with not being able to see all the stock in retail stores in contrast to online stores (Taylor, 2018). Overall, 72% of British consumers indicated that they viewed shopping as a frustrating experience, this being more so for traditional stores than for online channels (Taylor, 2018). So how can retailers of traditional stores make consumers' shopping experiences more enjoyable?

In the current economy with growing (international) competitiveness, retailers are challenged to retain a profitable business and as a result managing productivity and efficiency has become of greater importance (Sellers-Rubio & Mas-Ruiz, 2006). For a retailer many factors need to be balanced, for example balancing extensive product offering and store crowding or optimizing shopping efficiency and elongation of consumers' shopping trips for higher expenditures. Finding the optimal line between commercial goals and consumer satisfaction can be difficult to find.

When consumers are walking through a store, the efficiency of how they can move and navigate through a shopping environment is an important factor (Frumkin, 2016). A carefully designed store layout creates a flow which guides consumers through the shopping areas to view a wide variety of the assortment and includes the placing of tangible and spatial design factors, such as racks and product displays (Levy et al., 2012; van Rompay et al. 2012). The layout of a store influences efficient movement through a store, product search, and shopping time (Cil, 2012).

You can probably imagine the frustration of not being able to walk through a store as you please, because of clutter or inefficient walking paths. Such obstructions could influence consumers' feeling of control in a shopping environment. Providing consumers with more or less control in the form of choice options, e.g. of how to move through a store, can increase their perception of overall control and can influence emotional affect towards the shopping environment (Hui & Bateson, 1991).

Spatial freedom refers to the extent to which consumer have the choice to move freely in a store environment without any obstruction from the layout that could limit them in reaching their goals. Goals in a supermarket will mainly have a utilitarian nature, such as getting all the groceries to do able to cook dinner. Changing the layout or design factors of a store, such as aisles or shelves, to in- or decrease consumers' spatial freedom can impact consumers' in store experiences, e.g. wide aisles was found to give consumers the feeling of more freedom to walk through the store (Lee et al., 2011). Gaining more knowledge on the effect of store layout on consumers' in-store experiences can help retailers find a better balance between profit and consumer experience.

Such effects of layout are looked into in this research by developing three types of store layouts for a supermarket varying in degree of spatial freedom. Special attention is paid to consumers' feeling of perceived control and their expected shopping efficiency. Currently, most of the research in this domains focusses on emotions and behaviour in a shopping environment, yet as indicated by the appraisal theory, emotions alone cannot fully explain behaviour and the cognitive part might be equally important (Johnson & Stewart, 2005). By using the appraisal theory, both cognitive and emotional responses to these environments are explored. The emotions of satisfaction and frustration are used as indicators for positive and negative affects towards the shopping environments. Previous

research shows that positive affect, e.g. the feeling of satisfaction, positively influences consumers' store satisfaction (Bloemer & Odekerken-Schröder, 2002). This research will further look at store satisfaction, along with repatronage intention and consumers' cognitive mapping abilities as forms of consumer behaviour. A complete cognitive map of a store is a result of clear store layout and might influence consumer satisfaction with the store (Downs & Stea, 1977; Frumkin, 2016).

Moreover, a frequently mentioned limitation in researching consumer behaviour in a retail setting, by using for example surveys or laboratory settings, is the limited external validity due to difficulties in the recreation of a realistic shopping environment (Ploydanai et al., 2017). This can be overcome by using virtual reality (VR) simulations, allowing for a realistic 3D and flexible store simulations while also being cost effective (Ploydanai et al., 2017). This research makes use of this technology by immersing respondents into a realistically recreated shopping environment.

All in all, the aim of this research is to gain more insight into the effect of spatial freedom in a retail situation on both cognitive (in the form of perceived control and efficiency) and emotional (in the form of the emotions satisfaction or frustration) responses. Ultimately, these responses are expected to have an influence on consumers' ability to form cognitive maps, their overall store satisfaction and their repatronage intentions. This research contributes academically by expanding the current knowledge on the effects of store layout on consumer behaviour. Moreover, the results of this study can offer retailers more practical implications for future store and layout design, which can contribute to their overall store performance. And hopefully this can contribute to a decrease in felt frustration of consumers in traditional stores. In order to do so, the following research questions have been developed;

How does the degree of spatial freedom in a supermarket influence consumer behaviour with regard to both cognitive and emotional responses to the shopping environment?

- *How does the degree of spatial freedom influence expected shopping efficiency and perceived control?*
- *How do perceived control and expected shopping efficiency influence consumer emotions?*
- *What are the behavioural responses based on the emotional and cognitive responses to the degree of spatial freedom in a supermarket environment?*

The following chapter will give a more elaborate description of the relevant aspects of this research based on existing literature. In the third chapter the methodology for the experiment and plan of analysis will be given. The fourth chapter will show the results and analysis of the conducted experiment. Lastly, the discussion includes conclusions and recommendations for future research.

2. Theoretical framework

In any (retail) environment people use cues from the environment to perceive and process the information that the environment gives them, a term for these cues are environmental stimuli (Mehrabian & Russell, 1974; Donovan & Rossiter, 1982). Based on the environmental stimuli people can form emotional and/or cognitive responses, though the exact order of these responses is still under debate in current literature (Mehrabian & Russel, 1974; Lin, 2004). Based on their emotions and/or cognitive evaluation people behave in certain ways, which in behavioural psychology can be expressed in terms of approach or avoidance behaviour (Mehrabian & Russel, 1974). The structure of this chapter is based on this process, starting with environmental stimuli followed by cognitive and emotional responses and lastly, consumer behaviour. The end of this chapter shows the conceptual framework developed for this research based on the discussed literature.

2.1 Environmental stimuli from the store layout

In a store environment consumers receive cues from the many aspects of the layout of a store. Store layout includes the placing of tangible and spatial design factors, such as racks, shelves and product displays, in a store environment (van Rompay et al. 2012). In current literature a distinction is made between three types of store layouts namely; grid, free from and racetrack (Levy et al., 2012). A grid layout can be described as having straight, long aisles with multiple shelves placed parallel to each other, forming a structured pattern (Alawadhi & Yoon, 2016; van Herpen, 2016). This type of layout is commonly used in grocery and convenience stores, because it facilitates routine and planned shopping behaviour and it can offer many products per square meter (Alawadhi & Yoon, 2016; van Herpen, 2016; Vrechopoulos et al., 2004). A free form layout is usually more playful, asymmetric, with multiple shapes and heights of shelves (Lee et al., 2011; van Herpen, 2016). This type of store layout is more stimulating and entertaining and can push hedonic shoppers to browse and easily reach targeted products (van Herpen, 2016; Alawadhi & Yoon, 2016). Similar to the grid layout, this type of layout is used in grocery and convenience stores (van Herpen, 2016). The third type of store layout is the racetrack layout, which consists of having one main path that leads consumers through the store and with product groups on the sides of the track separating different departments (van Herpen, 2016). This type of store layout is commonly used in department stores. Since the focus of this research is on a supermarket environment, only the grid and free form layout were further incorporated into this research.

For consumers, a simple pattern such as seen in a grid layout, requires less effort, is easier to walk through and can increase product search abilities (Titus & Everett, 1995; Levi et al., 2012). Yet, although it increases shopping efficiency, the simple grid layout might not be stimulating enough and can be perceived as boring (Titus & Everett, 1995; Machleit & Eroglu, 2000). A more complex layout such as the free form, that is more exciting or stimulating because of the variation in stimuli, might be more enjoyable for consumers (Levi et al., 2012). Also, the free form layout allows consumers to browse more and walk through the store more freely (Alawadhi & Yoon, 2016; van Herpen, 2016). A layout is viewed as more successful when the concept is clear, consumers can easily find things and don't get lost, and departments are clearly separated (Bost, 1987).

2.1.1 Spatial freedom

In a supermarket environment the consumer goals will generally have a utilitarian nature, e.g. getting all the ingredients for tonight's dinner. And the shopping trip in most cases will not be done purely based on pleasure, which is a hedonic motivation. In a retail environment, consumers walk through the store to find desired products preferably using the least amount of steps or in the most efficient way (Cil, 2012; Larson et al., 2005). With regards to their in-store movements, consumers tend to walk

counter clockwise with attention mostly directed to the walls, and they avoid turns or any forms of diversion of the desired direction (Spies et al., 1997). The layout of a store can help or hinder them in this process, by varying in degree of spatial freedom. Spatial freedom is related to spatial density and spatial control. Whereas spatial density refers to the tangible design factors such as the sizes and placements of racks, product displays, or the width of aisles and heights of ceilings (van Rompay et al., 2008). Spatial control refers to the extent to which consumers in retail context are able to engage in, or bring to completion, actions required to fulfil their goals (van Rompay et al., 2012).

In this research spatial freedom refers to the extent to which consumer have the choice to move freely in a store environment without any obstruction from the layout that could limit them in reaching their goals. Especially when consumers are task oriented (which is the case when doing groceries in most cases), free movement and overview were found to be important determinants in goal attainment (van Rompay et al., 2012). For example, a research by van Rompay et al. showed that physically obstructing consumers, by placing a pillar in the middle of the aisle, reduced the feeling of spatial control which in turn reduced shopping pleasure (2008). Creating a more open environment gives consumers the freedom to choose their own routes in a store to find desired products in the most efficient way to reach their shopping goals. Several aspects of a store layout can be manipulated to increase/decrease spatial freedom, e.g. the width of aisles was found to give consumers the feeling of more freedom to walk through the store (Machleit et al., 2000; Lee et al., 2011). Yet increasing spatial freedom might lead to more complex shopping environments with higher levels of arousal, e.g. as seen in a free from layout. Previous research indicated that high arousal of a store environment has a negative effect on the pleasantness and in turn shopping intentions for consumers with utilitarian/task orientated shopping motivations (Kaltcheva & Weitz, 2006).

To further investigate spatial freedom in a store layout and its influence on consumer perception and behaviour, three shopping environments are created to represent different degrees of spatial freedom. Figure 1. illustrates the how consumers' spatial freedom can be increased by shortening the aisles in a grid layout or using a free from layout. In the table points A and B are used to indicated movement from one point in a store to another. The 'long aisles'-grid layout limits consumers in their movement, since they are unable to take short cuts. In order to get from point A to B consumers have to walk through an entire aisle to get to the next. In the 'short aisles'-grid layout, short cuts are created. This allows consumers to have more freedom in choosing their own route to get from point A to B. The free form layout, represents a store layout where spatial freedom is greatest. Since movement is least limited, many routes can be taken and making turns can be avoided.

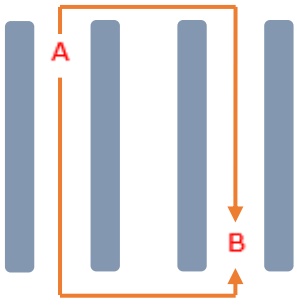
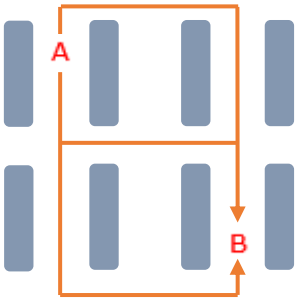
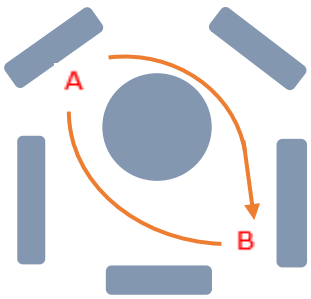
		
'Long aisles'-grid layout	**'Short aisles'-grid layout**	**Free form layout**
Lowest level of spatial freedom	Middle level of spatial freedom	Highest level of spatial freedom

Table 1. Spatial freedom in store layouts

2.2 Cognitive and emotional responses

Based on the stimuli consumers perceive from a store environment consumers, consciously and/or unconsciously, form cognitive and/or emotional responses. According to the appraisal theory emotions are elicited by appraisals of life events or situations in relation to a person's goals, needs and concerns (Scherer et al., 2001). It is a multistage process that is built up of the antecedents of the appraisal process, the process of appraising personally relevant information, and the consequences of appraisal and emotions (Johnson & Stewart, 2005). The appraising of a situation is done based on six distinct appraisal dimensions. The appraisal dimensions are; certainty, normative/moral compatibility, direction of goal congruence, agency, goal importance and degree of (expected) goal congruence (Johnson & Stewart, 2005). Based on a combination of these appraisal dimensions an emotional response can occur.

As for the goals in a supermarket environment, it can be assumed that most consumers in a supermarket shop with utilitarian or task orientated shopping goals in mind. Utilitarian shopping goals are related to the consumption of products in an efficient and timely way with the least amount of irritation (Babin et al., 1994). In contrast, consumers can also go shopping for entertainment, enjoyment or just for the experience which is commonly referred to as hedonic shopping motives (Babin et al., 1994).

Figure 1. shows a conceptual model of the relation between environmental stimuli, cognitive and emotional responses, and behavioural responses. This model is used as a basis for the conceptual model for this research. Although the exact order of responses to an environment is still under debate, this research follows the line of the Johnson and Stewart paper and starts with cognitive responses as antecedents to the process of appraising which in turn will lead to emotional responses (2005).

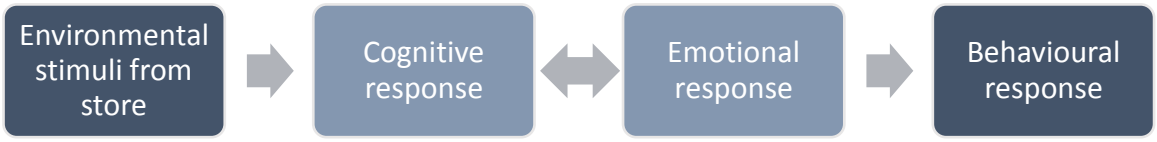


Figure 1. Conceptual model stimuli, response, behaviour

2.2.1 Cognitive response

The cognitive part of the appraisal theories includes the knowledge, the perception of personally relevant information (the antecedents of process of appraising). Individuals in any situation each have their personal views based on their own experience, knowledge, expectations or goals, and this colours their perception. Since these are antecedents to the appraising process, each individual might have different information available to appraise a situation on, which can result in different individual interpretations and felt emotions in the same situation (Johnson & Stewart, 2005).

In a supermarket environment most consumers shop to buy necessary products, thus with an utilitarian shopping motivation. Such utilitarian-orientated consumers, desire to shop as efficiently as possible to reach their shopping goals without any obstruction (Lunardo & Mbengue, 2009; Larson et al., 2005). They preferably choose a shop that facilitates them in reaching their goals, thus with an efficient layout (Lunardo & Mbengue, 2009). To be able to shop efficiently and to deal with a store environment, consumers in a supermarket may desire control in the shopping environment (Lunardo & Mbengue, 2009). Therefore the constructs of expected shopping efficiency and perceived control are considered cognitive responses to the shopping environment in this research.

2.2.1.1 Perceived control

Retail environments, more specifically supermarket environment, can influence feelings of control by helping or hindering consumers in reaching their shopping goals (Ward & Barnes, 2001; van Rompay et al., 2008). Control can be defined as the need to be master over one's environment (Dion, 2004; Hui & Bateson, 1991; Langer & Saegart, 1977; White, 1959). In Western societies having choice is also seen as a form of mastery and control over one's environment (Levav & Zhu, 2009; Snibbe and Markus 2005; Stephens et al., 2007). Control can be divided into three types; behavioural control, decisional control, and cognitive control, and all three are involved in a consumers' overall perception of control (Hui & Tiffoli, 2002; Langer, 1983). Behavioural controls refers to the ability of a person to respond in such a way that they can influence the outcome of an event. Decisional control is considered to be the extent of choice on means and goals in a given situation. Lastly, cognitive control can be explained in terms of the amount of available information a person has in order to perceive a situation as favourable, whereas less information was linked to less favourable perceptions of control (Hui & Tiffoli, 2002).

Spatial freedom in a shopping environment is mainly related to behavioural and decisional control, since it gives consumers the choice and behavioural ability to choose their own path and to reach their shopping goals. Based on the stimuli of the environment consumers receive information, this can differ per type of layout since in some there is more or less stimuli than in others.

A grid layout with long aisles can limit consumers in their movement and could therefore influence their perception of control negatively. On the other hand, the level of arousal is also generally lower, which can contribute to consumers perception of control. Yet, it is expected that from the three types of layout, the 'long aisles'-grid layout influences perceived control least.

H1a; Perceived control will be lowest with a 'long aisles'- grid layout.

In the 'short aisles'-grid layout the amount of environmental stimuli consumers have to deal with is still expected to be controllable, and by creating shortcuts consumers' freedom in choosing their own shopping route increases. Therefore, it is expected that the 'short aisles'-grid layout positively influences perceived control. From the three types of layouts, it is expected that the 'short aisles'-grid layout will influence perceived control to a higher degree than the 'long aisles'-grid layout but to a lower degree than the free form layout.

H1b; Perceived control will be second highest with a 'short aisles'- grid layout.

Lastly, the free-from layout represents the highest degree of spatial freedom, allowing consumer much choice in determining their own routs. Yet this type of layout generally is perceived as more complex, although a supermarket probably won't lead to extreme high or complex environmental stimuli. Therefore, it still is expected that this layout influences perceived control to the largest extent of the three types of layouts.

H1c; Perceived control will be highest with a free form layout.

2.2.1.2 Expected shopping efficiency

As mentioned at the beginning of the cognitive response paragraph, when consumers are shopping, especially with utilitarian shopping goals in mind, they preferably walk in the most efficient way and in a flow towards the checkout (Lunardo & Mbengue, 2009; Larson et al., 2005). The layout of a store can help or hinder consumers in their shopping process and is likely to give consumers impressions on how efficient they are able to move through a store.

Many aisles can result in a high 'aisleness' of a store, which means that a large percentage of a store is taken up by products, product displays and/or service counters. When this is the case in a store, consumers need more time to spend money, to reach products and thus waste parts of their shopping time to reach desired products (Sorensen, 2009). Which is thus very inefficient for shopping.

An important factor to expected shopping efficiency is consumers ability to orientate themselves in a store, since orientation contributes to consumers' ability to navigate through a store (Frumkin, 2016). Stimuli or information from the store environment can help consumers better understand or orientate where they are where they can find desired products, and therefore be less confused of the spatial distribution of available goods in a store (Grossbart & Rammohan, 1981). Being able to understand where you are and how you can walk to get all the items on your shopping list can contribute to walking efficiently through a store. Signage at every aisle and floorplans can help consumers, yet these are not visible from every location.

For consumers, a simple pattern such as seen in a grid layout, requires less effort, is easier to walk through and can increase product search abilities (Titus & Everett, 1995; Levi et al., 2012). Therefore it is expected that both the 'long aisles'-grid layout as the 'short aisles'-grid layout positively relate to expected shopping efficiency. Since the 'short aisles'- grid layout allows consumers to take short cuts and walking through a store environment more easily compared to with a 'long aisles'- grid layout, it is expected that expected shopping efficiency will be greatest with the 'short aisles'- grid layout.

