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DOCTORAL DISSERTATION

Olfactory marketing: The role of ambient scents in a shopping experience

Doctoral dissertation submitted to obtain the degree of
Doctor of Applied Economic Science, to be defended by

Lieve Doucé

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fwo

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Summary

Atmospheric elements such as lights, music, and scents make up the physical environment of a store and can have an impact on consumers' shopping behavior. This doctoral dissertation aims to provide a better understanding of the effects of ambient scent in the store environment on consumer reactions. Specifically, the moderating role of individual differences (chapter 2 and 3), product congruency (chapter 4 and 5) and congruency with other atmospheric elements (chapter 6 and 7) on scent effects as well as the effect of scent on memory and assortment perceptions of a whole product category (chapter 8), are examined.

In **chapter 1**, olfactory marketing is first positioned in a broader field of retailing, customer experience and retail design. Next, the academic literature on sensory marketing and olfactory marketing is discussed. Finally, an overview of the research objectives and the remainder of the dissertation is given.

In **chapter 2**, the moderating role of individual differences on scent effects is examined. Not every consumer is influenced equally by the presence of a scent. We study whether affect intensity (i.e., the degree to which people respond to emotional stimuli) and hedonic shopping motivation (i.e., shopping because of the shopping experience) influence the relationship between ambient scent and consumer reactions. A field experiment shows that consumers who scored high on affect intensity and consumers who score low on hedonic shopping motivation are more sensitive to the presence of a scent in the shopping environment, which leads to enhanced positive affect, evaluations, and approach

behaviors. **Chapter 3** continues the research on the moderating role of individual differences on scent effects; in this chapter, scent expertise is studied. Previous research found that an ambient scent only leads to positive reactions when it is congruent with the product under evaluation. However, we demonstrate that this congruency effect may be influenced by the consumers' ability to recognize a scent. Specifically, findings indicate that in the presence of an ambient scent, scent experts (i.e., people who have learned to identify scents) evaluate a product incongruent with the ambient scent less positively than laymen.

The relationship between ambient scent and consumer responses can also be influenced by the congruency of the scent with the product sold in the store. In **chapter 4**, the effect of thematic congruency between a scent and products without direct scent properties is investigated. A field experiment in a bookstore shows that a pleasant ambient scent positively influences approach and buying behavior toward thematically congruent books and negatively influences approach and buying behavior toward incongruent books. However, **chapter 5** demonstrates that, in certain well-defined cases, product-scent incongruity can have a positive effect on consumer reactions. This positive effect of product-scent incongruity was found in a men's and women's clothing store where a gender-(in)congruent ambient perfume was dispersed.

The congruency between scent and other atmospheric elements in the store environment can also affect the impact of an ambient scent on consumer responses. **Chapter 6** studies the combined effects of ambient scent and overall light. Scent and light are (mis)matched with each other based on semantic

associations (i.e., warm/cold and dim/bright). Results indicate that matching scent and light leads to enhanced consumer reactions than mismatching these atmospheric cues. In **chapter 7**, the combined effects of ambient scent and store neatness are examined. In particular, we study the effect of pleasant scents (not) associated with neatness on consumer evaluations of a tidy versus a messy store and demonstrate that a pleasant ambient scent cannot overcome a negative store element like store messiness. In a messy store, the pleasant scent even has a negative effect on product evaluations, unless the scent is associated with the negative element the retailer is trying to cover up.

Chapter 8 explores the effect of an ambient scent on consumers' memory and assortment evaluations of scent-congruent and scent-incongruent products when exposed to a large assortment. Additionally, the moderating role of product category familiarity is examined. However, findings suggest that an ambient scent does not influence consumers' memory and their assortment perceptions when they are exposed to a lot of products at the same time.

In **chapter 9**, a summary of our findings and the managerial implications are presented. Moreover, the cost of scent marketing and some ethical reflections of diffusing scents in a store are discussed. Finally, an overview of interesting opportunities for future research is provided.