> *H2a; A 'long aisles'-grid layout leads to the second highest degree of expected shopping efficiency.*
>
> *H2b; A 'short aisles'-grid layout leads to the highest degree of expected shopping efficiency.*

The free from layout represents the highest degree of spatial freedom, but might be perceived as less efficient due to higher complexity of the layout (Levi et al., 2012). Since consumers in a supermarket will mostly have utilitarian shopping goals, a layout that facilitates browsing more than it facilitates efficiency will probably be perceived as inefficient. Therefore it is expected that the free form layout will be perceived by consumers' as least efficient.

> *H2c; A free form layout leads to the lowest degree of expected shopping efficiency.*

2.2.2 Emotional response

Next to a cognitive response to a shopping environment, which are the antecedents of the appraisal process, an emotional reaction can occur (Johnson & Stewart, 2005). The appraising, or the interpretation of information and the inference of meaning and implications of a situation and associated elements is done on the basis of the six distinct dimensions (in bolt) shown in Table 2. (Johnson & Stewart, 2005). Based on the combination of cognitive appraisal of the situation an emotional reaction can occur, also referred to as discrete emotion. Table 2. also shows an overview of examples of the related discrete emotions based on the combination of the six appraisal dimensions (Johnson & Stewart, 2005).

Agency	Goal congruency				Normative/ moral compatibility
	Positive		Negative		
	Certainty				
	Certain	Uncertain	Certain	Uncertain	
Moderate intensity					
Self	Proud	Hope	Guilt, shame	Anxiety	Relevant
	Happy	Hope	Distress	Anxiety	Irrelevant
Other person	Admiration	Hope	Contempt	Anxiety	Relevant
	Pleased	Hope	Anger	Anxiety	Irrelevant
Object or circumstance	Satisfied	Hope	Disappointment	Anxiety	Relevant
	Pleased	Hope	Sad	Anxiety	Irrelevant
Indeterminate or irrelevant	Glad	Hope	Pity	Anxiety	Relevant
	Happy	Hope	Sad	Anxiety	Irrelevant
High intensity					
Self	Proud	Anticipatory	Humiliated	Afraid	Relevant
	Joyous	Excited	Depressed	Afraid	Irrelevant
Other person	Love	Anticipatory	Disgust	Afraid	Relevant
	Love	Excited	Enraged	Afraid	Irrelevant
Object or circumstance	Delighted	Anticipatory	Frustrated	Afraid	Relevant
	Delighted	Excited	Miserable	Afraid	Irrelevant
Indeterminate or irrelevant	Delighted	Anticipatory	Commiserate	Afraid	Relevant
	Joyous	Excited	Miserable	Afraid	Irrelevant

Table 2. Appraisal combinations

The emotions in Table 2. are not all empirically proven and are for illustrative purposes, therefore there might be other emotions that can be experienced with a certain appraisal combination or in a certain context. Additionally, the intensity (moderate vs. high) is a reflection of goal importance and congruence. Thus when goal importance is high and the situation diverges from the expectation emotions in the high intensity section can be experienced (Johnson & Stewart, 2005).

Based on the type of environment used in this research (supermarket) and the two cognitive responses to the varying degree of spatial freedom, two discrete emotions are expected; satisfaction and frustration. Why these two emotions are expected as a result of a combination of the appraisal dimensions is further explained in the following section.

2.2.2.1 Satisfaction and frustration

Based on a combination of the six appraisal dimension the emotion of satisfaction and frustration were expected. Meeting an utilitarian goal is expected to gives rise to lower levels of arousal than meeting hedonic expectations (Chitturi et al., 2008). On the other hand, not meeting utilitarian expectations evokes more intense negative emotions (e.g. anger) than not meeting hedonic expectations which leads to mare moderate negative emotions (e.g. disappointment) (Chitturi et al., 2008). Doing the groceries is for most consumers a means to an end, e.g. to be able to make dinner at home, and therefore related to utilitarian shopping goals.

This utilitarian shopping goal is thus related to goal intensity, but also to the appraisal dimensions of goal congruence and goal certainty. In a shopping environment being able (or not) to reach desired products positively (or negatively) influence goal congruency. Whether it is certain or uncertain that a goal can be achieved within a supermarket is usually quit certain, since the product is available or not. In the supermarket environment the object to which the emotion is targeted is the supermarket, more specifically in this research the degree of spatial freedom of the store layout, thus object or circumstances. Since the supermarket is a social environment, normative/moral compatibility is relevant. Thus based on this combination of the appraisal dimension the emotions of satisfaction when goal congruency is positive, and frustration when goal congruency is negative.

Having more control over an environment was found to result in positive psychological and behavioural outcomes, such as increased pleasure with increased control (Hui & Bateson, 1991; Wortman, 1975). This, in combination with consumers' utilitarian shopping goals in a supermarket, could indicate that when consumers feel as if they have control over an environment during their shopping trip, this will give rise to the moderate emotion of satisfaction. While the feeling of no control gives rise to the negative and more intense emotion of frustration. Based on these findings the following hypothesis have been developed;

H3a; Perception of control positively relates to the feeling of satisfaction.

H3b; Perception of control negatively relates to the feeling of frustration.

Since consumers desire to walk through a store as efficient as possible, any obstruction in doing so might be followed with negative affect (Larson et al., 2005; Babin et al., 1994). In the same manner, being able to walk as efficient as possible might be attributed with positive affect. When the store is expected to be efficient for shopping this might lead to more moderate feelings and more intense feelings when the store is expected not to be efficient for shopping, since efficiency possibly facilitates or hinders consumers goal achievement. Also, low efficiency of a store was found to lead to more time of consumers wasted, e.g. by unnecessary extra steps to reach products (Sorensen, 2009). Therefore, it is expected that expected shopping efficiency positively relates to the feeling of satisfaction (moderate emotion) and negatively to the feeling of frustration (intense emotion). To test this the following two hypothesis are incorporated;

H4a; Expected shopping efficiency positively relates to the feeling of satisfaction.

H4b; Expected shopping efficiency negatively relates to the feeling of frustration.

2.3 Consumer behaviour

Lastly, consumers' cognitive and emotional responses to environmental stimuli influences consumer behaviour. Previous research in this field has already established the relations between stimuli, emotions and consumer behaviours, and that affect is an important determinant of approach-avoidance behaviour in a store (Donovan & Rossiter, 1982; Baker et al., 1992; Mehrabian & Russel,

1974). For example, when consumers are experiencing more arousal and pleasure, they were found to generally spent more time in a shopping environment and were more likely to buy products, then were people experiencing negative emotions (Donovan & Rossiter, 1982; Babin & Darden, 1995). Since there are many types of approach-avoidance behaviours, this research looks into only two; store satisfaction and repatronage intentions. Next to the two approach-avoidance behaviours, consumers' cognitive ability in relation to expected shopping efficiency is also looked into.

2.3.1 Cognitive mapping

The layout of a store affects people wayfinding and orientation in a store, and to not get lost people need to be able to create a cognitive map of their surroundings (Frumkin, 2016). A cognitive map is mental representation of one's surrounding (Frumkin, 2016). The formation of these maps are seen as a mental process in which information from the spatial environment are turned into simplified mental images (Downs & Stea, 1977; Grossbart & Rammohan, 1981).

Simple pattern or shapes, such as seen in a grid layout, can facilitate consumers in forming a cognitive map (Frumkin, 2016). According to research by Lynch consumers use the paths, nodes, districts, edges and landmarks in an environment to form cognitive maps (1960). Being able to make a cognitive representation of a store can help consumers in navigating through a store and can make them feel comfortable and less stressed when navigating through a novel store environment (Frumkin, 2016). From these mental images, consumers may also form inferences about the store (Grossbart & Rammohan, 1981). Very complex shopping environments might decrease consumers' ability to formulate a cognitive map and remembering the environment correctly, and therefore could increase the chance of making mistakes when forming their cognitive maps. Experience or familiarity with an environment influences a persons' ability to form cognitive maps of an environment, e.g. when a person is familiar in an environment they can remember the environment more easily and thus are more able to form cognitive maps correctly then persons who are not familiar in the environment (Tversky, 1981).

Orientation, wayfinding in a supermarket environment, as part of expected shopping efficiency, can contribute to consumers' understanding of where they are and the spatial distribution of goods in a store, due to the environmental cues consumers perceive (Grossbart & Rammohan, 1981). Also it is expected that simple layouts, such as the two types of grid layout, are perceived as more efficiency, and therefore also facilitate consumers cognitive mapping ability (Frumkin, 2016). It is assumed that expected shopping efficiency positively influences cognitive mapping ability. Moreover, in the research by Grossbart and Rammohan a positive relation between convenience of a downtown environment and mapping abilities were found (1981). To find whether such links exist between expected shopping efficiency and cognitive mapping abilities in a supermarket environment, the following hypothesis has been developed;

H5; Higher expected shopping efficiency leads to higher consumer cognitive mapping ability.

2.3.2 Store satisfaction and repatronage intentions

Positive and negative affect might influence consumers' satisfaction with a store. Consumers' store satisfaction is a subjective evaluation of whether the store meets or exceeds consumer expectations (Bloemer & De Ruyter, 1998). Positive affect towards a store was found to be an antecedent of store satisfaction (Bloemer & Odekerken-Schröder, 2002). Thus, when a consumer feels satisfied with the shopping environment he/she is likely to also evaluate the store as more satisfying.

Similarly, associations were found with positive or negative affective reactions and repatronage intentions, as part of approach-avoidance behaviour (Donovan & Rossiter, 1982). Therefore it is

expected that the emotions a person experiences also influence repatronage intentions. Thus for example, when a consumer is experiencing a positive emotion such as satisfaction he/she is more likely to be willing to return to the store then when they experience a negative emotion such as frustration.

To test whether positive or negative affect has effects on consumers' store satisfaction and (re)patronage intentions, the following hypothesis have been developed;

H6a; Higher feelings of satisfaction lead to higher store satisfaction.

H6b; Higher feelings of satisfaction lead to higher re-patronage intentions.

On the contrary;

H7a; Higher feelings of frustration lead to lower store satisfaction.

H7b; Higher feelings of frustration lead to lower re-patronage intentions.

Lastly, the construct of satisfaction was found to influence repatronage intentions in a restaurant setting, but this might also hold for a store setting (Yap & Kew, 2007). Thus it might be likely that when a consumer is satisfied with a store they are more likely to show repatronage intentions. To test this relationship in a shopping environment the following hypothesis was incorporated;

H8; Higher store satisfaction leads to higher repatronage intentions.

With regard to consumers' cognitive mapping ability, research in discount stores showed that the more consumers were able to form correct maps, the more positive their approach behaviours (Groeppel-Klein & Bartmann, 2009). This might indicate that there could be a positive relation between consumers' cognitive mapping ability of a store environment and their store satisfaction. A complete cognitive map of a store is a result of clear store layout and might influence consumer satisfaction with the store (Downs & Stea, 1977; Frumkin, 2016). Since people form inferences based on the cognitive maps they are able to make (Grossbart & Rammohan, 1981), being able to make a clear cognitive map may lead to more positive inferences than being less able to make a clear cognitive map. Therefore, it can be expected that there might be a positive relation between cognitive mapping ability and store satisfaction.

H9; Higher ability to form a cognitive map leads to higher store satisfaction.

2.4 Conceptual framework

Combining the discussed literature and developed hypotheses, the conceptual framework shown in Figure 2. was developed. This framework follows the line of the conceptual model in Figure 1, starting from environmental stimuli to cognitive and emotional responses to ultimately consumer behaviour.

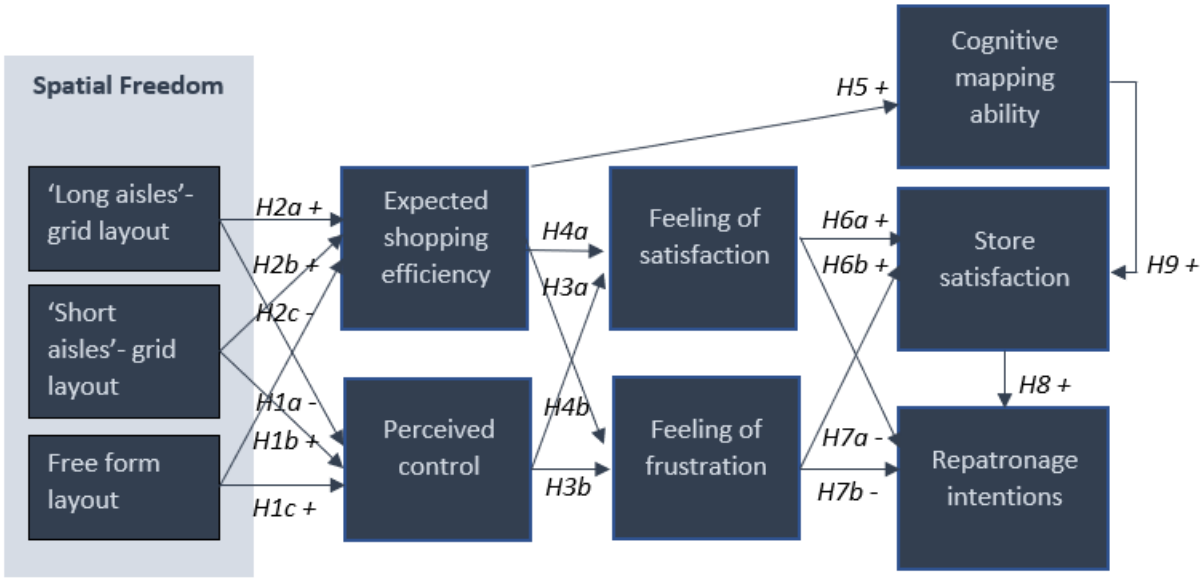


Figure 2. Conceptual framework

3. Research design

This research investigated both cognitive and emotional responses in relation to the degree of spatial freedom in a supermarket environment and consumer behaviour in term of satisfaction, (re)patronage intention, and floor coverage. In a VR simulation three shopping situations varying in degree of spatial freedom were developed to test the hypotheses of the conceptual framework.

3.1 Participants

Using a convenience sampling method, students were approached for participation using flyers and the researchers' personal network. Also, a snowball effect for gathering more respondents was created by actively asking respondents to tell their networks about this experiment. Small chocolate bars were used as incentive for participation.

For this research, 138 native Dutch university students of Wageningen University & Research in The Netherlands served as subjects. Only native Dutch students were allowed to participate to minimize any cultural differences with regard to spatial freedom. All respondents were between the age of 18 and 36 with an average age of 21.22 years old. Of the 138 respondents, 47 (34.1%) were male and 91 (64,9%) were female. There was an equal number of respondents in each treatment level, 46 respondents per type of store layout. There was no significant variation of age and gender between the three groups, indicating that randomization was successful. An overview of the division of age and gender per group can be found in Appendix VI.I.

3.2 Design

For the experiment a 3 groups between-subjects design was used, with three treatment levels/simulations varying in degree of spatial freedom, as shown in table 4. Using a between-subject design, participants were randomly allocated to one of the three conditions (Greenwald, 1976). Although the three situations were reasonably similar, the influence of multiple experiences of simulations, as with a within subjects design, was deemed to effect the cognitive mapping exercise to such an extent results would become unclear. By choosing a between-subject design this possibility of carry-over effects was limited (Greenwald, 1976). For statistical precision with a between-subjects design more respondents were needed than compared to a within-subject design (Keren & Raaijmakers, 1988; Erlebacher, 1977), but attaining enough respondents was not seen as a problem at the university.

The three treatment levels in this research are presented to the participants using an immersive virtual reality (VR) technique to realistically recreate an actual supermarket environment. The use of VR as a research tool receives increasingly more attention in the field of consumer behaviour and has also been applied multiple times in relation to food shopping or supermarket environments (e.g. Waterlander et al., 2012; Massara et al., 2010; Kim et al., 2014). In comparison to the use of pictures (2D), VR environments (3D) improve the representation of an actual store and are able to better represent physical in-store behaviour of consumers (van Herpen et al., 2016). VR simulations are an affordable and flexible solution for a realistic recreation of shopping environments and can increase the external validity due to the controllability of external variables (Ploydanai et al., 2017; van Herpen et al., 2016). For these reasons, this research used VR as a research tool to look at consumer responses and behaviour in a supermarket environment. The VR simulations including the paths through the store were created using VR-Deck software. Appendix 1 gives an overview of the five VR pictures used in this research per store environment.

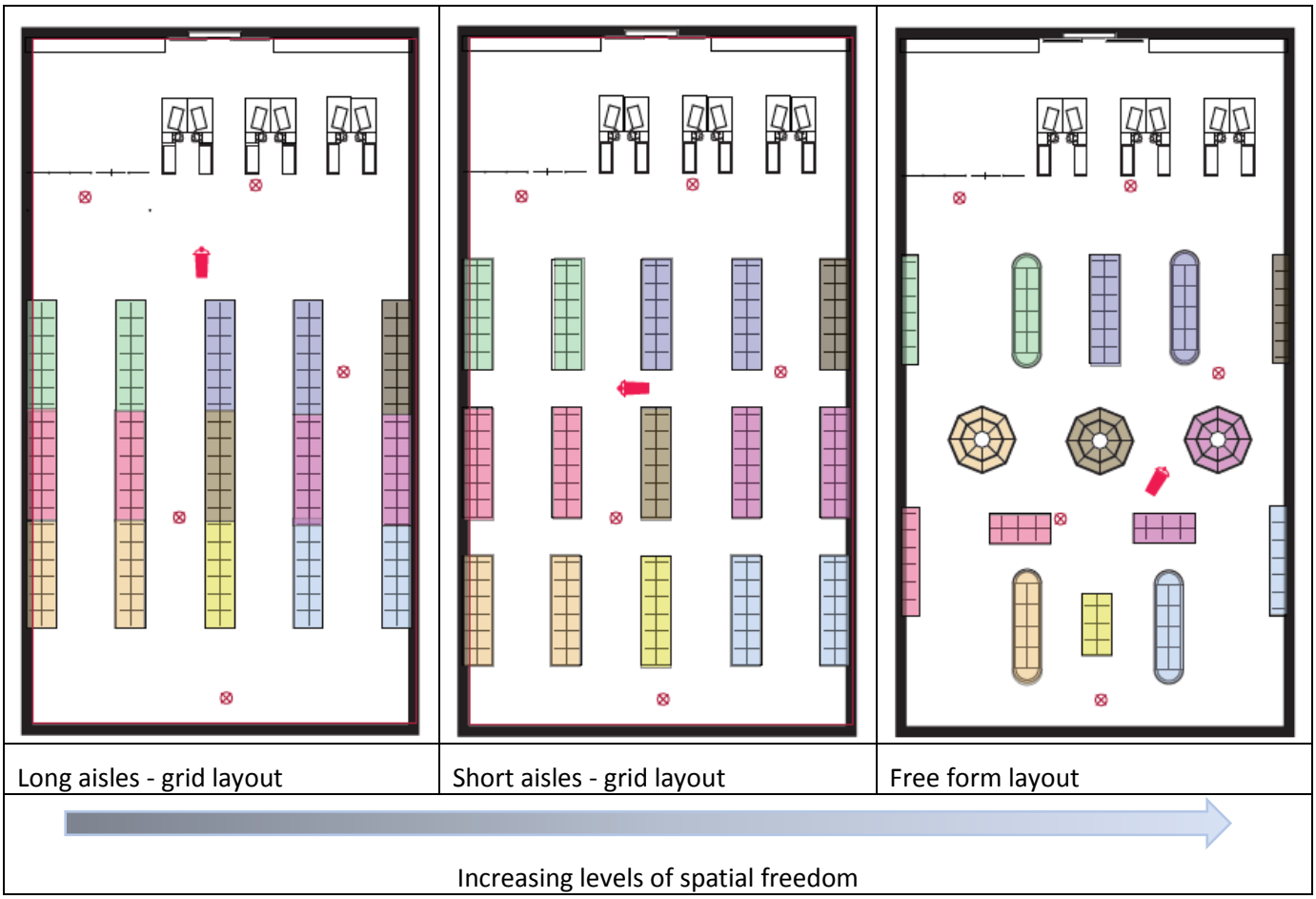


Table 4. Treatment levels simulations

3.3 Stimulus material

A previous study tested similar VR layouts on symmetry, spatial density, interior visual complexity, and processing fluency (Keulemans, 2018). The results of this research showed a significant effect of wide aisles on lower perceived density (M=2.55), while narrow aisles made respondents perceive the store as more dense (M=3.82) (Keulemans, 2018). Yet, although spatial density and spatial freedom might share some similarities, none of the tests looked at the level of spatial freedom specifically. Therefore, a pre-test manipulation check was conducted based on scales to measure spaciousness or confinement of a store (Machleit et al., 1994). The following 4 item scale was used as manipulation check for the degree of spatial freedom on a 7-point Likert scale; 'The store seemed very spacious', 'The store had an open feeling to it', 'I would feel cramped in this store', and 'This store would feel confining to shoppers' (Machleit et al., 1994).

A pre-test was done before the pilot test and the actual experiment and a qualitative research method was used to find out the respondents' view on the effect of increasing spatial freedom to a store layout. A total of 4 respondents participated in the pre-test. Participants have mentioned that the 'short aisles'- grid layout seemed easiest to walk through, while the third (free form layout) was perceived as better to orientate in. In addition, one respondent mentioned that the round fixtures in the free form layout felt inefficient and hindered her in her wayfinding. Overall all the three environments did not feel confining or cramped, yet one participants indicated that if he was to feel cramped or confined, this feeling would be highest in the 'long aisles'-grid layout and lowest in the free form layout. Based on the results of this pre-test, no changes were made to the manipulation of the three store environments.

In each simulation there are five camera's placed at exactly the same location in the store environment and participants walked through the store using the same path. These paths were made using the VR photos shown in Appendix 1. Yet, the product categories that are visible/recognisable to the respondents from those viewpoints might not all be similar due to the layout. Table 4. and Figure 3a/b. give an overview of the viewpoints in in a simulation and the product categories in a layout. Since efficiency in a store is important for the ability to form cognitive maps, seeing more or less product categories might be of influence on participants ability to form such maps.

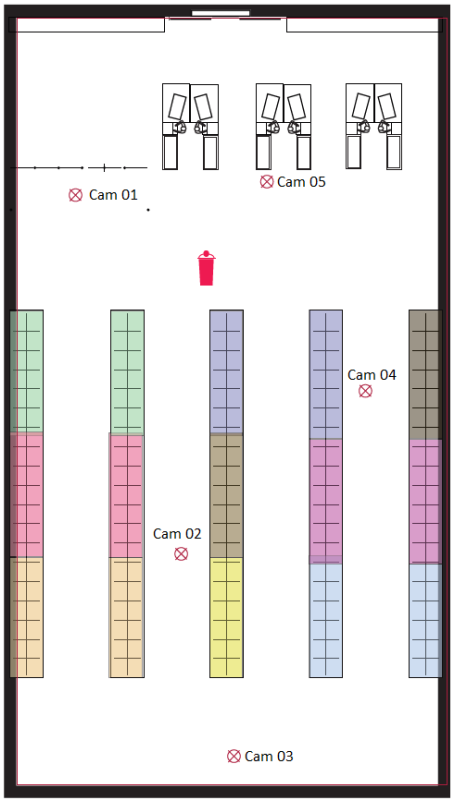


Figure 3a. Viewpoints simulation

Figure 3b. Legend

A comparison of the views from each viewpoint on the product categories was made and can be found in Appendix II. Visibility of product categories per layout differed slightly and small differences were found between the three simulations. The viewpoints from camera 01, 03, and 05 were quit similar in each simulation, yet the viewpoints from camera 02 and 04 showed some differences. The differences in these viewpoints were mainly made up of differences in visibility of signage or blockage of sight by racks. The main product categories that could be seen in each of the three layouts were more or less the same. Therefore, it was deemed possible to do a cognitive mapping task.

3.4 Procedure

When the respondents entered the research location they were shortly informed of the procedure of the experiment. A room at the Forum or Leeuwenborch building served as research location, with several computer and VR glasses available for use. The total experiment consisted per participant of a VR simulation, a cognitive mapping task and a questionnaire.

When students entered the room they were requested to take a seat in front of one of the set-up computer screens. Before they could start with a VR simulation they had to read a short text informing them about their rights as participants, the use of their data, and an request to agree to participate. After agreeing to participate in the experiment they were able to read an introductory text introducing

the topic, the use of VR and the following steps of the experiment. Moreover, participants were subtly instructed to keep in mind that they were also observing the efficiency of the store and to pay attention to several aspects of a store including the product categories. The next step was to put on the VR glasses to experience one of the three simulations. When the participant had seen the simulation they had to perform the corresponding cognitive mapping ability task. After this task, the participant was asked to further complete the questionnaire on the computer. The cognitive mapping tasks and the questionnaire used for the experiment can be found in Appendix III, IV and V. At the end of the questionnaire, the respondents were asked to fill in some demographic information such as gender and age. After this, they were thanked for their participation, were able to could pick up an incentive and could leave the research room.

Before the actual experiment a pilot test was conducted to test whether the procedure of the experiment would run smoothly. Three participants went through one of the three simulations while thinking out loud. They were asked to mention any errors or specifics they encountered when experiencing the simulation and also when doing the cognitive mapping ability task and filling in the questionnaire. As a result of this pilot study no changes were made. All participants understood the questions and steps in de procedure, yet overall comments were made with regard to the sharpness and realistic representation of the VR environment. Changes to the VR environment were outside of the scope of this research and the experiment proceeded with the simulations. During the pilot test participants used approximately 9 minutes to complete the whole procedure. To be on de safe side, it was communicated that the experiment took up 10 to 15 minutes of respondents' time.

3.5 Measurement scales

The constructs used in the conceptual framework were measured using different scales per construct. The following paragraphs describe the scales used for the corresponding constructs in this research. During the research a Dutch translation of the scales was used, which is shown in the table of each measurement scale. To avoid an extensive duration of the experiment and participants getting exhausted or bored, some constructs are measured using limited scale items per construct.

3.5.1 Spatial freedom

Similar to the scales used in the pre-test of the manipulation, the construct of spatial density was measured using scales based on scales to measure spaciousness or confinement of a store (Machleit et al., 1994). The scale for spatial freedom has four items with a 7-point Likert scale ranging from 'strongly disagree' to 'strongly agree', the items of the scale are shown in Table 5.

Spatial freedom	α = .879
Please indicate to which extent you agree or disagree with the following statements: ('Strongly disagree' - 'Strongly agree')	*Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: ('Sterk mee oneens'- 'Sterk mee eens')*
1. 'The store seemed very spacious'	1. 'De winkel oogt erg ruim'
2. 'The store had an open feeling to it'	2. 'De winkel heeft een open sfeer'
3. 'I would feel cramped in this store'*	3. 'Ik zou mij benauwd voelen in deze winkel'*
4. 'This store would feel confining to shoppers'*	4. 'Deze winkel voelt beklemmend aan voor shoppers'*

Table 5. Spatial freedom scale
(*) = Reversed scale

3.5.2 Expected shopping efficiency

The construct of expected shopping efficiency was measured using three items with a 7-point scale ranging from 'strongly disagree' to 'strongly agree'. The items to measure expected shopping efficiency were based on the scale for measuring retail convenience by Beauchamp and Ponder (2010). For this research only a selection of two items of that scale were included (item 1 and 2). A third item was included based on the scale for shopping efficiency used by McDaniel & Burnett (1990). An overview of the scale items is given in Table 6.

Expected shopping efficiency	α = .765
Please indicate to which extent you agree or disagree with the following statements: ('Strongly disagree' - 'Strongly agree')	*Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: ('Sterk mee oneens'- 'Sterk mee eens')*
1. 'I think this store is well organized' 2. 'I think I can find easily what I am looking for' 3. 'I think I can move through this store easily'	1. 'Ik vind deze winkel goed ingedeeld' 2. 'Ik denk dat ik gemakkelijk kan vinden wat ik zoek in deze winkel' 3. 'Ik denk dat ik mij gemakkelijk door deze winkel kan bewegen'

Table 6. Expected shopping efficiency scale

3.5.3 Perceived control

To measure perceived control a six item scale was used with a 7-point Likert scale ranging from 'strongly disagree' to 'strongly agree', used by Lunardo & Mbengue (2009). The scale is based on Mehrabian and Russell's (1974) scale for dominance combined with a scale for control in terms of goal achievement from Ward and Barnes (2001). Table 7. shows the six items for the measurement of this construct.

Perceived control	α = .767
Please indicate to which extent you agree or disagree with the following statements: ('Strongly disagree' - 'Strongly agree')	*Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: ('Sterk mee oneens'- 'Sterk mee eens')*
1. 'In this store environment, I feel controlling' 2. 'In this store environment, I feel influential' 3. 'In this store environment, I feel in control' 4. 'In this store environment, I feel important' 5. 'In this store environment, I feel dominant'[1] 6. 'In this store environment, I feel autonomous'[1]	1. 'In deze winkel voelt het alsof ik de regie in handen heb' 2. 'In deze winkel voel ik mij invloedrijk' 3. 'In deze winkel heb ik de controle' 4. 'In deze winkel voel ik mij belangrijk' 5. 'In deze winkel voel ik mij dominant'[1] 6. 'In deze winkel voel mij onafhankelijk'[1]

Table 7. Perceived control scale

[1] This item was deleted after factor analysis

3.5.4 Emotion of satisfaction and frustration

The emotions of satisfaction and frustration in this research were measured using single items scales with 7-point agreement scale. Although the reliability of the internal consistency cannot be computed

for a single-item scale, using single-item scale per emotion could contribute to participants not getting exhausted (Soderlund and Ohman, 2003; Yap & Kew, 2012). In their research, Yap and Kew used a single item scale to measure intentions in a supermarket environment, therefore it was also expected that this might also work for emotions. Table 8. shows the items used to measure satisfaction and frustration based on previous work of Liljander and Strandvik (1997) and Yu and Dean (2001).

Emotions	
Please indicate to which extent you agree or disagree with the following statements: ('Strongly disagree' - 'Strongly agree')	*Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: ('Sterk mee oneens'- 'Sterk mee eens')*
1. 'In this store, I feel satisfied'	1. 'In deze winkel voel ik mij tevreden'
2. 'In this store, I feel frustrated'	2. 'In deze winkel voel ik mij gefrustreerd'

Table 8. Emotions scales

3.5.5 Cognitive mapping ability

To measure participants' ability to form a cognitive map of the store, they were asked to name the product categories from the simulation they could remember and to the correctly allocate the locations of these categories on a base map of the store. This mapping test is a variation on previously employed mapping tests (Downs & Stea, 1977; Grossbart & Rammohan, 1981). Although such previous mapping tasks were used for shopping areas in city centres, this version was seen as most suitable for mapping tasks within a shopping environment and the use of VR simulations. In general people orientate themselves and form cognitive maps using paths, nodes, districts, edges, and landmarks for guidance (Lynch, 1960). In this store environment, the aisles can be seen as the paths, districts are the product categories, edges are the walls of the store and the basic landmarks are the entrance, exit, and cash registers. For this experiment nodes are not purposefully included, but in large Albert Heijn stores for example, the coffee area with the coffee machine and seating area can be seen as a node. To simplify the mapping task and to manage the duration of the experiment, the edges, paths and landmarks will be included in the base map of a condition. Also a the route respondents took in the simulation is visible, helping them to orientate and remember how they walked through the store. The task thus focusses on the ability to remember product categories and identify the correct districts, thus in this case the product categories in the store environment. In Appendix III. the cognitive mapping task for each of the three conditions can be found.

The cognitive mapping task was measured with two items, remembered product categories and placement of these categories in a map of the store environment. From these two items, scores were created based on the proportion of correctly identified product categories and locations. A correctly named product category resulted in one point with a total of nine points available for this item, corresponding with the total of nine product categories included in the VR supermarket. For the location of the product categories there were three types of scores possible; two points for an exactly correct location, one point for a location in the near area, and zero points if the location was completely wrong or not filled in. The highest possible score for this item was eighteen, based on nine exactly located product categories. For this task a combined score was calculated based on the proportions of points a respondent received for each item.

3.5.6 Store satisfaction and re-patronage intention

Store satisfaction was measured with two items based on the store satisfaction/dissatisfaction scale from Babin and Griffin (1998). One item was a statement with a 7-point Likert scale ranging from

'Strongly disagree' to 'Strongly agree'. The other item was measured with a scale representing consumers' percentage of satisfaction. Whereas, 0% referred to 'Not at all satisfied' and 100% referred to 'Completely satisfied'.

Store satisfaction	α = .871
Please indicate to which extent you agree or disagree with the following statements: ('Strongly disagree' - 'Strongly agree')	*Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: ('Sterk mee oneens'- 'Sterk mee eens')*
1. 'I feel satisfied with my experience at this supermarket'	1. 'Ik voel mij tevreden over mijn ervaring in deze supermarkt'
2. 'Please indicate the percentage best describing your level of satisfaction experienced in this supermarket'	2. 'Geef aan welk percentage jouw niveau van tevredenheid met deze supermarkt het beste omschrijft'

Table 9. Store satisfaction scale

Re-patronage intention was measured using a one item scale with a 7-point Likert scale ranging from 'Strongly disagree' to 'Strongly agree'. This single item scale was used in previous research, such as the research of Jones, Reynolds and Arnold (2006), Lemon, White and Winer (2002), and Mittel, Ross, and Baldasare (1998).

Re-patronage intention	
Please indicate to which extent you agree or disagree with the following statements: ('Strongly disagree' - 'Strongly agree')	*Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: ('Sterk mee oneens'- 'Sterk mee eens')*
1. I will probably visit this store again in the future'	1. 'Ik zal deze winkel in de toekomst waarschijnlijk weer bezoeken'

Table 10. Re-patronage intention scale

3.5.7 Utilitarian shopping motivation

Since efficiency is an important construct in this research and participants were subtly instructed to experience the simulation with utilitarian shopping motivations in the back of their minds, this was measured at the end of the questionnaire. Based on the scale developed by Babin, Darden and Griffin (1994) to measure shopping motivations, the following item was included in the questionnaire.

Utilitarian shopping motivation	
Please indicate to which extent you agree or disagree with the following statements: ('Strongly disagree' - 'Strongly agree')	*Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: ('Sterk mee oneens'- 'Sterk mee eens')*
1. 'During this shopping experience, I was motivated to focus on the evaluation of the supermarket environment'	1. `Tijdens deze winkel ervaring was ik gemotiveerd de supermarkt omgeving gericht te evalueren'

Table 11. Utilitarian shopping motivation scale

3.5.8 VR technology

The use of the VR technology is very cost efficient, yet using such a new technology could also distract participants from the focus of the experiment. To measure whether or not participants were too distracted by the technology, the scale in Table 12 was included into the questionnaire.

VR technology	
Please indicate to which extent you agree or disagree with the following statements: ('Strongly disagree' - 'Strongly agree')	*Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: ('Sterk mee oneens'- 'Sterk mee eens')*
1. 'The Virtual Reality technology was so new to me that I completely forgot to pay attention to the shopping environment'*	1. 'De Virtual Reality technologie was zo nieuw voor mij dat ik compleet ben vergeten om op de winkel omgeving te letten'*

Table 12. Virtual technology scale
(*) = Reversed scale

3.5.9 Control variables

At the end of the questionnaire two control variables were included. The control variables of age was measured using an open answer possibility in years. Gender was measured using the choice between male, female or otherwise/do not want to answer.

Control variables	
Please answer the following questions:	*Gelieve de volgende vragen te beantwoorden:*
1. 'What is your age?' (in years)	1. 'Wat is uw leeftijd?' (in jaren)
2. 'What is your gender?' (male/female/otherwise/do not want to answer)	2. 'Wat is uw geslacht?' (man/vrouw/anderszins/vermeld ik liever niet)

Table 13. Control variables scale

3.6 Data analysis plan

To prepare the data for data analysis, the data was checked for missing values, outliers and extreme values. Based on these results, decisions of exclusion of responses were made. Then, a factor analysis was performed to inspect the variables and the used scales. Based on these results mean scores were computed per variable. Then the variables were checked for normality, skewness and kurtosis, and correlation. For the testing of the hypotheses simple linear regression and one-way ANOVA tests were used. Based on these results, further mediating effects were tested using models 4 of Hayes if regression analysis indicated significant relations between variables.

4. Results

This chapter gives an overview of the results from the experiment. In Appendix VI., several tables can be found with more detailed information of the results.

4.1 Respondents and data description

As first part of data analysis the data was prepared for final data analysis and the experiment was evaluated based on comments of respondents during the experiment.

4.1.1 Control variables

During the preparation of the data the raw data was checked for missing values, outliers and extreme values. The raw data included 138 responses and none were removed for further data analysis. Normality tests showed one outlier in regard to age that caused extreme skewness and kurtosis values, yet there were no further motivations to exclude this responses.

Based on the results of a Chi-square test, there were no significant differences in gender per treatment group (X^2(2, N=138) = 4.904, p = .086). ANOVA results showed no significant difference per group for the variables of age (F(2,125) = 1.573, p = .211), utilitarian motivation during VR experience (F(2,135) = 1.422, p = .245), and newness of VR technology (F(2,135) = 2.97, p = .743).

4.1.2 Comments during experiment

During the experiment some respondents mentioned they felt (slightly) nauseous during or after the VR experience. Yet, all respondents were able to complete the experiment. Respondents indicated that the feeling of disorientation, not seeing a nose or one's feet, and the sharpness of the VR images would be possible causes of the nausea.

Another frequently mentioned comment was the difficulty of the cognitive mapping ability test. Respondents mentioned that they did not pay that much attention to product categories during the VR experience and could therefore not remember many product categories or their locations. Also, they mentioned that the visibility of the products and the in-store signage were not sharp enough for them to indicate specific product categories.

4.1.3 Analysis of variables

Factor analysis

Factor analysis was performed to check the correlation between the items and whether they fitted well with the measurement component they were supposed to measure. Initial factor analysis showed low scores (<.4) for two items for perceived control. Critically re-evaluating these low scores indicated that these items had low communality scores and might be more reflective of dominance instead of control. For these reasons the two items were excluded. After exclusion of the two items the Kaiser-Maier-Olkin (KMO) measure was well above the critical value (>.5) at .691 with a reliability score of .767. For the other constructs no items were excluded for final analysis, due to sufficient results (KMO >.5 and Cronbach alpha for reliability >.7) (Field, 2013).