Samenvatting

Atmosferische elementen zoals licht, muziek en geur maken deel uit van de winkelomgeving en kunnen het koopgedrag van de consument beïnvloeden. Het doel van dit proefschrift is om meer inzicht te krijgen in de effecten van een omgevingsgeur in de winkel op consumentenreacties. Meer bepaald wordt er onderzoek gedaan naar de modererende rol van individuele verschillen (hoofdstuk 2 en 3), van de gepastheid van de geur met de aangeboden producten (hoofdstuk 4 en 5), en van de combinatie van geur en andere atmosferische elementen (hoofdstuk 6 en 7) op geureffecten. Eveneens wordt het effect van geur op de herinnering en de assortimentspercepties van een hele productcategorie onderzocht (hoofdstuk 8).

In **hoofdstuk 1** wordt geurmarketing eerst gepositioneerd in een bredere context van retailing, klantbeleving en retail design. Vervolgens wordt de academische literatuur over zintuiglijke marketing en geurmarketing besproken. Ten slotte wordt er een overzicht gegeven van de onderzoeksobjectieven en de opbouw van deze doctoraatsthesis.

In **hoofdstuk 2** wordt de modererende rol van individuele verschillen op het effect van geur onderzocht. Niet elke consument wordt in gelijke mate beïnvloed door de aanwezigheid van een geur. We bestuderen of affect intensiteit (i.e., de mate waarin mensen reageren op emotionele stimuli) en hedonistische winkelmotivatie (i.e., winkelen omwille van winkelervaring) de relatie tussen omgevingsgeur en consumentenreacties beïnvloeden. Een veldexperiment toont aan dat consumenten die sterk reageren op emotionele prikkels en mensen die

laag scoren op hedonistische winkelmotivatie gevoeliger zijn voor de aanwezigheid van een geur in een winkelomgeving, wat leidt tot zowel positievere emotionele reacties en evaluaties als meer toenaderingsgedrag. **Hoofdstuk 3** zet het onderzoek naar de modererende rol van individuele verschillen verder. In dit hoofdstuk wordt geurexpertise onderzocht. Eerder onderzoek stelde vast dat een omgevingsgeur enkel leidt tot positievere reacties wanneer de geur past bij het geëvalueerde product (i.e., congruentie-effect). We tonen echter aan dat dit congruentie-effect beïnvloed kan worden door de geurherkenningscapaciteit van de consumenten. In het bijzonder geven onze resultaten aan dat in de aanwezigheid van een omgevingsgeur, geurexperten (i.e., mensen die geleerd hebben om geuren te herkennen) een product dat niet past bij de omgevingsgeur minder positief beoordelen dan leken.

De relatie tussen omgevingsgeur en consumentenreacties kan ook beïnvloed worden door de mate waarin de geur past bij de aangeboden producten. In **hoofdstuk 4** wordt het effect van een thematische 'fit' tussen geur en producten zonder directe geureigenschappen bestudeerd. Een veldexperiment in een boekenwinkel toont dat een aangename omgevingsgeur toenaderingsgedrag naar en koopgedrag van boeken die thematisch passen bij de geur positief beïnvloedt en toenaderingsgedrag naar en koopgedrag van boeken die thematisch niet passen bij de geur negatief beïnvloedt. Hoofdstuk 5 toont echter aan dat in bepaalde gevallen een omgevingsgeur die niet past bij de producten toch een positief effect kan hebben op consumentenreacties. Dit positieve effect werd gevonden in een mannen- en vrouwenkledingwinkel waar een parfum niet passend bij het geslacht verspreid werd.