A main factor analysis indicated that the several items showed high factor loadings on multiple components. Table VI.II in the appendix gives an overview of the results. Especially the items for store satisfaction showed high factor loadings for spatial freedom, perceived control, and expected shopping efficiency. This indicates that the scales may not have been differentiating enough. When the items were analysed per component KMO and reliability showed sufficient results.

Normality

Results of analysis on normality showed significant results that the data was not normally distributed on both the Kolmogorov-Smirnov as the Shapiro-Wilks tests, as shown in Appendix VI.III. The non-normal distribution of the results was also clearly visible in the histograms, which for some variable showed double peaks. The levels of skewness and kurtosis of most variables were between the critical value of –1 and 1 (Muthén & Kaplan, 1985). The values for the newness of the VR technology (-1.343 on kurtosis) and age (2.225 on skewness and 9.760 on kurtosis) exceeded the critical values. Although the results for the newness of the VR technology exceeded the critical value, they were deemed acceptable for further analysis based on a visual inspection of their histograms. The histogram for age showed an extreme value of 36 years old (one respondent) was the probable cause of the extreme values, yet it was not enough cause to eliminate the response of this participant from final analysis. Thus, still final analysis was continued with 138 respondents.

The non-normal distribution of the data depicted the choice of tests for further analysis. The correlation was tested with both Pearson's and Spearman's test to see if there were any differences in results between parametric and non-parametric tests. Also for the manipulation check, the non-normal distribution of the data was accounted for by using both LSD and Bonferroni as post-hoc tests. For the testing of the hypothesis, simple linear regression was used which could allowed for bootstrapping. For the mediation analysis the choice was made to use models of Hayes, since these tests allow for bootstrapping and were therefore a very suitable tests to use (Hayes, 2018; Zhao et al., 2010).

Correlations

The results of the two correlation analyses were quite similar, except for the correlation between perceived control and frustration and with respondents' motivation during the VR experience. With the Pearson correlation test the correlation between perceived control and motivation was not significant *(r* = .161, *p* >.05), while with the Spearman correlation test this correlation was significant (*r* = .176, *p* <.05). The Pearson correlation matrix can be found in Appendix VI.IV.

4.2 Manipulation check

A one-way ANOVA with spatial freedom as dependent variable and the treatment groups as independent variables showed a significant main effect, *F* (2,135) = 3.93, *p* = .022. Both the LSD and the Bonferroni tests were run, yet only the results of the Bonferroni test will be reported unless there were significant differences with the LSD test. Results indicated a significant mean difference in spatial freedom between group B and C, *p* = .021. Yet, no significant differences between group A and the other groups. A two-way ANOVA was conducted to include age as covariate of spatial freedom between the groups, yet no significant effect of age was found. Table 14 shows the mean scores per variable in the framework and how the means for spatial freedom differ. Based on this results the manipulation was not proven successful.

M (*SD*)	'Long aisles'-grid layout (Group A) *N* = 46	'Short aisles'- grid layout (Group B) *N* = 46	Freeform layout (Group C) *N* = 46
Spatial freedom*	5.22 [ab] (1.30)	4.70 [a] (1.42)	5.46 [b] (1.35)
Expected shopping efficiency	5.08 (1.04)	5.16 (1.05)	5.12 (1.22)
Perceived control	4.07 (0.92)	4.10 (0.77)	4.16 (1.11)
Emotion of satisfaction	4.63 (1.36)	4.59 (1.26)	4.74 (1.51)
Emotion of frustration	3.26 (1.51)	3.20 (1.36)	2.98 (1.47)
Store satisfaction	0.66 (0.16)	0.66 (0.16)	0.70 (0.18)
Re-patronage intention	4.48 (1.46)	4.43 (1.39)	4.41 (1.47)
Cognitive mapping ability	0.35 (0.15)	0.36 (0.16)	0.38 (0.18)

** = p < .05, ** = p < .01, *** = p < .001*

Table 14. Means scores and standard deviation per variable in framework

4.3 Hypothesis testing

4.3.1 Regression analysis

Main model

A simple linear regression was performed to analyse the main effect of spatial freedom on re-patronage intention. The results indicated a significant positive effect, $F(1,136) = 52.363$, $p < .001$, adjusted $R^2 = .273$, and $\beta = .558$, $p < .001$.

Expected shopping efficiency

The mean scores of expected shopping efficiency showed an increase between group A and B and a slight decrease between B and C, just as was expected in the theoretical framework. Yet, the results showed no significant differences between the mean scores of the groups, $F(2,135) = .060$, p = n.s., as shown in table 14. With regard to the hypotheses this means that the data did not support hypotheses 1a, 1b, and 1c.

The results of a simple linear regression indicate a significant effect of spatial freedom on expected shopping efficiency, $F(1,136) = 35.118$, $p < .001$. The adjusted R^2 indicates that approximately 19,9% of change in expected shopping efficiency can be explained by spatial freedom. And a beta of $\beta = .368$, $p < .001$ showed a positive coefficient.

Perceived control

The results shown in table 14 indicated that the mean scores of perceived control slightly increased per treatment level, yet there were no significant differences between the groups. Thus, although the mean scores follow the expected line, hypothesis 2a, 2b, and 2c were not statistically proven. The results of a simple linear regression indicated a significant effect of spatial freedom on perceived control, $F(1,136) = 11.838$, $p < .001$. with an adjusted $R^2 = .073$ and $\beta = .196$, $p < .01$

Emotions of satisfaction and frustration

The results of a simple linear regression for satisfaction indicated a significant effect of expected shopping efficiency and perceived control on the emotion of satisfaction ($F(2,135) = 44.258$, $p < .001$ with an adjusted $R^2 = .387$ and β(expected shopping efficiency) = .469, $p < .001$ and β(perceived control) = .556, $p < .001$). Based on these results, hypotheses 3a and 4a were supported.

The results of a simple linear regression with expected shopping efficiency and perceived control as independent variables and the emotion of frustration as dependent variables show a significant result ($F(2,135) = 34.412$, $p < .001$ with an adjusted $R^2 = .328$ and β(expected shopping efficiency) = -.507, $p < .001$ and β(perceived control) = -.478, $p < .001$). These results support hypothesis 3b and 4b.

Store satisfaction

With both emotions as independent variables and store satisfaction as dependent variables the results of a simple linear regression show a significant result ($F(2,135) = 140.458$, $p < .001$ with an adjusted $R^2 = .671$ and β(satisfaction) = .078, $p < .001$, β(frustration) = -.025, $p < .01$). Based on these results both hypothesis 6a and 7a were supported.

Re-patronage intention

A simple linear regression analysis with re-patronage intentions as dependent variable and the two emotions as independent variables show significant results ($F(2,135) = 59.662$, $p < .001$ with an adjusted $R^2 = .461$, and β(satisfaction) = .587, $p < .001$ and β(frustration) = -.146, p = n.s.). Although the ANOVA was significant, the beta for frustration was not. Thus the data does support hypothesis 6b, but not hypothesis 7b.

The results also showed an significant effect of store satisfaction on re-patronage intention, $F(1,136) = 251.267$, $p < .001$ with an adjusted $R^2 = .646$ and β = 6.912, $p < .001$, supporting hypothesis 8.

Cognitive mapping ability

The results of a simple linear regression to test the effect of expected shopping efficiency on consumers' cognitive mapping ability show that there is no significant effect, $F(1,136) = 1.348$, p = n.s. Therefore, hypothesis 5 could not be supported. Also hypothesis 9 was not supported, since there was no significant effect of cognitive mapping ability on store satisfaction.

Out of interest the two measurement items for cognitive mapping ability were also tested separately. Results of regression analyses showed no significant results from expected shopping efficiency on either of the two cognitive mapping ability scales. Similarly, no significant effects from either of the two scales as independent variables were found on store satisfaction as dependent variable.

4.3.2 Overview results hypotheses in framework

The following figure (Figure 10) shows the theoretical framework with an overview of the supported and not supported hypothesis. The dotted lines represent the not supported hypothesis, whereas the full line represents the supported hypothesis.

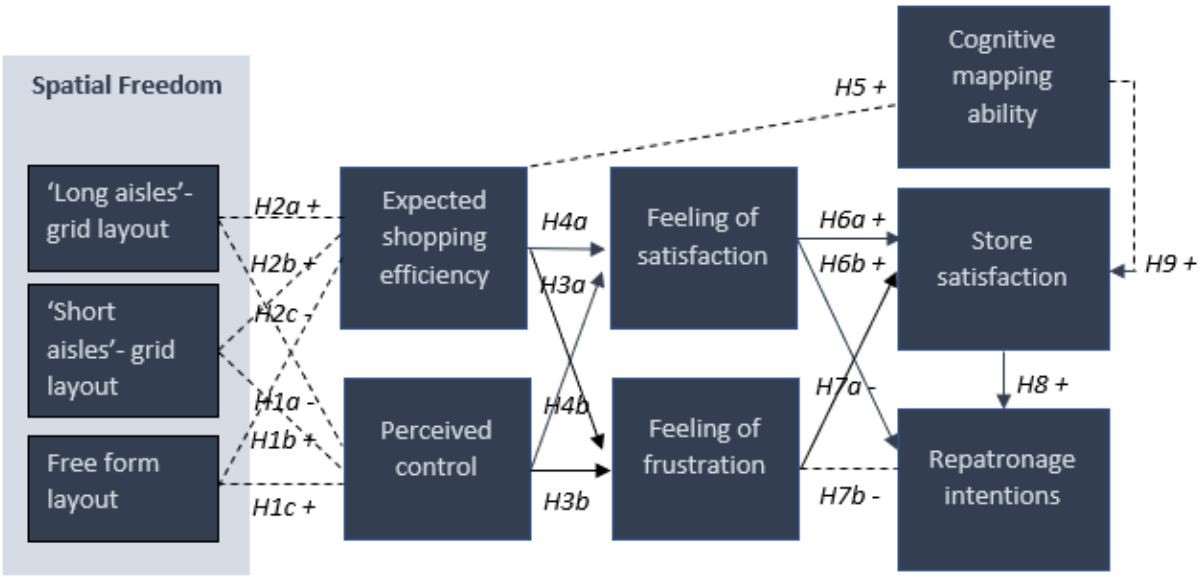


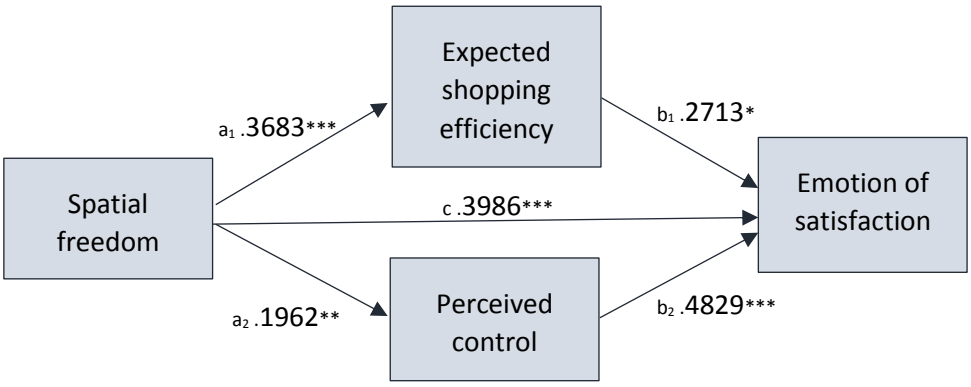
Figure 10. Overview supported and not supported hypothesis.

4.4 Mediation analysis

Using mediation analysis the mediation effects of some of the variables in the model were tested. Only the possible mediation effects of expected shopping efficiency on cognitive mapping ability, and cognitive mapping ability on store satisfaction were not tested (H5 and H9), since the initial regression tests were not significant. For the testing of mediation effects multiple variations of model 4 of Hayes were used, since this model allows for single or parallel mediation (Hayes, 2018).

Mediating role of expected shopping efficiency and perceived control on emotions

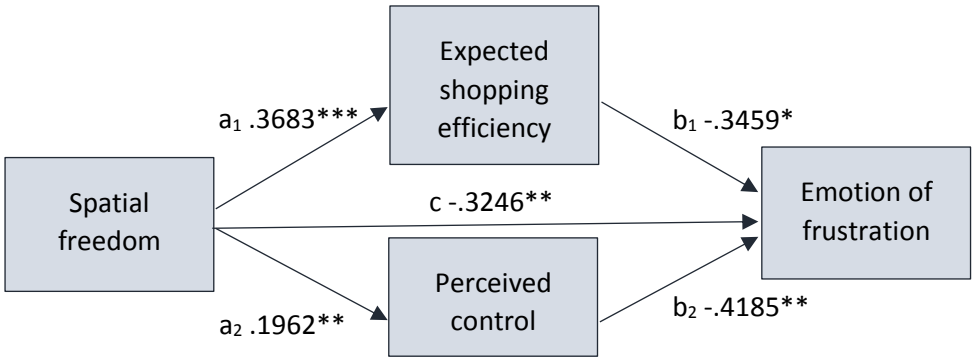
Taking spatial freedom as X-variable and the emotion of satisfaction as Y-variable, results indicate significant indirect effects with expected shopping efficiency (*c* = . 0999 *CI* (.0315, .1855)) and perceived control (*c* = .0948 *CI* (.0300, .1846)) as parallel mediating variables, next to a significant direct effect of spatial freedom on the emotion of satisfaction.



** = p < .05, ** = p < .01, *** = p < .001*

Figure 11. Mediation effects expected shopping efficiency and perceived control 1

Also for the emotion of frustration as Y-variable, results show significant indirect effects, via expected shopping efficiency (*c* = -.1247 *CI* (-.2331, -.0441)) and via perceived control (*c* = -.0821 *CI* (-.1712, -.0208)) next to a significant direct effect of spatial freedom on the emotion of frustration. So both Figure 11. and Figure 12. Show partial mediation effects.

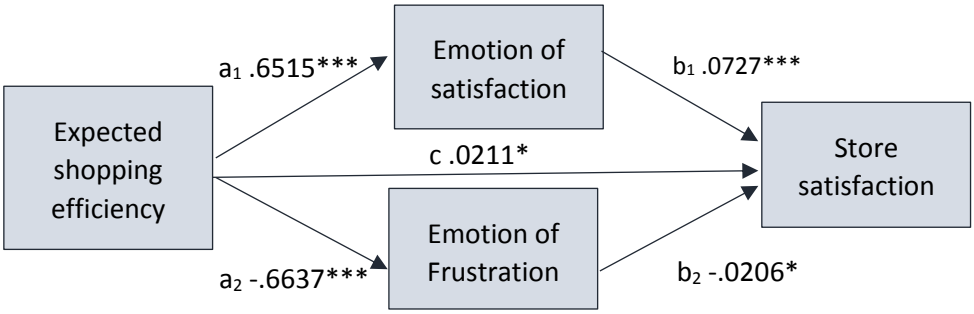


** = p < .05, ** = p < .01, *** = p < .001*

Figure 12. Mediation effects expected shopping efficiency and perceived control 2

Mediating roles of emotions on store satisfaction

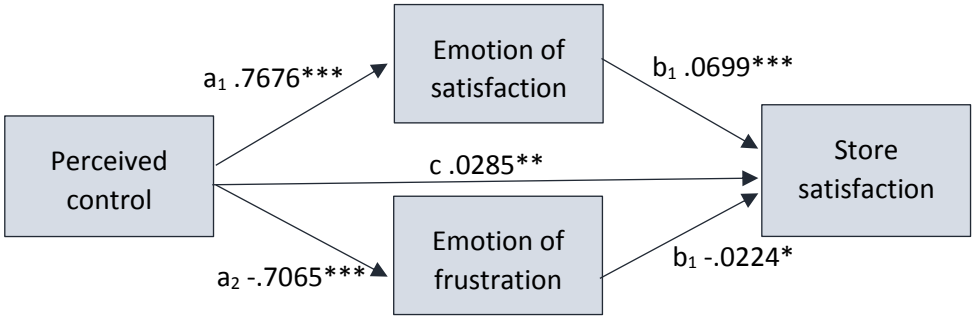
The indirect effect was significant via the emotion of satisfaction (*c* = .0474 *CI* (.0274, .0710)), yet not significant via the emotion of frustration (*c* = .0137 *CI*(-.0018, .0308)). The direct effect of expected shopping efficiency on store satisfaction was significant, indicating that the emotion has a partial mediating effect on store satisfaction.



** = p < .05, ** = p < .01, *** = p < .001*

Figure 13. Mediation effects emotions 1

When taking perceived control as X-variable, meditating roles of both emotions were significant, via satisfaction *c* = .0536 *CI* (.0314, .0778) and via frustration *c* = .0158 *CI* (.0002, .0328). Results indicate a partial mediation effect of the two emotions, next to the significant direct effect of perceived control on store satisfaction.

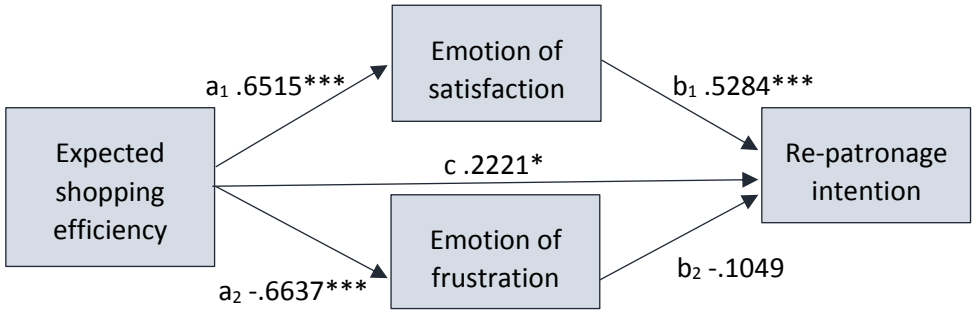


** = p < .05, ** = p < .01, *** = p < .001*

Figure 14. Mediation effects emotions 2

Mediating roles of emotions on re-patronage intention

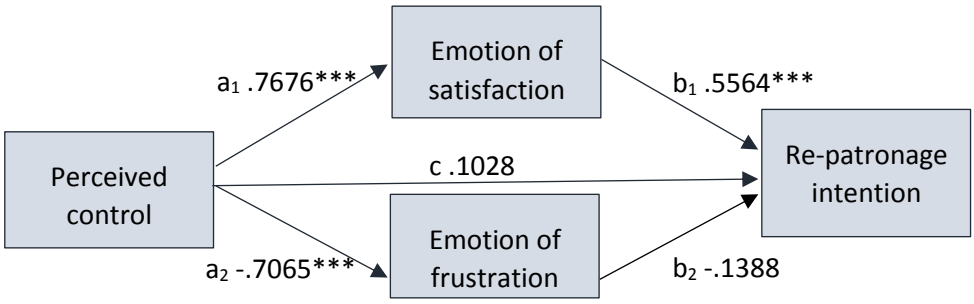
Via the emotion of satisfaction there was a significant indirect effect, *c* = .3442 *CI* (.1510, .5696), but there was not a significant indirect effect via frustration, *c* = .0696 *CI* (-.1081, .2645). The results show there was a partial mediation via the emotion of satisfaction and a significant direct effect.



** = p < .05, ** = p < .01, *** = p < .001*

Figure 15. Mediation effects emotions 1

With perceived control as X-variable, the mediation was significant via satisfaction (*c* = 4271 *CI* (.1969, .6905)), but not significant via the emotion of frustration (*c* = .0981 *CI* (-.0942, .2907)). Moreover, the direct effect of perceived control on re-patronage intention was also not significant, indicating a full mediation effect via the emotion of satisfaction.



** = p < .05, ** = p < .01, *** = p < .001*

Figure 16. Mediation effects emotions 2

Mediating role of store satisfaction on re-patronage intention

To measure the mediating role of store satisfaction on re-patronage intention, tests were run with both emotions as X-variables. Using the emotion of satisfaction as X-variable, there was a significant indirect effect via store satisfaction on re-patronage intention, *c* = .6307 *CI* (.4615, .8114). There was no significant direct effect between emotion of satisfaction and re-patronage intention. Indicating a full mediation via store satisfaction.

** = p < .05, ** = p < .01, *** = p < .001*

Figure 17. Mediation effect of store satisfaction 1

Similarly when taking the emotion of frustration as X-variable, there was a significant indirect effect via store satisfaction (*c* = -.5627 *CI* (-.7048, -.4212), but no significant direct effect. Indicating a full mediation via store satisfaction.

** = p < .05, ** = p < .01, *** = p < .001*

Figure 18. Mediation effect of store satisfaction 2

5. Discussion

This chapter concludes the results and discusses certain aspects of this research. Based on these discussion points, recommendations for future research are given. Moreover, the academic contribution of this research is discussed, along with the practical learnings for supermarket retailers based on the results of this study. Lastly, a short overall conclusion of this study is given.

This study has looked into the effect of spatial freedom in a supermarket environment and its influence on consumers' in-store behaviour. In the current economy it is important for traditional brick and mortar stores to offer an optimal experience to consumers, to be able to compete against increasing international competition or competition from online channels (Sellers-Rubio & Mas-Ruiz, 2006). This study expands on current literature by including both cognitive and emotional responses to a shopping environment, combined with consumers' cognitive mapping ability. Based on the results of this research answers to the research questions are discussed;

How does the degree of spatial freedom in a supermarket influence consumer behaviour with regard to both cognitive and emotional responses to the shopping environment?

- *How does the degree of spatial freedom influence expected shopping efficiency and perceived control?*
- *How do perceived control and expected shopping efficiency influence consumer emotions?*
- *What are the behavioural responses based on the emotional and cognitive responses to the degree of spatial freedom in a supermarket environment?*

5.1 Spatial freedom

Results of this research have indicated that the manipulation used in this experiment was not successful. Between the three types of store layout there was only a significant difference between the 'short aisles'- grid layout and the free form layout, instead of a significant difference between all three types of layout. It was expected that from the 'long aisles'- grid layout, to the 'short aisles'- grid layout and towards the free form layout, the degree of spatial freedom would increase. Against expectations, results indicated that the respondents saw the 'short aisles'-grid layout as least spatially free. The free form layout yielded the highest degree of spatial freedom, which was in line with expectations.

Although there was no significant difference between all three layouts, the variable of spatial freedom did show significant effects on expected shopping efficiency and perceived control. This indicates possible problems in the design of the manipulation in this experiment, because the construct of spatial freedom itself does seem to have some influence in this model.

A possible reason for the failure of the manipulation was the use of VR technology during the experiment. During the experiment respondents have mentioned they experienced difficulties in seeing the store environment and/or products in the rack clearly. Since orientation in an environment is an important factor in determining spatial freedom, it might have been difficult to grasp the sense of spatial freedom when experiencing a store environment in VR. Thus even though VR is a very cost effective and flexible research tool, the representation of a store environment may in this case have not been successful enough.

Moreover, during the pre-test to test the manipulation, respondents mentioned did they see clear differences in spatial freedom according to the increasing degrees of spatial freedom per type of store layout. A big difference between the actual experiment and the pre-test was the research design. During the pre-test respondents experiences all three store layouts, thus a within-subjects design,

while for the actual experiment a between-subject design was used. This indicates the possibility that the manipulation might have been more successful when a within-subject design or another type of design was used.

With the rapid developments of technology it is expected that VR software will become even more realistic and therefore more able to realistically represent store environments. For future research it would be interesting to see how store environments can be manipulated in such a way different degrees of spatial freedom are easily identifiable. Within this research respondents 'jumped' through the store environment from view point to view point. Sometimes respondents mentioned they felt a bit disorientated after they moved from one place to another. Not being able to see one's nose or feet were possible reasons for problems in orientation mentioned by respondents during the experiment. For future research such features could be added to allow the simulation to be more realistic.

When technological developments allow respondents to actually 'walk' through a store environment, it is expected that short cut possibilities and estimations between distances between points in the store will become more realistic. Also being better able to see products and identifying product categories will also be helpful. These improvements to VR technology would possibly increase the sense of spatial freedom for each type of store layout and therefore be better recognisable for respondents.

5.2 Cognitive and emotional responses

Results of this research indicated the effect of spatial freedom on both expected shopping efficiency and perceived control. Since the relationship is positive, it can be assumed that when spatial freedom increases, both expected shopping efficiency and perceived control increase. It was expected that to a certain point, an increase of spatial freedom would no longer be perceived as being efficient for shopping. The mean scores of expected shopping efficiency show a small decline between the 'short aisles'- grid layout and the free form layout, yet the differences in means between the groups were not significant. Therefore, this might be an interesting topic for future research. Especially with new VR technologies different types of layout can be tested. For this testing it might be interesting to look at routing, placement of racks and placement of product categories. This way, an optimal level of efficiency or perceived control for a supermarkets (or other type of store environment) can be developed based on consumer behaviour. In turn, this could help retailers determine the most effective floorplan for their store, balancing sales and customer in-store experiences.

The cognitive responses included in this research had a significant positive relation with the emotion of satisfaction and a significant negative relation with the emotion of frustration, just as was expected. This indicates that when expected shopping efficiency and/or perceived control increases, consumers might feel more satisfied or less frustrated. Cognitive responses also played a significant partial mediating role between spatial freedom and both emotions, next to a significant direct effect of spatial freedom on both emotions. Following, both emotions also had partial mediating roles between the cognitive responses and store satisfaction and re-patronage intentions. Results even indicated a full mediation effect between perceived control and re-patronage intentions via the emotion of satisfaction. This confirms the importance of including both cognitive and emotional responses in the explanation of consumer behaviour.

This research followed the line of Johnson and Stewart (2005) and assumed that cognitive responses, as antecedents to the process of appraising, will lead to emotional responses. The effects of the cognitive responses on the emotional responses included in this research were also proven significant. Yet, this does not provide the answer to the ongoing debate of the order of the two responses, since the effect of emotional responses on cognitive responses could not be tested in this research. Finding

which order of responses is most appropriate in the light of consumer experiences during shopping might be an interesting topic for future research. For this research similar variables as included in this research could be used, since these variable showed significant results for a supermarket environment, yet there might also be more relevant variables such as crowding or personal characteristics such as age, desire for control or tolerance for crowding.

For this research, the emotion of satisfaction and the emotion of frustration were selected based on the type of shopping environment in this research. It could be interesting for future research to look into different emotions for different kinds of shopping environments. Since the emotions shown in Table 2. were mere examples of possible outcomes of appraisal combinations, other emotions might also be of relevance. A supermarket environment is quite low in intensity or hedonic stimulation, but for more experiential store environments, e.g. teen clothing stores or game shops, more intense emotion such as joy or excitement are more suitable. Therefore it could be interesting for future research to see what kind of store environments spark which emotions and how this influences certain cognitive responses (or the other way around).

More generally, results of correlation and factor analysis of this research showed some insignificance between constructs such as spatial freedom, perceived control and expected shopping efficiency. Some items had high factor loading to multiple components, which indicates that the scale might fail to measure distinctively different variables. The use of a similar theory, such as PAD or dominance scales of Mehrabian and Russell (1974), as basis for multiple measurement scales could be a possible reason for similarity among the scales. For the field of consumer behaviour it would be interesting to see if with future research new, and more distinctive, measurement scales can be developed based on different theories. Another reason could be that the measurement scales did not work for the research population or for the VR simulation. For future research it could also be interesting to find scales that are more relatable to the population, in this case students.

Also, since the use of VR technology is still quite new, measurement scales may not be directly applicable. This research looked into feelings and subjective measurements, but for respondents to be able to answer such questions the simulation must be realistic to such an extent such feelings can be experienced by the respondent. When VR technology will be used for more research purposes, it is wise to first investigate similarities between VR experiences and real experiences. Differences between these two experiences could lead to skewed results when similar measurement scales are used.

5.3 Behavioural responses

From the emotion of satisfaction there were significant positive relations established with both store satisfaction and re-patronage intention. With the emotion of frustration, there was only a significant negative effect with store satisfaction proven. This implies that when consumers experience more satisfaction, they evaluate the store as more satisfying and show higher re-patronage intentions. When consumers feel more frustrated, they will evaluate the store less satisfying. Results also indicated that higher store satisfaction would lead to higher re-patronage intentions. Store satisfaction also played an important mediating role between the two emotions and repatronage intention. Results indicated no direct effect from either of the emotions on repatronage intentions, only a full mediation effect via store satisfaction.

The positive effect of cognitive mapping ability on store satisfaction was not proven significant in this research. Also the expected positive effect of expected shopping efficiency on cognitive mapping ability could not be supported based on the results of this research. This indicates there is no significant relation between expected shopping efficiency and cognitive mapping ability and in turn also no significant relation between cognitive mapping ability and store satisfaction. Although no significant

relations were proven in this research, it is still expected there might some relations between the variables based on previous researches.

As mentioned with possibilities for improving the manipulation using VR technology, new technological innovations could also contribute to uncovering the effects regarding cognitive mapping ability in store environments. During the cognitive mapping ability task in this experiment, respondents often mentioned they found the task very difficult to complete. Reasons for this were they had no idea they had to focus on product categories and they were not able to clearly see all the product categories or products in the racks. Clearer en more realistic representations of store environments can help respondents identify products and product categories in their surroundings better, possibly improving cognitive mapping ability. For future research, it is recommended to make cognitive mapping ability a central topic in an experiment, instead of an additional subject as within this study. It could also be interesting to see if cognitive mapping ability increases after multiple visit to the same location or similar locations and how this effects store satisfaction. Another interesting aspect could be giving respondents a certain goal or task to complete during their VR experience and how this effects their cognitive mapping ability. Especially cognitive mapping ability in relation to store efficiency can be very interesting to investigate further in relation to supermarket store layout, due to the mainly utilitarian nature of grocery shopping.

5.4 Academic contributions

This research contributed academically by using VR technology as research tool to study consumer in-store behaviour. It is expected that the technology and usability of VR technology will increase in the near future, because it is such an affordable, flexible and time effective research tool. For this experiment the possibilities of VR technology were not completely used to the fullest, since there are more realistic VR programmes currently available that unfortunately still come with a certain price. Hopefully this research showed the possibilities of VR technology for consumer behaviour research for future research, since several relations from the model were proven significant.

Moreover, an academic contribution of this research was the confirmation of the significant effect of cognitive responses to a store environment on a consumers' emotional responses. And although this does not directly contribute to the discussion of the order of occurrence of cognitive and emotional responses, it does expand current knowledge. Cognitive responses, similar to emotional responses, can be quit divers. Therefore not all types of cognitive responses will work in all shopping environments. This study has indicated that expected shopping efficiency, perceived control, satisfaction and frustration play a role in a supermarket environment.

5.5 Practical implication for retailers

An intention of this research was to provide supermarket retailers with practical information about the layout of their store. Based on the results of this research it is not possible to give retailers concrete guidelines for the optimal degree of spatial freedom for their store layout. A reason for this was the unsuccessful manipulation. Although such advises cannot be given yet, overall effects of spatial freedom on consumer responses and behaviour were proven significant. This emphasizes the possible interesting role of spatial freedom in the development of a store layout that balances consumers' shopping efficiency and orientation while also guiding consumers through most product offerings.

For future research, a combination of multiple fields of science could offer retailers a more holistic advice. Consumer behaviour was the main field research in this study, yet during the exploratory phase inspiration was also retrieved from other fields of science, such as spatial planning, architecture or

engineering. Joint research into e.g. store layout, consumer in-store experience/ behaviour, or routing could offer new insights to retailers, but also to the related fields of science.

5.6 Overall conclusion

All in all, this research found some interesting relations between consumers' cognitive responses and ultimately their shopping behaviour. Although results indicated no significant results between the three types of layout used in this study, there were significant relations found between spatial freedom and expected shopping efficiency and perceived control. This study also showed that VR technology can be a useful research tool and it is expected that increasing technological improvement will only make it more effective. This offers future research possibilities to study this, or related, topics further. Moreover, it was suggested to research cognitive mapping ability as a separate study, since this study did not show significant results. It is expected that cognitive mapping ability can be a very interesting topic in relation to the layout of a supermarket, due to the utilitarian nature of doing the groceries. Future research might also offer retailers more specific and practical implications for future changes to store layout.

On a personal note, I'm very curious about the future technological innovations and implications of VR technology as research tool for consumer behaviour. Maybe in the future VR technology can be used to actually do groceries, but what would be an optimal store layout for a virtual reality supermarket?

References

Alawadhi, A., & Yoon, S. Y. (2016). Shopping behavioral intentions contributed by store layout and perceived crowding: An exploratory study using computer walk-through simulation. *Journal of Interior Design*, *41*(4), 29-46.

Babin, B. J., Darden, W. R., & Griffin, M. (1994). Work and/or fun: measuring hedonic and utilitarian shopping value. *Journal of consumer research*, *20*(4), 644-656.

Babin, B. J., & Darden, W. R. (1995). Consumer self-regulation in a retail environment. *Journal of retailing*, *71*(1), 47-70.

Babin, B. J., & Griffin, M. (1998). The nature of satisfaction: an updated examination and analysis. *Journal of Business research*, *41*(2), 127-136.

Baker, J., Parasuraman, A., Grewal, D., & Voss, G. B. (2002). The influence of multiple store environment cues on perceived merchandise value and patronage intentions. *Journal of marketing*, *66*(2), 120-141.

Beauchamp, M. B., & Ponder, N. (2010). Perceptions of retail convenience for in-store and online shoppers. *Marketing Management Journal, 20*(1), 49-65. doi: 10.1007/s11274-015-1903-5

Bitner, M. J. (1992). Servicescapes: the impact of physical surroundings on customers and employees. *Journal of marketing*, *56*(2), 57-71.

Bloemer, J. M. M., & Odekerken-Schröder, G. J. (2002). Store satisfaction and store loyalty explained by customer-and store related factors.

Bloemer, J., & De Ruyter, K. (1998). On the relationship between store image, store satisfaction and store loyalty. *European Journal of marketing*, *32*(5/6), 499-513.

Borges, A., (2003). Toward a new supermarket layout: from industrial categories to one stop shopping organization through a data mining approach. In *Proceedings of the 2003 society for marketing advances annual symposium on retail patronage and strategy*, Montreal, November 4–5.

Bost, E., 1987. Ladenatmosphare und Konsumentenverhalten. Heidelberg: Physica.

Burger, J. M. (1987), "Increased Performance with Increased Personal Control: A Self-Presentation Interpre- tation," Journal of Experimental Social Psychology, 23 (4), 350-360.

Burger, J. M., & Cooper, H. M. (1979). The desirability of control. *Motivation and emotion*, *3*(4), 381-393.

Burger, J. M., Oakman, J. A., & Bullard, N. G. (1983). Desire for control and the perception of crowding. *Personality and Social Psychology Bulletin*, 9, 475–479.

Chebat, J-C., Filiatrault, P., Gelinas-Chebat, C., & Vaninsky, A. (1995). Impact of waiting attribution and consumer's mood on perceived quality. *Journal of Business Research*, 34, 19 1 - 197.

Chitturi, R., Raghunathan, R., & Mahajan, V. (2008). Delight by design: The role of hedonic versus utilitarian benefits. *Journal of marketing*, *72*(3), 48-63.

Cil, I. (2012). Consumption universes based supermarket layout through association rule mining and multidimensional scaling. *Expert Systems with Applications*, *39*(10), 8611-8625.

Curren, M. T., & Folkes, V. S. (1987, Spring). Attributional influences on consumers' desires to communicate about products. *Psychology and Marketing*, 4, 31-45.

Dion, D. (2004). Personal control and coping with retail crowding. International Journal of Service Industry Management, 15, 250–263

Donovan, R., & Rossiter, J. (1982). Store atmosphere: an environmental psychology approach. Journal of retailing, 58(1), 34-57.

Downs, R. M., & Stea, D. (Eds.). (1974). *Image and environment: Cognitive mapping and spatial behavior*. Transaction Publishers.

Downs, R. M., & Stea, D. (1977). *Maps in minds: Reflections on cognitive mapping*. HarperCollins Publishers.

Erlebacher, A. (1977). Design and analysis of experiments contrasting the within-and between-subjects manipulation of the independent variable. *Psychological Bulletin*, *84*(2), 212.

Eroglu, Sevgin, and Gilbert D. Harrell. (1986). "Retail Crowding: Theoretical and Strategic Implications," Journal of Retailing 62, 346-363.

Field, A. (2013). Discovering statistics using IBM SPSS statistics. sage.

Folkes, V. S., Koletsky, S., & Graham, J. (1987). A field study of causal inferences and consumer reactions: The view from the airport. *Journal of Consumer Research*, 13, 534-539.

Frumkin, H. (Ed.). (2016). *Environmental health: from global to local*. John Wiley & Sons.

Greenwald, A. G. (1976). Within-subjects designs: To use or not to use?. *Psychological Bulletin*, *83*(2), 314.

Grewal, D., Baker, J., Levy, M., & Voss, G. B. (2003). The effects of wait expectations and store atmosphere evaluations on patronage intentions in service-intensive retail stores. *Journal of retailing*, *79*(4), 259-268.

Groeppel-Klein, A., & Bartmann, B. (2009). Turning bias and walking patterns: Consumers' orientation in a discount store. *Marketing ZFP*, *31*(JRM 1), 43-56.

Grossbart, S. L. & Rammohan, B. (1981). "Cognitive Maps and Shopping Convenience", *NA - Advances in Consumer Research Volume 08,* eds. Kent B. Monroe, Ann Abor, MI: Associations for Consumer Research, Pages; 128-133.

Hayes, A. F. (2018). Introduction to mediation, moderation, and conditional process analysis : A regression-based approach (Second edition). New York: Guilford Press.

Hui, M. K., & Bateson, J. E. (1991). Perceived control and the effects of crowding and consumer choice on the service experience. *Journal of consumer research*, *18*(2), 174-184.

Hui, S. K., Inman, J. J., Huang, Y., & Suher, J. A. (2012). Estimating the effect of in-store travel distance on unplanned spending: Applications to store layout and mobile promotion strategies. *Retrieved from http: $$ citeseerx. ist. psu. edu $ viewdoc $ summary*.