De mate waarin de geur past bij de andere atmosferische elementen kan ook het effect van een omgevingsgeur beïnvloeden. **Hoofdstuk 6** bestudeert de gecombineerde effecten van omgevingsgeur en licht. Geur en licht worden op elkaar afgestemd op basis van semantische associaties (i.e., warm/koud en duister/helder). Resultaten tonen dat consumentenreacties positiever zijn wanneer geur en licht op elkaar zijn afgestemd dan wanneer zij niet op elkaar zijn afgestemd. In **hoofdstuk 7** worden de gecombineerde effecten van omgevingsgeur en winkelnetheid onderzocht. Meer bepaald bestuderen we het effect van aangename geuren (niet) geassocieerd met netheid op consumentenevaluaties van een ordelijke en een wanordelijke winkel en vinden we dat een omgevingsgeur negatieve elementen zoals rommeligheid niet kan compenseren. In een wanordelijke winkel heeft een aangename omgevingsgeur zelfs een negatief effect op productevaluaties, tenzij de geur geassocieerd is met het negatieve element dat de winkelier probeert goed te maken.

Hoofdstuk 8 bestudeert het effect van omgevingsgeur op het geheugen en de assortimentsevaluaties van consumenten wanneer zij worden blootgesteld aan een groot assortiment. Ook wordt de modererende rol van vertrouwdheid met de productcategorie onderzocht. De bevindingen geven echter aan dat een omgevingsgeur geen effect heeft op het geheugen en de assortimentspercepties van de consumenten wanneer ze veel producten tegelijkertijd zien.

In **hoofdstuk 9** worden onze bevindingen samengevat en de praktische implicaties besproken. Vervolgens worden de kosten van geurmarketing en enkele ethische reflecties bediscussieerd. Ten slotte wordt een overzicht van interessante opportuniteiten voor vervolgonderzoek gegeven.

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Chapter 1

Olfactory marketing: Introduction and research objectives

The aim of this dissertation is to study the influence of ambient scent on shopping behavior. In this chapter, we first position the research topic in a broader field of retailing, customer experience and retail design. Second, an overview of the academic literature on sensory marketing and olfactory marketing is provided and the research objectives of this doctoral dissertation are put forward. In particular, the moderating role of non-atmospheric elements (i.e., individual differences and product congruency) and other atmospheric cues (i.e., light and tidiness) on scent effects as well as the impact of scent on memory and assortment perceptions of a whole product category are studied. Examining the moderating effect of non-atmospheric elements and the interaction of scent with other atmospheric cues allows us to find out which moderators are relevant and will provide new insights and nuance existing findings.

1.1 Retailing and store differentiation

In this dissertation, the effect of a pleasant ambient scent added to a retail environment on consumer reactions is studied. A retailer is defined as "any establishment engaged in selling merchandise for personal or household consumption and rendering services incidental to the sales of such goods" (Baker, 1998; in Varley & Rafiq, 2014, p. 2) and is one possible intermediary in the distribution channel from which products produced by a manufacturer reach consumers. Nowadays the retail market has become very competitive and retailers often offer homogenous products and services (for an overview, see Willems, 2012). This means that consumers can chose between various alternatives to satisfy their needs. To attract customers, retailers are continuously looking for differentiation strategies. A differential advantage adds value to the shopping process (Varley & Rafiq, 2014), allows retailers not to focus merely on price as a differentiation tool (Turley & Chebat, 2002), and is expected to increase profitability and long-term customer loyalty (Zentes, Morschett, & Schramm-Klein, 2011). Differentiation can be achieved through diverse strategies such as offering a superior level of customer service, offering a flexible shopping format, providing a higher level of corporate responsibility, or staging unforgettable customer experiences (e.g., Varley & Rafiq, 2014; Verhoef, Lemon, Parasuraman, Roggeveen, Tsiros, & Schlesinger, 2009).

1.1.1 Experience economy

Because homogenization of products and services is widespread, one of the main goals of retail environments today is differentiation through staging unforgettable customer experiences (Verhoef et al., 2009). Experiences provide

"sensory, emotional, cognitive, behavioral and relational values that replace functional values" (Schmitt, 1999, p. 57) and have become a key element in the understanding of hedonic consumer behavior (Petermans, 2012). Experiential marketers view consumers as rational and emotional creatures that like to encounter pleasant experiences (Schmitt, 1999). In a retail context, this entails a shift from an emphasis on products and services to the creation of customer experiences in the store (Soars, 2009).

Pine and Gilmore (1999) were the first to use the term Experience Economy as the new emerging economy following the agrarian, goods-based industrial and service economy. This progression of economic value is illustrated with the example of a cup of coffee. In the agrarian economy, coffee beans (i.e., commodities) are harvested and sold at a relatively low value. In the goods-based industrial economy, the coffee beans are turned into a good by grinding, packaging, and selling them in diverse retail channels. The price per cup of homemade coffee (i.e., €0.10 – €0.20) increases in comparison to the cup of coffee made on the basis of coffee beans. In the service economy, people can go to a coffee bar where the coffee is made and served to the customer's table. Again, the price of a cup of coffee is increased to approximately €2 to €3. In the experience economy, people not only pay for a cup of coffee, but also for the experience offered by the store. For example, a coffee at Starbucks costs approximately €5. The customer is willing to pay more for the experience. In the experience economy, companies aim to stage a meaningful experience by engaging customers in a personal and memorable way (Pine & Gilmore, 1999).

Pine and Gilmore (1999) have identified five key experience-design principles that companies should take into account when staging an experience for their customers. First, the company should use a well-defined theme. The theme has to appeal to the customer and characterize the company. Second, the experience must be memorable and rendered with unforgettable impressions. These impressions can be created with the aid of positive cues that support the nature of the experience. Every cue should be consistent with one another and with the theme. Third, negative elements that distract from the theme should be eliminated. Fourth, experience stagers should offer memorabilia, that is, things that the customer can take home to remind him of the visit. Fifth, the experience should engage all five senses. The more senses are triggered, the more effective and unforgettable the experience will be. Additionally, Pine and Gilmore (1999) also stated that every experience is personal. Because an experience is a result of the interaction between an organized setting and the condition of the customer at the time of the interaction, it cannot be experienced in the exact same way by different people.

The starting point of the process of experiencing is sensory perception (see Figure 1.1; Boswijk, Thijssen, & Peelen, 2008). Sensory perception is "the awareness or understanding of sensory information" (Krishna, 2012, p. 334). People use their senses to gather information of the world around them and of their bodies. Besides the reception of sensory information, sensory perception also entails the unconscious interpretation of these impressions in light of earlier experiences. Next, sensory perception leads to emotions. Emotions are "an involuntary, unintended, non-deliberate way of dealing with the outside world"

and have an affective and cognitive component (Frijda, 1986; in Boswijk et al., 2008, pp. 21-22). The experienced emotions entail an evaluation of the context (e.g., the store) and largely determine a person's behavior in this context. These emotions can subsequently lead to an experience (i.e., *Erlebnis* or *Belevenis*) defined as "an immediate, relatively isolated occurrence with a complex of emotions that make an impression and represent a certain value for the individual within the context of a specific situation" (Boswijk et al., 2008, p. 22). Experiences provide sensory, emotional, cognitive, behavioral, and relational values that go beyond functional values (Schmitt, 1999). A meaningful experience (i.e., *Erfahrung* or *Ervaring*) is the sum of all the interactions that people have with the environment or with others (Boswijk et al., 2008). It includes all kind of experiences and has no clear beginning for end. A meaningful experience differs from an experience in that way that a meaningful experience comprises an important learning component. It involves know-how that people have obtained after experiencing multiple interactions.