Hui, M. K., & Toffoli, R. (2002). Perceived control and consumer attribution for the service encounter. *Journal of Applied Social Psychology*, *32*(9), 1825-1844.

Johnson, A. R., & Stewart, D. W. (2005). A reappraisal of the role of emotion in consumer behavior. In *Review of marketing research* (pp. 3-34). Emerald Group Publishing Limited.

Jones, M. A., Reynolds, K. E., & Arnold, M. J. (2006). Hedonic and utilitarian shopping value: Investigating differential effects on retail outcomes. *Journal of business research*, *59*(9), 974-981.

Kaltcheva, V. D., & Weitz, B. A. (2006). When should a retailer create an exciting store environment?. *Journal of marketing*, *70*(1), 107-118.

Keren, G. B., & Raaijmakers, J. G. (1988). On between-subjects versus within-subjects comparisons in testing utility theory. *Organizational Behavior and Human Decision Processes*, *41*(2), 233-247.

Keulemans, R. (2018). *Make it easy: How to reduce visual complexity of supermarkets in virtual reality* (bachelor thesis). Management and Consumer Studies, Wageningen University - Department of Social Sciences, Wageningen.

Kim, A. E., Nonnemaker, J. M., Loomis, B. R., Shafer, P. R., Shaikh, A., Hill, E., Hooloway, J. W., & Farrelly, M. C. (2014). Influence of point-of-sale tobacco displays and graphic health warning signs on adults: Evidence from a virtual store experimental study. American Journal of Public Health, 104(5), 888-895.

Langer, E. J. (1983), The Psychology of Control, Beverly Hills, CA: Sage.

Langer, E. J., & Saegart, S. (1977), "Crowding and Cognitive Control," Journal of Personality and Social Psychology, 35 (3), 175-182.

Larson, J. S., Bradlow, E. T., & Fader, P. S. (2005). An exploratory look at supermarket shopping paths. *International Journal of research in Marketing*, *22*(4), 395-414.

Lee, S. Y., Kim, J. O., & Li, J. G. (2011). Impacts of Store crowding on shopping behavior and store image. *Journal of Asian Architecture and Building Engineering*, 10(1), 133–140.

Lemon, K. N., White, T. B., & Winer, R. S. (2002). Dynamic customer relationship management: Incorporating future considerations into the service retention decision. *Journal of marketing*, *66*(1), 1-14.

Levav, J., & Zhu, R. (2009). Seeking freedom through variety. *Journal of Consumer Research*, *36*(4), 600-610.

Levy, M., Weitz, B. A., & Grewal, D. (2012). *Retailing management* (Vol. 6). New York, NY: McGraw-Hill/Irwin.

Liljander, V. and Strandvik, T. (1997). “Emotions in service satisfaction”, *International Journal of Service industry Management,* Vol. 8 No. 2, pp. 148-69.

Lin, I. Y. (2004). Evaluating a servicescape: the effect of cognition and emotion. *International Journal of Hospitality Management*, *23*(2), 163-178.

Lunardo, R., & Mbengue, A. (2009). Perceived control and shopping behavior: The moderating role of the level of utilitarian motivational orientation. *Journal of Retailing and Consumer Services*, *16*(6), 434-441.

Lynch, K. (1960). *The image of the city* (Vol. 11). MIT press.

Machleit, K.A., Eroglu, S.A., 2000. Describing and measuring emotional response to shopping experience. J. Bus. Res. 49 (2), 101–111.

Machleit, K. A., Kellaris, J. J., & Eroglu, S. A. (1994). Human versus spatial dimensions of crowding perceptions in retail environments: A note on their measurement and effect on shopper satisfaction. *Marketing Letters*, *5*(2), 183-194.

Massara, F., Liu, S. S., & Melara, R. D. (2010). Adapting to a retail environment: Modeling consumer–environment interactions. Journal of Business Research, 63(7), 673-681.

Maxham III, J. G., & Netemeyer, R. G. (2002). A longitudinal study of complaining customers' evaluations of multiple service failures and recovery efforts. *Journal of marketing*, *66*(4), 57-71.

McDaniel, S. W., & Burnett, J. J. (1990). Consumer religiosity and retail store evaluative criteria. *Journal of the Academy of marketing Science*, *18*(2), 101-112.

Mehrabian, A. & Russell, J. A. (1974). *An Approach to Environmental Psychology.* Cambridge, Mass.: MIT Press.

Mittal, V., Ross Jr, W. T., & Baldasare, P. M. (1998). The asymmetric impact of negative and positive attribute-level performance on overall satisfaction and repurchase intentions. *Journal of marketing*, *62*(1), 33-47.

Muthén, B., & Kaplan, D. (1985). A comparison of some methodologies for the factor analysis of non-normal Likert variables. *British Journal of Mathematical and Statistical Psychology*, *38*(2), 171-189.

Passini, R. (1984). *Wayfinding in Architexture.* New York: Van Nostrand Reinhold.

Ploydanai, K., van den Puttelaar, J., van Herpen, E., & van Trijp, H. (2017). Using a Virtual Store As a Research Tool to Investigate Consumer In-store Behavior. *JoVE (Journal of Visualized Experiments)*, (125), e55719.

Scherer, K. R., Schorr, A., & Johnstone, T. (Eds.). (2001). Appraisal processes in emotion: Theory, methods, research. Oxford University Press.

Sellers-Rubio, R., & Mas-Ruiz, F. (2006). Economic efficiency in supermarkets: evidences in Spain. *International Journal of Retail & Distribution Management*, *34*(2), 155-171.

Sherrod, Drury R., Jaime N. Hage, Phillip L. Halpern, and Bert S. More (1977), "Effects of Personal Causation and Perceived Control on Responses to an Aversive Environment: The More Control, The Better," Journal of Experimental Social Psychology, 13 (1), 14-27.

Snibbe, A. C., & Markus, H. R. (2005). You can't always get what you want: educational attainment, agency, and choice. *Journal of personality and social psychology*, *88*(4), 703.

Soderlund, M., & Ohman, N. (2003). Behavioral intentions in satisfaction research revisited. *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior*, *16*, 53.

Sorensen, H. (2009). The in-store “audience”. *Journal of Advertising Research*, *49*(2), 176-179.

Spies, K., Hesse, F., & Loesch, K. (1997). Store atmosphere, mood and purchasing behavior. *International Journal of Research in Marketing*, *14*(1), 1-17.

Staub, Ervin, Bernard Tursky, and Gary E. Schwartz (1971), "Self-Control and Predictability: Their Effects on Reactions to Aversive Stimulation," Journal of Personality and Social Psychology, 18 (2), 157-162.

Stephens, N. M., Markus, H. R., and Townsend, S. S. M. (2007), “Choice as an Act of Meaning: The Case of Social Class,” *Journal of Personality and Social Psychology*, 93 (November), 814–30.

Taylor, M.(2018, 23 February). Guest comment; Customers are frustrated with in-store shopping - they deserve better. Retrieved from: https://internetretailing.net/themes/themes/guest-comment-customers-are-frustrated-with-in-store-shopping--they-deserve-better-16085.

Titus, P., Everett, P., 1995. The consumer retail search process: a conceptual model and research agenda. J. Acad. Mark. Sci. 23 (2), 106–119.

Tversky, B. (1981). Distortions in memory for maps. *Cognitive psychology*, *13*(3), 407-433.

van Herpen, E. (2016). Product Category Layout and Organization: Retail Placement of Food Products. In *Reference Module in Food Science*. Elsevier.

van Rompay, T. J. L., Galetzka, M., Pruyn, A. T., & Garcia, J. M. (2008). Human and spatial dimensions of retail density: revisiting the role of perceived control. Psychology & Marketing, 25(4), 319-335.

van Rompay, T. J., Tanja-Dijkstra, K., Verhoeven, J. W., & van Es, A. F. (2012). On store design and consumer motivation: Spatial control and arousal in the retail context. Environment and Behavior, 44(6), 800-820.

Vogel, D.(2018, 13 May). Shopping in 2018: What entitled consumers really want from retail. Retrieved from https://www.selligent.com/blog/inspiration/shopping-2018-what-entitled-consumers-really-want-from-retail.

Vrechopoulos, A.P., O'Keefe, R.M., Doukidis, G.I., Siomkos, G.J., 2004. Virtual store layout: an experimental comparison in the context of grocery retail. J. Retail. 80, 13–22.

Waterlander, W., Mhurchu, C. N., & Steenhuis, I. (2012). The use of virtual reality in studying complex interventions in our every-day food environment. Virtual Reality – Human Computer Interaction. Ed. Xinxing, T., INTECH Open Access Publisher. doi: 10.5772/46410.

White, Robert W. (1959), "Motivation Reconsidered: The Concept of Competence," Psychological Review, 66 (5), 297-333.

Yap, S. F., & Kew, M. L. (2007). Service quality and customer satisfaction: antecedents of customer's re-patronage intentions. *Sunway Academic Journal*, *4*, 59-73.

Yu, Y. T., & Dean, A. (2001). The contribution of emotional satisfaction to consumer loyalty. *International journal of service industry management*, *12*(3), 234-250.

Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1996). The behavioral consequences of service quality. *Journal of marketing*, *60*(2), 31-46.

Appendices

I. VR store photos

Best visible using VR glasses.