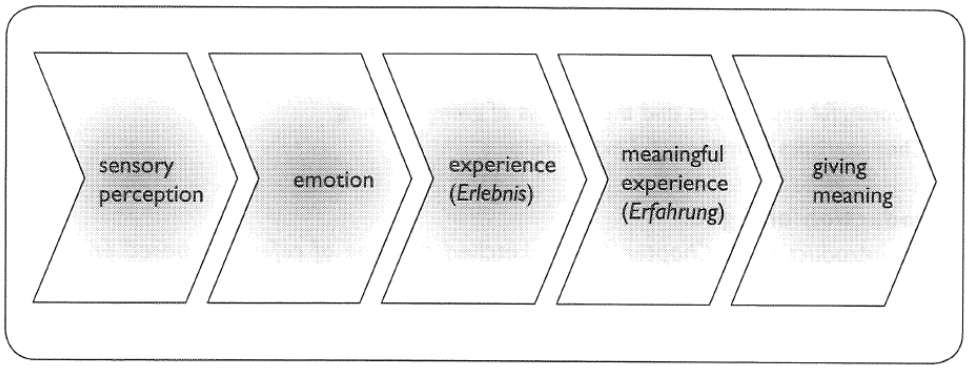

Figure 1.1. The process of experiencing (Boswijk, Thijssen, & Peelen, 2008).

In this dissertation, we mainly focus on experience as *Belevenis*. We study whether atmospheric cues —mainly the presence of an ambient scent— can engage consumers and create a pleasant meaningful experience within the store environment, leading to enhanced consumer reactions. However, as experience is a holistic concept, both types of experiences cannot be fully separated from each other.

1.1.2 Customer experience and retail design

Atmospheric cues, or the retail store environment, can be used by retailers to create a context in which customers can immerse themselves and co-create a pleasant experience (e.g., Petermans, 2012; Soars, 2009). Kotler (1973) was the first to consider store atmosphere as a marketing tool and defined "atmospherics" as "the effort to design buying environments to produce specific emotional effects in the buyer that enhance his purchase probability" (p. 50). Atmospherics are a part of retail design, a rising domain in the field of interior design (Petermans & Van Cleempoel, 2009). Retail design entails diverse aspects that should be well-thought-out when designing retail store environments. It includes tangible elements (e.g., store facade) as well as intangible elements (e.g., scents) of a retail store design and an understanding of how different elements will work aesthetically within the store environment and how they will perform functionally and commercially (Kindleysides, 2007; in Petermans & Van Cleempoel, 2009).

As mentioned above, the starting point of the process of experiencing is sensory perception (Boswijk, Thijssen, & Peelen, 2008). Consumer use their senses to

gather information of the store and it products. This means that sensory marketing can be applied to improve the customer experience in the store (e.g., Krishna, 2012; Soars, 2009). Krishna (2012) described sensory marketing as "marketing that engages the consumers' senses and affects their perception, judgment and behavior" (p. 332).

Before discussing sensory marketing and its theoretical foundation, we make clear that the physical store continues to be important in a new age of online retailing.

1.1.3 Physical retail environments versus online retail environments

In the last decade online shopping rapidly entered the retail scene. Some authors predicted the arrival of a new age of shopping defined by electronic media and stated that the physical retail environments would soon be turned into dead weight (Gerbert, Schneider, & Birch, 1999). The success of online retailers like Amazon at the end of the 1990s, caused traditional retailers to add a virtual store to their multichannel distribution strategy (Turley & Chebat, 2002). Today, many consumers shop for a wide variety of products and services on the Internet (Petermans, 2012). Online shopping offers consumers advantages such as ease and convenience; however, it also has some disadvantages. One of the most important weaknesses of this medium is the absence of a physical setting consisting of atmospheric variables that completely surround the products and stimulate consumers' senses (Turley & Chebat, 2002). Online retail environments can also create an atmosphere that influences

consumer reactions (Eroglu, Machleit, & Davies, 2003). However, a physical retail environment enables consumers to be immersed in the atmosphere to a greater extent than a purely online retail environment (Petermans, 2012). For example, the online atmosphere usually lacks tactical and olfactory cues. Moreover, besides a qualitative product, customers today also value an excellent in-store service, an appealing and experiential store atmosphere, nice packaging, etc. (Petermans, 2012). In-store experiences can be the foundation of a longer-term relationship between customer and retailer (Grewal, Roggeveen, Puccinelli, & Spence, 2014). These in-store experiences lead to pleased customers that continue to come back to the store. Hence, the physical store continues to play an important role in the current retail landscape.

The shift toward an experience economy and the altered, yet continued importance of the physical store demonstrate the value of sensory marketing. In the next section, we will focus on sensory marketing and its theoretical foundation.

1.2 Sensory marketing

Sensory marketing is an element of experiential marketing. Experiential marketers view consumers as rational and emotional creatures that want to achieve pleasant experiences (Schmitt, 1999). In a retail context, this entails a shift from an emphasis on products and services to the creation of customer experiences in the store (Soars, 2009). Schmitt (1999) defined sensory marketing as follows:

> Sense marketing appeals to the senses with the objective of creating sensory experiences through sight, sound, touch, taste and smell. Sense marketing may be used to differentiate companies and products, to motivate customers and to add value to products (e.g., through aesthetics or excitement). (p. 61)

This definition is in line with Krishna's (2012) description of sensory marketing as mentioned in the previous paragraph. The retail store environment can be used by retailers to appeal to the senses of their customers.

1.2.1 Typology of atmospheric variables

Because consumers perceive retail atmospherics with their senses (i.e., sight, sound, scent, touch and taste), store atmosphere is an important aspect of the shopping process. Several researchers have developed a typology of atmospheric cues. Bitner (1992), who focused on the servicescape, stated that the store environment is divided in three dimensions: ambient conditions (e.g., odor, music); spatial layout and functionality (e.g., layout, furnishings); and signs, symbols, and artifacts (e.g., signage, style of decor). Baker, Grewal, and Parasuraman (1994) also divided the store environment into three dimensions. However, their dimensions are ambient factors (e.g., odor, music), design factors (e.g., layout, signs) and social factors (e.g., amount, type, and behavior of other customers and sales personnel). The most comprehensive overview was given by Turley and Milliman (2000). They extended the typology of Berman and Evans (1995) and divided atmospheric stimuli into five categories: (1) external variables, (2) general interior variables, (3) layout and design variables, (4)

point-of-purchase and decoration variables, and (5) human variables (see Table 1.1).

Table 1.1. Atmospheric cues (Turley & Milliman, 2000)

1. External variables
   a. Exterior signs
   b. Entrances
   c. Exterior display windows
   d. Height of building
   e. Size of building
   f. Color of building
   g. Surrounding stores
   h. Lawns and gardens
   i. Address and location
   j. Architectural style
   k. Surrounding area
   l. Parking availability
   m. Congestion and traffic
   n. Exterior walls
2. General interior variables
   a. Flooring and carpeting
   b. Color schemes
   c. Lighting
   d. Music
   e. P.A. usage
   f. Scents
   g. Tobacco smoke
   h. Width of aisles
   i. Wall composition
   j. Paint and wall paper
   k. Ceiling composition
   l. Merchandise
   m. Temperature
   n. Cleanliness
3. Layout and design variables
   a. Space design and allocation
   b. Placement of merchandise
   c. Grouping of merchandise
   d. Work station placement
   e. Placement of equipment
   f. Placement of cash registers
   g. Waiting areas
   h. Wating rooms
   i. Department locations
   j. Traffic flow
   k. Racks and cases
   l. Waiting ques
   m. Furniture
   n. Dead areas
4. Point-of-purchase and decoration variables
   a. Point-of-purchase displays
   b. Signs and cards
   c. Wall decorations
   d. Degrees and certificates
   e. Pictures
   f. Artwork
   g. Product displays
   h. Usage instructions
   i. Price displays
   j. Teletext
5. Human variables
   a. Employee characteristics
   b. Employee uniforms
   c. Crowding
   d. Customer characteristics
   e. Privacy

In this dissertation, we focus on the effect of ambient scents in the retail store environment on consumer reactions. As can be noticed, scents reside under general interior variables. Clearly, scents are only one of many atmospheric cues retailers can use to appeal to their customers' senses. Moreover, as shopping is a holistic experience, besides the separate effect each of these elements may have, more importance should be given to the interaction effect that the different elements might generate.