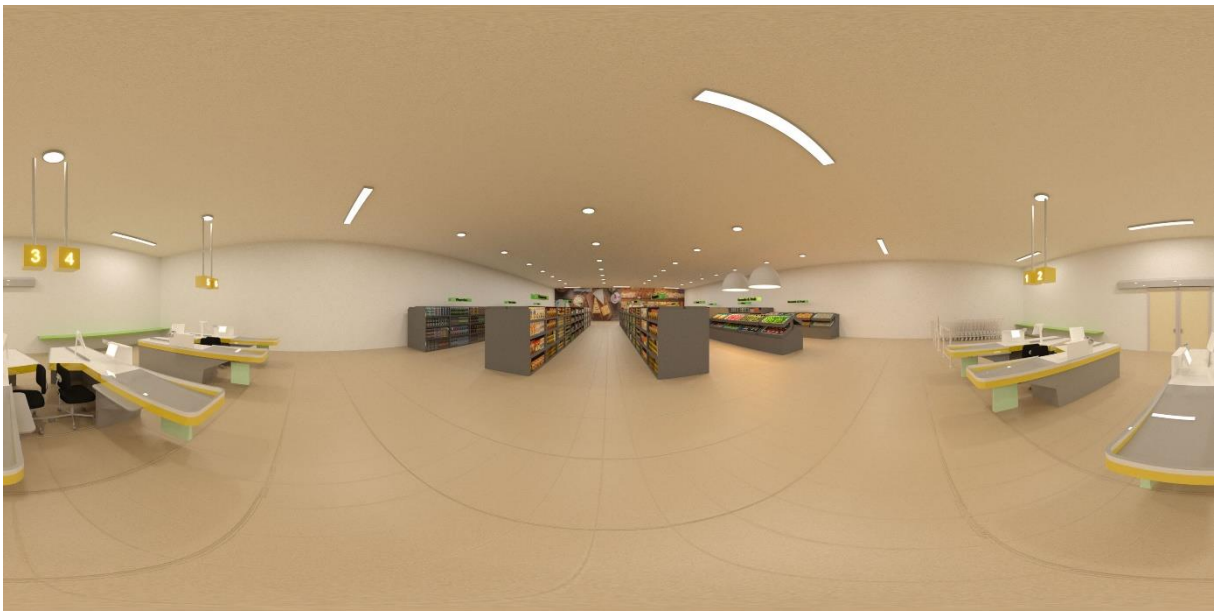
I.II ‘Long aisles’- grid layout

Point 1

Point 2

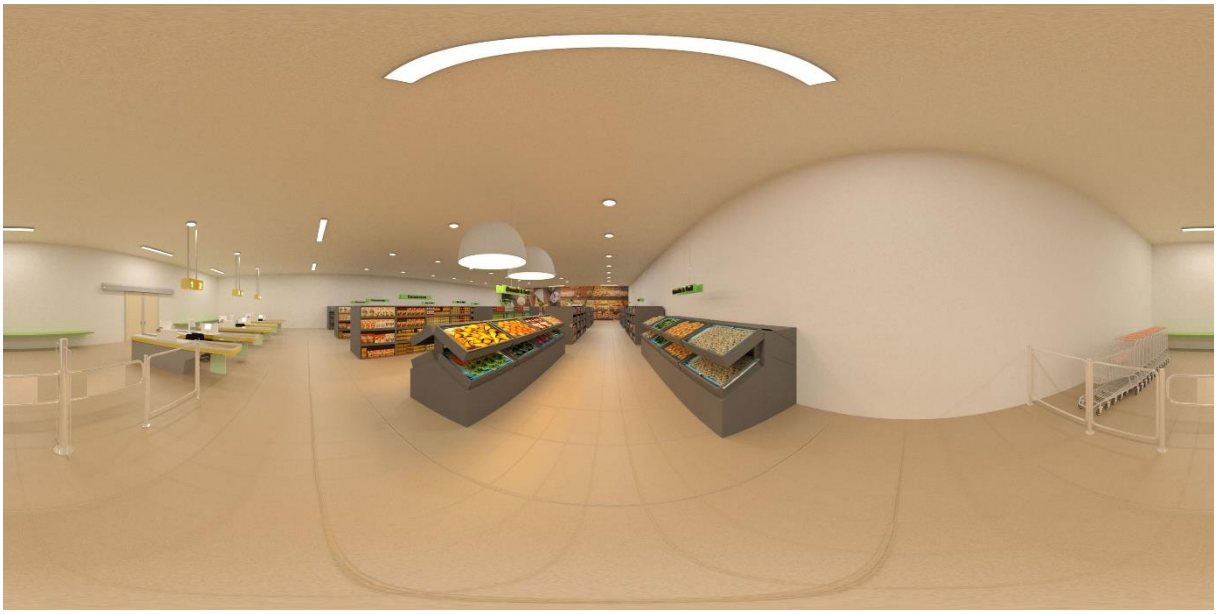
Point 3

Point 4



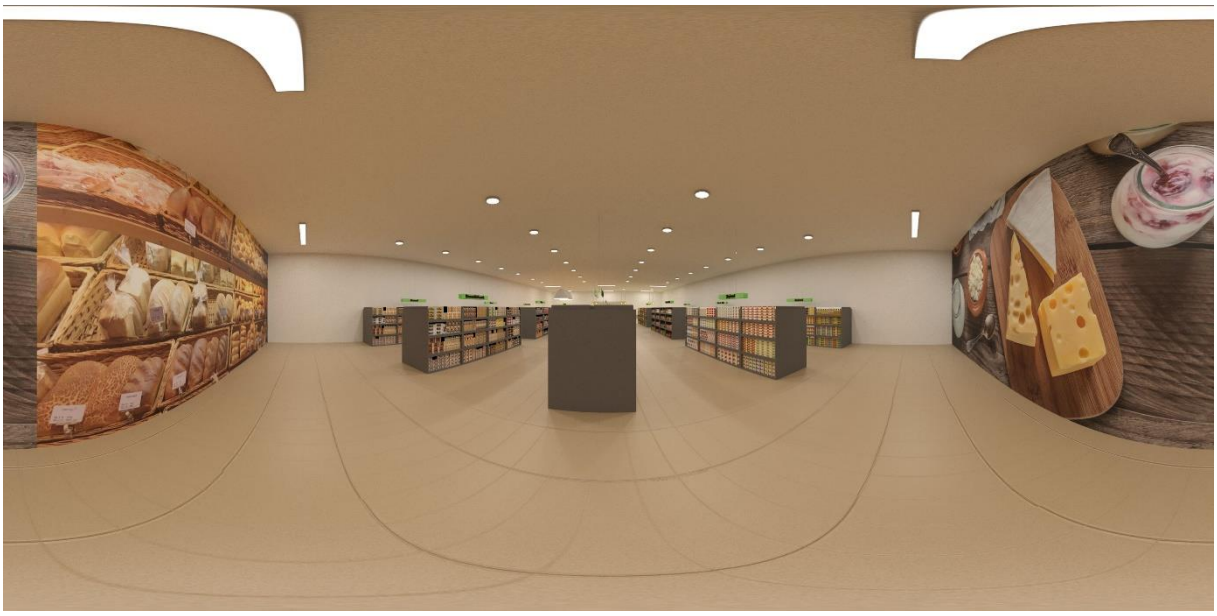
Point 5

I.II ‘Short aisles’- grid layout



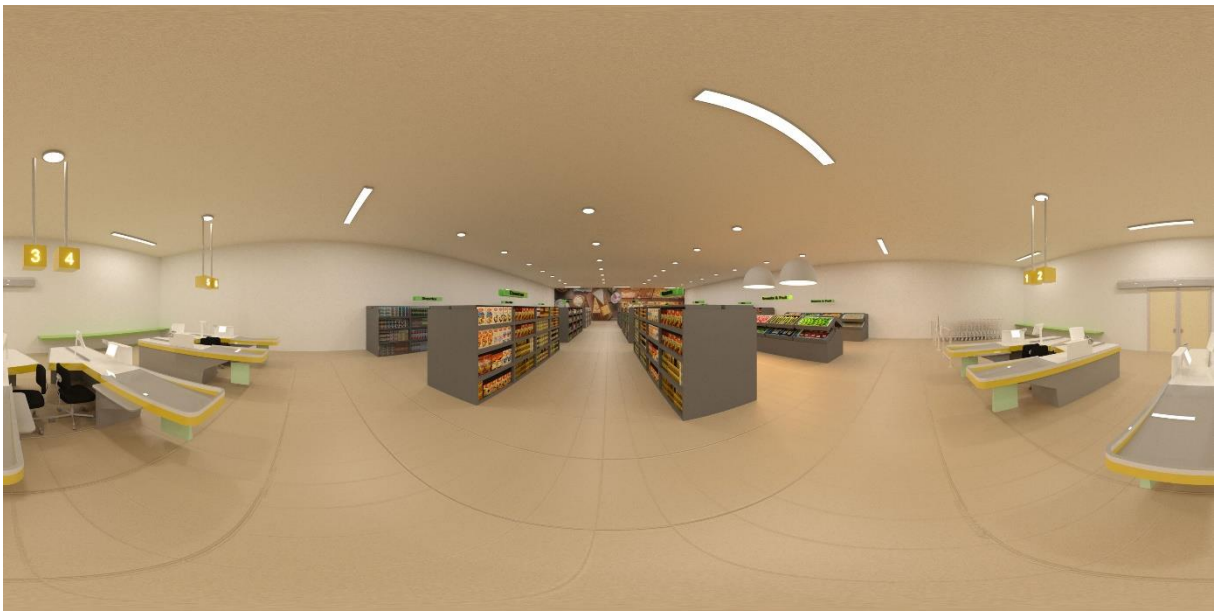
Point 1

Point 2



Point 3

Point 4

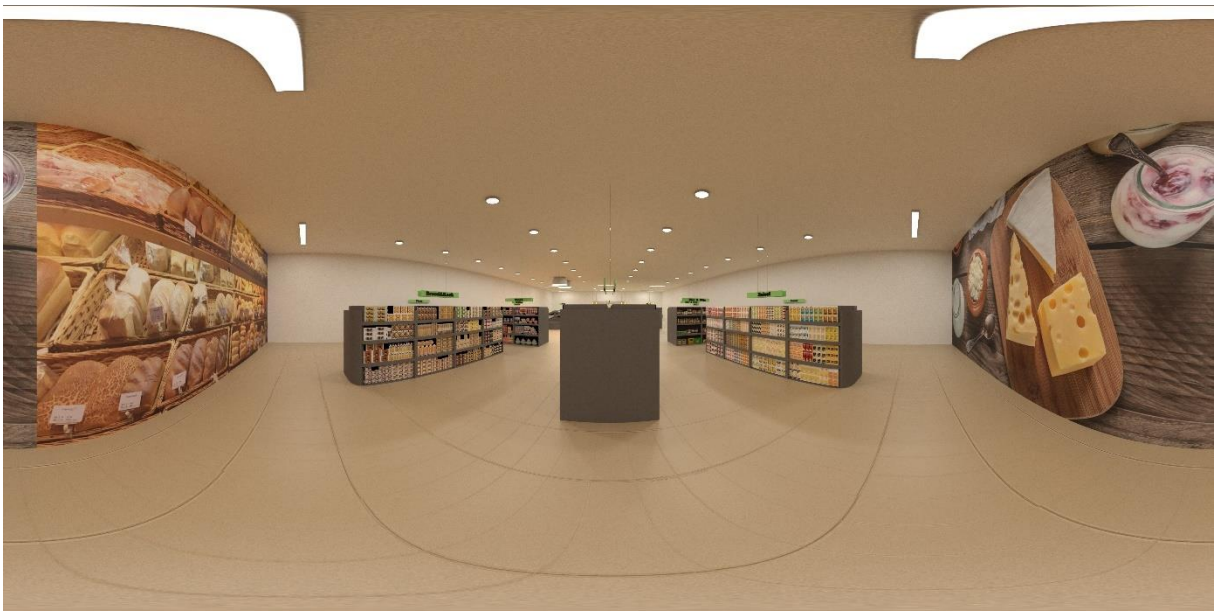


Point 5

I.III Free form layout

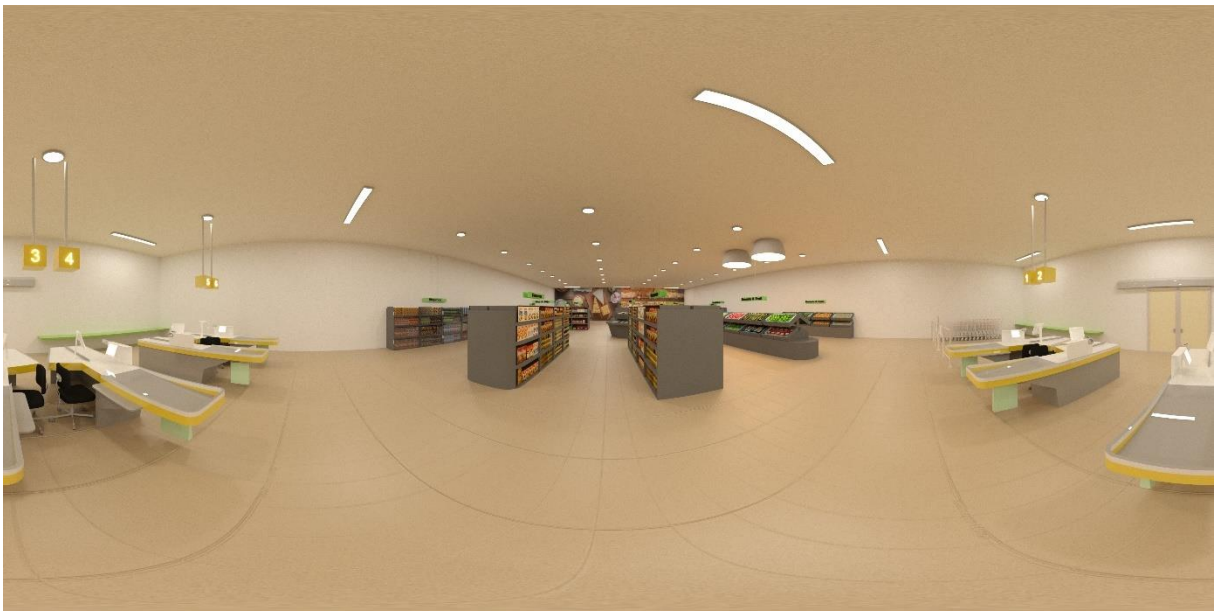
Point 1

Point 2



Point 3

Point 4



Point 5

II. Visibility product categories per layout

Camera	'Long aisles'- grid layout	'Short aisles'- grid layout	Free form layout
01	Vegetables and fruit	Vegetables and fruit	Vegetables and fruit
02	Meat, coffee and tea, bread, and candy	Meat, coffee and tea, bread, and candy	Bread, vegetables and fruit, coffee and tea, beer and wine, meat**, and frozen foods
03	Bread and dairy	Bread and dairy	Bread, meat**, dairy and beer and wine
04	Beer and wine, preservatives, and frozen foods	Beer and wine, preservatives* , and frozen foods	Beer and wine, coffee and tea, preservatives, and frozen foods
05	Frozen foods, preservatives, and vegetables and fruit	Frozen foods, preservatives, and vegetables and fruit	Frozen foods, preservatives, and vegetables and fruit

* You can see the shelfs, but the readability of the sign is low.

** You look upon the side of the self and sign, in such a way the products are not visible of the meat category. In the background a sign with 'meat' is visible. The following view point (03), does allow you to see the meat section, even though this is not visible from this viewpoint in the other layouts. Therefore, you can still view the meat section, only at a later viewpoint.

All in all, in the free form layout the visibility of the sign of product category is slightly higher than in the other two layouts (except for the 'meat' sign in viewpoint two), yet the some product categories are slightly further removed from the viewing point.

III. Cognitive mapping tasks

III.I Explanation

(In Dutch)

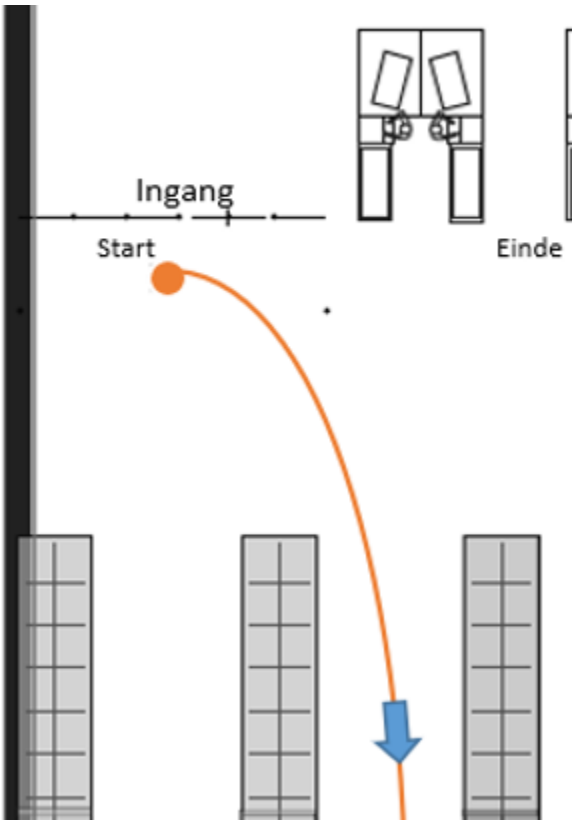
Dit onderdeel gaat over de product categorieën die je je kunt herinneren van de VR omgeving. De afbeelding op het volgende papier is de plattegrond van de supermarkt die je zojuist in de simulatie hebt ervaren. De lijnen met de pijlen geven aan hoe je door de supermarkt bent gelopen, en de punten geven de punten weer waarop je rond kon kijken in de simulatie.

Deze vraag bestaat uit twee stappen;

- Welke product categorieën heb je gezien in de VR simulatie van de winkel? Schrijf zo veel als je je kunt herinneren in de tabel.
- Teken de locatie en grootte van de product categorieën in de kaart van de winkel. Je kan hiervoor gebruik maken van de stiften. Voor de duidelijkheid kun je de lege vakjes in de tabel intekenen als een legenda, zie voorbeeld. (*In de versie voor de participant waren er een twee vakjes in de tabel en twee delen in het voorbeeld ingekleurd met viltstift)*

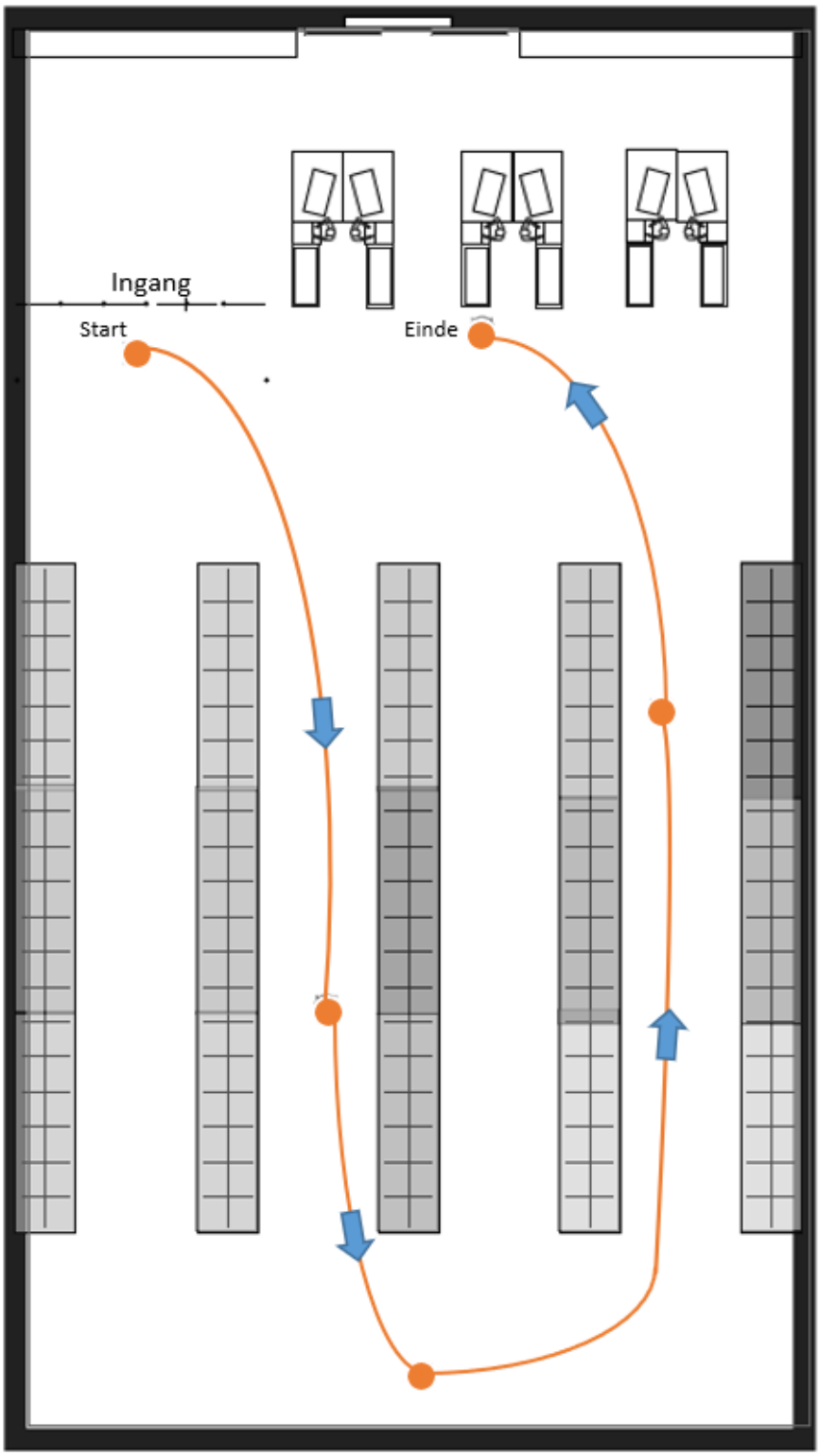
Participant nummer	*Voorbeeld*				
1. *XYZ*		5.		9.	
2. *ABC*		6.		10.	
3.		7.		11.	
4.		8.		12	

Voorbeeld;



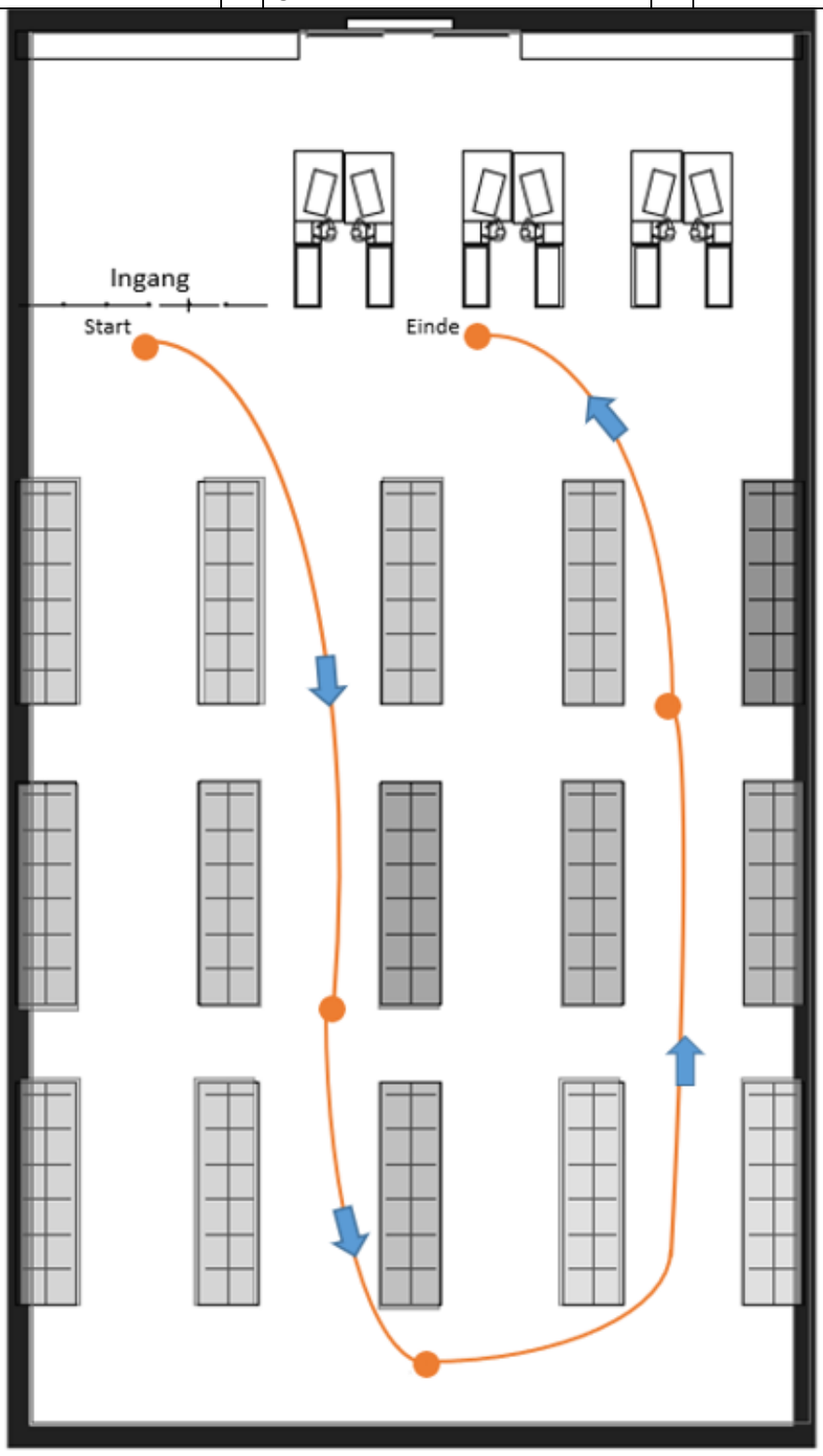
III.II Cognitive mapping task - ‘Long aisles’- grid layout

Participant nummer					
1.		5.		9.	
2.		6.		10.	
3.		7.		11.	
4.		8.		12	



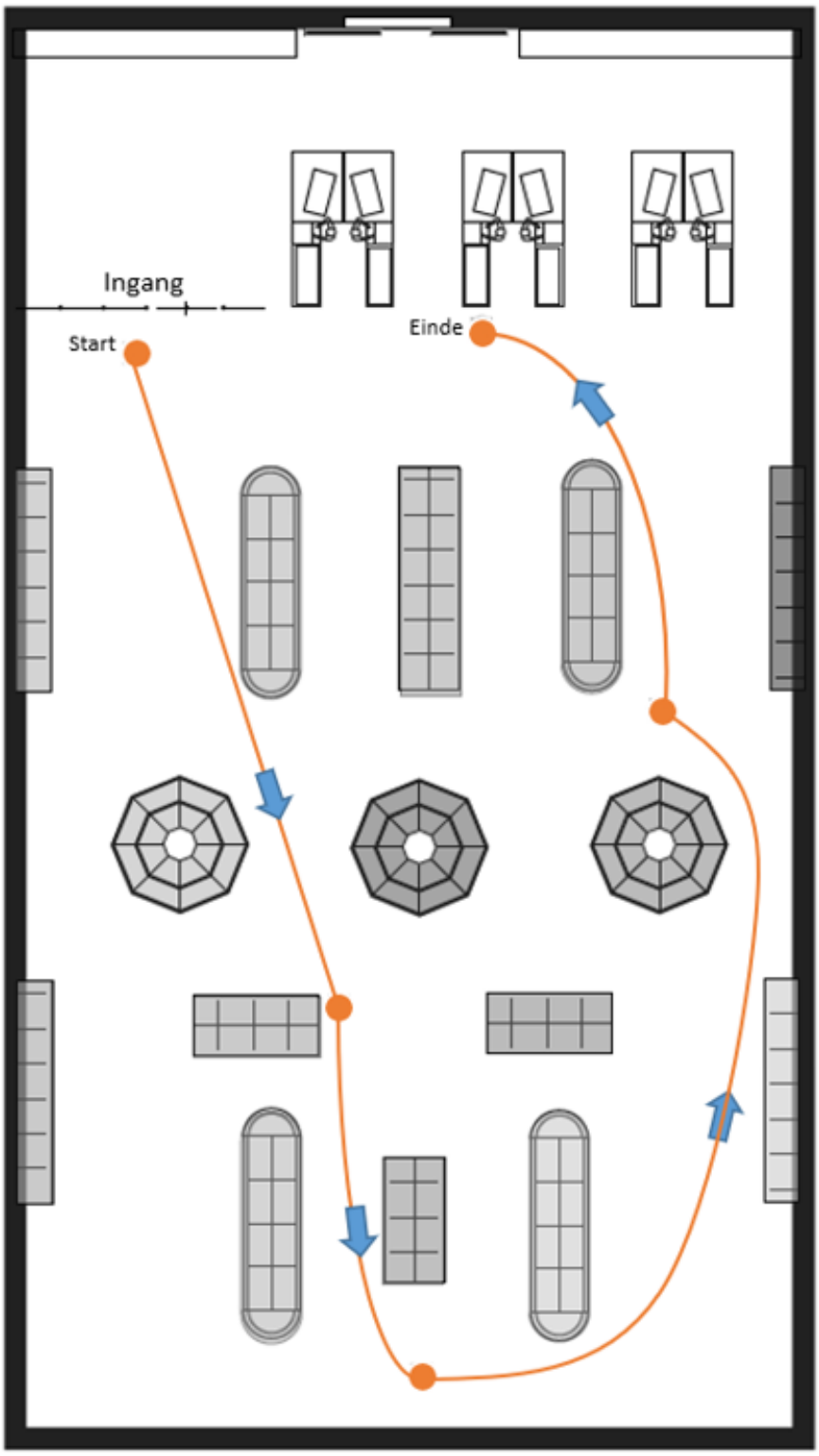
III.III Cognitive mapping task - 'Short aisles'- grid layout