1.2.2 Conceptual framework

The most common theoretical basis for studying the effects of atmospheric cues on shopping behavior is based on environmental psychology. One of its basic paradigms is the stimulus–organism–response (S–O–R) paradigm (Donovan & Rossiter, 1982; Mehrabian & Russell, 1974). In a retail context, a store's atmosphere (S) is the stimulus that affects consumers' emotional state (O). This emotional state then leads to behavioral responses (i.e., approach or avoidance responses (R)). Approach responses are positive responses to a store environment, such as a desire to stay in a store and explore the products. In contrast, avoidance responses are negative responses to the store environment, such as a desire to leave the store or not wanting to explore the merchandise.

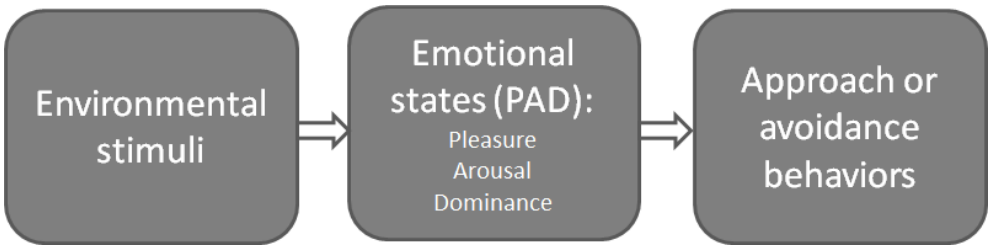

Figure 1.2. The stimulus–organism–response (S–O–R) paradigm (Mehrabian & Russell, 1974).

Atmospheric cues influence the emotional state of consumers in the shopping environment (Donovan & Rossiter, 1982; Mehrabian & Russell, 1974). This emotional state can be divided into three dimensions: pleasure, arousal, and dominance (abbreviated as PAD). Pleasure refers to the degree to which a person feels good, happy, or satisfied in a situation. Arousal is the degree to which a person feels excited, stimulated, or active in a situation, and dominance refers to the degree to which a person feels that he/she has control over the situation. Pleasant environments lead to approach behaviors while unpleasant environments lead to avoidance behaviors (Bone & Ellen, 1999; Spangenberg, Crowley, & Henderson, 1996). Arousing environments only lead to positive behavior when the arousal is combined with pleasantness. An unpleasant arousing environment is characterized by stress and is thus to be avoided (Bitner, 1992; Donovan & Rossiter, 1982). The dominance dimension is often omitted in research that uses the S–O–R paradigm because of a lack of empirical support for its suitability over a wide range of situations (Donovan, Rossiter, Marcoolyn, & Nesdale, 1994; Russell & Pratt, 1980). Moreover, the two

dimensions pleasure and arousal were found to be adequate in representing consumers' affective responses to various environments (Russell & Pratt, 1980).

It should be noted that the emotional state of consumers is not the only internal response that mediates the effect of environmental cues on behavior. Atmospheric elements can also affect consumers' cognition (e.g., attention, information search, and evaluations; Bitner, 1992; Lam, 2001). The consumers use atmospheric elements as cues when assessing the quality of a store and its products (Chebat & Michon, 2003). The environment is seen as a form of nonverbal communication that influences the consumers' beliefs about the store and/or helps them categorize the store mentally (Bitner, 1992). For example, Baker et al. (1994) found that ambient (e.g., light) and social elements (e.g., clothing of store personnel) in a store environment are used by consumers to evaluate merchandise and service quality of the store and that these quality inferences, in turn, have an influence on store image. Furthermore, some environmental elements can affect the physiological state of shoppers in a store (e.g., blood pressure, pulse rate, and comfort; Birren, 1997; Bitner, 1992).