Participant nummer					
1.		5.		9.	
2.		6.		10.	
3.		7.		11.	
4.		8.		12	



III.IV Cognitive mapping task - Free form layout

Participant nummer					
1.		5.		9.	
2.		6.		10.	
3.		7.		11.	
4.		8.		12	



IV. Questionnaire

Qualtrics screen	Question
1	Beste participant, Alvast bedankt dat je wilt deelnemen aan het onderzoek voor mijn master thesis! Het onderzoek zal ongeveer 15 minuten duren en bestaat uit drie verschillende onderdelen. Deelname aan dit onderzoek is anoniem en gegevens zullen met beleid worden behandeld. Daarnaast is het ten alle tijden mogelijk om de deelname te beëindigen of om een korte pauze te verzoeken. Door op het vervolg pijltje te klikken ga je akkoord met een deelname aan dit onderzoek.
2	Tijdens dit onderzoek ga je via een Virtual Reality (VR) simulatie een supermarkt omgeving evalueren. Na de simulatie krijg je een aantal vragen over deze omgeving. De bedoeling is om tijdens de simulatie goed rond te kijken (denk bijvoorbeeld aan indeling, wandelroutes of de producten die je ziet) om zo de winkel goed te kunnen beoordelen. In de simulatie is het niet mogelijk om daadwerkelijk producten op te pakken of te kopen.
3	Vraag de onderzoeker nu de VR bril bij je op te zetten.
4	Laat deze vraag invullen door de onderzoeker: Simulatie? A/B/C Laat deze vraag invullen door de onderzoeker: Token nummer?
5	Back to reality! Je bent nu toegekomen aan het tweede deel van het onderzoek. Draai het papier voor je om en beantwoord de vragen. Wanneer je hiermee klaar bent, kun je aan het laatste deel van dit onderzoek beginnen door op het pijltje rechts onderin te klikken.
6	Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: (7-point Likert scale ‘Volledig mee oneens’ tot ‘Volledig mee eens’) 1. De winkel oogt erg ruim. 2. De winkel heeft een open sfeer. 3. Ik zou mij benauwd voelen in deze winkel. 4. Deze winkel voelt beklemmend aan voor klanten.
7	Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: (7-point Likert scale ‘Volledig mee oneens’ tot ‘Volledig mee eens’) 1. Ik vind deze winkel goed ingedeeld. 2. Ik vind dat ik gemakkelijk kan vinden wat ik zoek in deze winkel. 3. Ik denk dat ik mij gemakkelijk door deze winkel kan bewegen.
8	Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: (7-point Likert scale ‘Volledig mee oneens’ tot ‘Volledig mee eens’) In deze winkel, …. 1. … voelt het alsof ik de regie in handen heb. 2. … voel ik mij invloedrijk. 3. … heb ik de controle. 4. … voel ik mij belangrijk. 5. … voel ik mij dominant. 6. … voel ik mij onafhankelijk.

9	Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: (7-point Likert scale 'Volledig mee oneens' tot 'Volledig mee eens') 1. In deze winkel voel ik mij tevreden. 2. In deze winkel voel ik mij gefrustreerd.
10	Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: (7-point Likert scale 'Volledig mee oneens' tot 'Volledig mee eens') 1. Ik voel mij tevreden over mijn ervaring in deze supermarkt. 2. Ik zal deze winkel in de toekomst waarschijnlijk weer bezoeken. Geef aan welk percentage jouw niveau van tevredenheid met deze supermarkt het beste omschrijft. (Slider met schaal van 0%-100% tevredenheid).
11	Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: (7-point Likert scale 'Volledig mee oneens' tot 'Volledig mee eens') 1. Tijdens deze winkel ervaring was ik gemotiveerd de supermarkt omgeving gericht te evalueren.
12	Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: (7-point Likert scale 'Volledig mee oneens' tot 'Volledig mee eens') 1. De VR technologie was zó nieuw voor mij, dat ik compleet ben vergeten om op de winkel omgeving te letten.
13	Wat is je leeftijd? (in jaren) Wat is je geslacht? Man/vrouw/anders/vermeld ik liever niet.
14	Geïnteresseerd in meer onderzoeken op het gebied van consumenten gedrag? Laat hieronder je e-mail adres achter!
15	Hartelijk dank voor je deelname aan mijn onderzoek! Neem gerust een chocolaatje als dank voor je deelname mee. Vond je het leuk om mee te doen aan dit onderzoek? Vertel het dan vooral aan je vrienden en laat ze langskomen tussen 13 en 17 mei in Forum!

Beste participant,

Alvast bedankt dat je wilt deelnemen aan het onderzoek voor mijn master thesis! Het onderzoek zal ongeveer 15 minuten duren en bestaat uit drie verschillende onderdelen. Deelname aan dit onderzoek is anoniem en gegevens zullen met beleid worden behandeld. Daarnaast is het ten alle tijden mogelijk om de deelname te beëindigen of om een korte pauze te verzoeken. Door op het vervolg pijltje te klikken ga je akkoord met een deelname aan dit onderzoek.

Screen 1

Tijdens dit onderzoek ga je via een Virtual Reality (VR) simulatie een supermarkt omgeving evalueren. Na de simulatie krijg je een aantal vragen over deze omgeving. De bedoeling is om tijdens de simulatie goed rond te kijken (denk bijvoorbeeld aan indeling, wandelroutes of de producten die je ziet) om zo de winkel goed te kunnen beoordelen. In de simulatie is het niet mogelijk om daadwerkelijk producten op te pakken of te kopen.

Screen 2

Vraag de onderzoeker nu de VR bril bij je op te zetten.

→

Screen 3

Laat deze vraag invullen door de onderzoeker: Simulatie?

- A
- B
- C

Laat deze vraag invullen door de onderzoeker: Token nummer?

→

Screen 4

Back to reality!

Je bent nu toegekomen aan het tweede deel van het onderzoek. Draai het papier voor je om en beantwoord de vragen.

Wanneer je hiermee klaar bent, kun je aan het laatste deel van dit onderzoek beginnen door op het pijltje rechts onderin te klikken.

→

Screen 5

Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent:

	Volledig mee oneens	Mee oneens	Enigszins mee oneens	Neutraal	Enigszins mee eens	Mee eens	Volledig mee eens
1. De winkel oogt erg ruim.	○	○	○	○	○	○	○
2. De winkel heeft een open sfeer.	○	○	○	○	○	○	○
3. Ik zou mij benauwd voelen in deze winkel	○	○	○	○	○	○	○
4. Deze winkel voelt beklemmend aan voor klanten	○	○	○	○	○	○	○

→

Screen 6

Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent:

	Volledig mee oneens	Mee oneens	Enigszins mee oneens	Neutraal	Enigszins mee eens	Mee eens	Volledig mee eens
1. Ik vind deze winkel goed ingedeeld.	○	○	○	○	○	○	○
2. Ik denk dat ik gemakkelijk kan vinden wat ik zoek in deze winkel.	○	○	○	○	○	○	○
3. Ik denk dat ik mij gemakkelijk door deze winkel kan bewegen.	○	○	○	○	○	○	○

→

Screen 7

Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent: In deze winkel, ...

	Volledig mee oneens	Mee oneens	Enigszins mee oneens	Neutraal	Enigszins mee eens	Mee eens	Volledig mee eens
1. ... voelt het alsof ik de regie in handen heb.	○	○	○	○	○	○	○
2. ... voel ik mij invloedrijk.	○	○	○	○	○	○	○
3. ... heb ik de controle.	○	○	○	○	○	○	○
4. ... voel ik mij belangrijk.	○	○	○	○	○	○	○
5. ... voel ik mij dominant.	○	○	○	○	○	○	○
6. ... voel ik mij onafhankelijk.	○	○	○	○	○	○	○

→

Screen 8

Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent:

	Volledig mee oneens	Mee oneens	Enigszins mee oneens	Neutraal	Enigszins mee eens	Mee eens	Volledig mee eens
1. In deze winkel voel ik mij tevreden.	○	○	○	○	○	○	○
2. In deze winkel voel ik mij gefrustreerd.	○	○	○	○	○	○	○

→

Screen 9

Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent:

	Volledig mee oneens	Mee oneens	Enigszins mee oneens	Neutraal	Enigszins mee eens	Mee eens	Volledig mee eens
1. Ik voel mij tevreden over mijn ervaring in deze supermarkt.	○	○	○	○	○	○	○
2. Ik zal deze winkel in de toekomst waarschijnlijk weer bezoeken.	○	○	○	○	○	○	○

Geef aan welk percentage jouw niveau van tevredenheid met deze supermarkt het beste omschrijft.

Totaal niet tevreden — Compleet tevreden

0 10 20 30 40 50 60 70 80 90 100

Tevredenheid %

→

Screen 10

Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent:

	Volledig mee oneens	Mee oneens	Enigszins mee oneens	Neutraal	Enigszins mee eens	Mee eens	Volledig mee eens
1. Tijdens deze winkel ervaring was ik gemotiveerd de supermarkt omgeving gericht te evalueren.	○	○	○	○	○	○	○

→

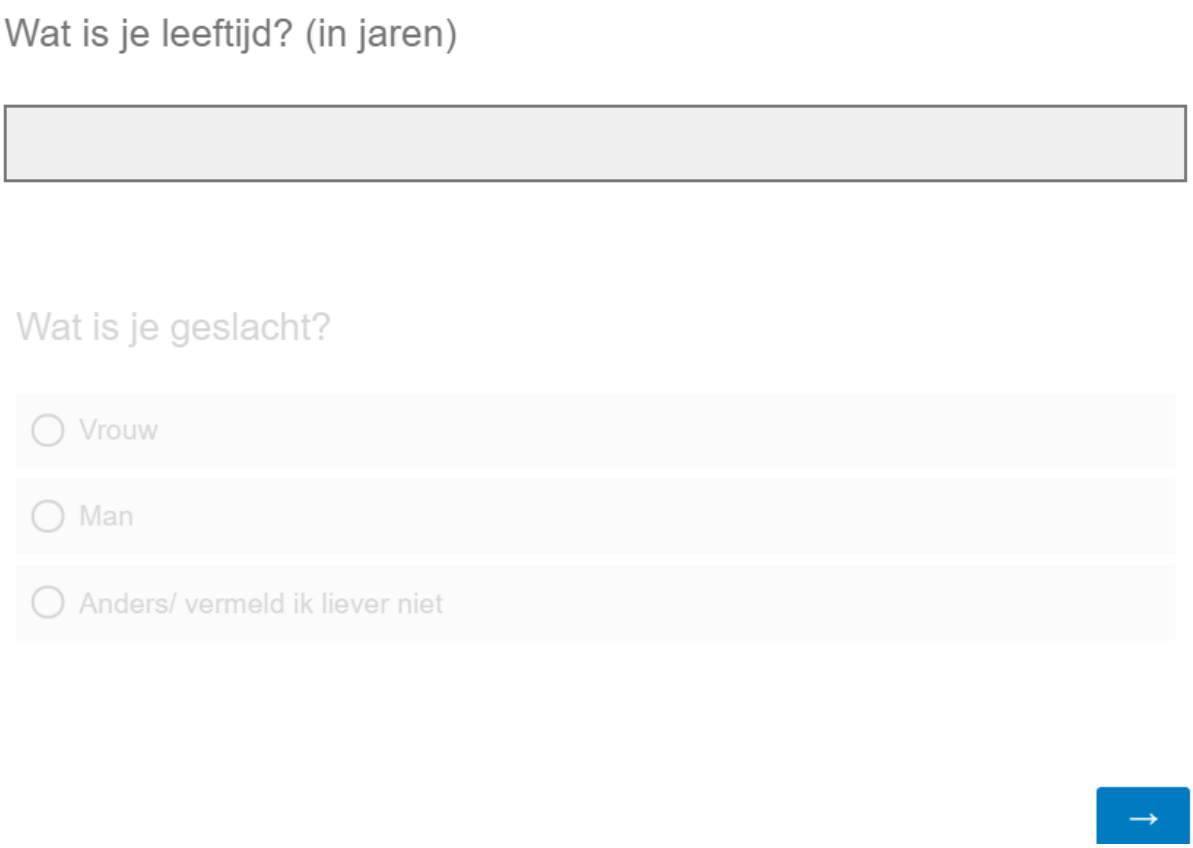
Screen 11

Geef aan in hoeverre je het met de volgende stellingen eens of oneens bent:

	Volledig mee oneens	Mee oneens	Enigszins mee oneens	Neutraal	Enigszins mee eens	Mee eens	Volledig mee eens
De VR technologie was zó nieuw voor mij, dat ik compleet ben vergeten om op de winkel omgeving te letten.	○	○	○	○	○	○	○

→

Screen 12


Wat is je leeftijd? (in jaren)
Wat is je geslacht?
Vrouw
Man
Anders/ vermeld ik liever niet
→

Screen 13

Geïnteresseerd in meer onderzoeken op het gebied van consumenten gedrag? Laat hieronder je e-mail adres achter!

Screen 14

Hartelijk dank voor je deelname aan mijn onderzoek! Neem gerust een chocolaatje als dank voor je deelname mee.
Vond je het leuk om mee te doen aan dit onderzoek? Vertel het dan vooral aan je vrienden en laat ze langskomen tussen 13 en 17 mei in Forum!

Screen 15

VI. Results tables

VI.I Demographics

Division of age and gender per group

Group	A	B	C
Male	21	11	15
% within group	*45,65%*	*23,91%*	*32,61%*
Female	25	35	31
% within group	*54,35%*	*76,09%*	*67,39%*
Total	**46**	**46**	**46**
Total percentage	*100%*	*100%*	*100%*

Means

Group	A	B	C	Total
Age	21.72	20.85	21.09	21.22
Motivation	4.52	4.78	5.04	4.78
VR Technology	4.50	4.22	4.37	4.36

VI.II Factor analysis

Structure matrix

Item	Component				
	Spatial freedom	Perceived control	Cognitive mapping ability	Expected shopping efficiency	Store satisfaction
'The store seemed very spacious'	**.722**	-.243	.179	-.331	-.056
'The store had an open feeling to it'	**.867**	-.202	.077	-.276	-.165
'I would feel cramped in this store'	**.877**	-.142	.027	-.296	-.205
'This store would feel confining to shoppers'	**.922**	-.200	.029	-.331	-.184
'I think this store is well organized'	.368	-.288	.020	**-.867**	-.238
'I think I can find easily what I am looking for'	.289	-.322	.166	**-.859**	.029
'I think I can move through this store easily'	**.582**	-.286	.144	**-.634**	.259
'In this store environment, I feel controlling'	.222	**-.828**	-.007	**-.406**	-.112
'In this store environment, I feel influential'	.143	**-.814**	.002	-.013	-.356
'In this store environment, I feel in control'	.288	**-.755**	.162	**-.470**	-.271
'In this store environment, I feel important'	.190	-.388	.013	-.119	**-.822**
'I feel satisfied with my experience at this supermarket'	**.635**	**-.511**	.144	**-.564**	**-.529**
'Please indicate the percentage best describing your level of satisfaction experienced in this supermarket'	**.653**	-.333	.039	**-.578**	**-.596**
'Write down all the product categories you can remember'.	.099	-.013	**.952**	-.049	.018
'Allocate these product categories on map'.	.041	-.046	**.958**	-.096	.027
Eigenvalues	5.475	1.895	1.854	1.300	0.855
% of variance	36.497	12.630	12.363	8.667	5.702

Scales

Spatial freedom	*Factor loading*	*Reliability*
1. 'The store seemed very spacious'	.530	.879
2. 'The store had an open feeling to it'	.777	
*3. 'I would feel cramped in this store'**	.784	
*4. 'This store would feel confining to shoppers'**	.854	

* Reverse coded

Expected shopping efficiency	*Factor loading*	*Reliability*
1. 'I think this store is well organized'	.701	.765
2. 'I think I can find easily what I am looking for'	.754	
3. 'I think I can move through this store easily'	.592	

Perceived control	*Factor loading*	*After exclusion*	*Reliability*
1. 'In this store environment, I feel controlling'	.516	.600	.767
2. 'In this store environment, I feel influential'	.482	.610	
3. 'In this store environment, I feel in control'	.611	.621	
4. 'In this store environment, I feel important'	.438	.374	
~~*5. 'In this store environment, I feel dominant'*~~	.349	-	
~~6. 'In this store environment, I feel autonomous'~~	.390	-	

Store satisfaction	*Factor loading*	*Reliability*
1. 'I feel satisfied with my experience at this supermarket'	.894	.871
2. 'Please indicate the percentage best describing your level of satisfaction experienced in this supermarket'	.894	

Cognitive mapping ability	*Factor loading*	*Reliability*
1. Write down all the product categories you can remember. *2. Allocate these product categories on map.*	.919 .919	.911

VI.III Normality

		Kolmogorov-Smirnov		Shapiro-Wilks	
	Df	Statistic	Sig.	Statistic	Sig
Spatial Freedom	138	.167	.000	.900	.000
Expected Efficiency	138	.160	.000	.921	.000
Perceived Control	138	.098	.002	.976	.015
Re-patronage intention	138	.181	.000	.919	.000
Store Satisfaction	138	.125	.000	.944	.000
Cognitive mapping ability	138	.105	.001	.961	.001
Utilitarian motivation	138	.239	.000	.904	.000
Newness of VR Technology	138	.224	.000	.886	.000
Age	138	.180	.000	.833	.000
Gender	138	.422	.000	.598	.000

VI.IV Correlation matrix

	Mean	SD	Spatial Freedom	Expected Efficiency	Perceived Control	Satisfaction	Frustration	Re-patronage Intention	Store Satisfaction	CMT
Spatial freedom	5.1268	1.35	1							
Expected Efficiency	5.1184	1.10	.453**	1						
Perceived Control	4.1105	.94	.283**	.384**	1					
Satisfaction	4.6500	1.37	.585**	.522**	.525**	1				
Frustration	3.1400	1.44	.500**	.505**	.459**	.787 **	1			
Repatronage intention	4.4400	1.43	.527**	.489**	.411**	.679**	-.590**	1		
Store Satisfaction	.6746	.17	.625**	.542**	.551**	.811**	-.719**	.805**	1	
CMT	.3778	.18	.072	.099	.032	.036	-.051	.040	.081	1