Bitner (1992) extended the stimulus–organism–response (S–O–R) paradigm of Mehrabian and Russell (1974) by adding the effect of retail atmospherics on employees. As store personnel are also exposed to the retail environment, Bitner (1992) expected that positive internal responses to the store environment lead to greater effort and commitment of the personnel. In turn, these positive reactions of the employees can affect the social interactions between customers and employees. However, scholarly research on the effect of retail atmospherics on employees and the social interactions with customers has been limited: the

necessity for a longitudinal approach and the difficulty of disentangling the effect of pleasant retail atmospherics on customer reactions from the effect of employees' more positive behavior caused by the store environment may be seen as the main reasons for this. Nevertheless, atmospheric cues might also have an effect on the personnel, and hence indirectly influence consumer reactions through the social interactions between the personnel and the customers. We believe that this effect can be larger in certain types of retail contexts (e.g., in a small boutique that wants to assist the customer in their search for a particular product).

Another important extension offered by Bitner (1992) is the addition of response moderators. The effect of environmental stimuli on internal responses is moderated by personal and situational factors. Personal factors are personality traits such as arousal-seeking tendencies. Consumers with a higher arousal-seeking tendency prefer higher levels of stimulation and will therefore appreciate a store environment with lots of stimulating elements (e.g., fast-tempo music, stimulating scents, and bright lights). Situational factors include, for example, expectations, momentary mood, and the purpose for being in the store. When a person has certain expectations about the store and these expectations are positively confirmed or exceeded, reactions will be more positive than when these expectations are not met.

Within the typology of general interior variables as well as the conceptual framework that emerged from atmospheric research, the senses of sight and hearing have received the most scholarly interest. These senses are also called the higher senses because they are more involved in the intellect and spatial

orientation (Boswijk et al., 2008). This dissertation focuses on the environmental stimulus of scent. More specifically, the aim of this dissertation is a better understanding of the role of ambient scent in atmospherics. The sense of smell is a 'lower sense' more related to pleasure, well-being, and intimacy. Lower senses are usually less at the center of the attention, are more difficult to describe and identify, and are more emotional than higher senses. People are less aware of scents in their environment and adapt quickly to the presence of a scent (Smeets & Dijksterhuis, 2014). Even after a few breaths people perceive a scent less intensively (Dalton, 2000). However, the fact that people are unaware of the presence of a scent and/or the fact that they adapt quickly to its presence does not mean that the scent does not have an effect on information processing and behavior (Smeets & Dijksterhuis, 2014). The sense of smell occupies an essential place in our daily life and its influence on emotions and experiences should not be underestimated (Boswijk et al., 2008). In the next section, we will discuss olfactory marketing and the ambient scent effect model of Gulas and Bloch (1995).

1.3 Olfactory marketing

A human being breathes approximately 15,000 to 20,000 times a day. As such, the nose is an instrument that receives communication continuously. Moreover, in contrast to other sensory cues that are processed in higher-level brain centers, scents are first directly processed in the limbic system of the brain. The limbic system contains the olfactory bulb, the amygdala, and hippocampus (Herz & Engen, 1996). The amygdala and the hippocampus play an important role in emotion and memory (Bosmans, 2006; Ehrlichman & Halpern, 1988; Hirsch,

1995; Krishna, 2012). The sense of smell is directly connected with our emotions and memory. For example, Orth and Bourrain (2008) found that the presence of an ambient scent evoked nostalgic memories which in turn led to heightened exploratory behavior such as variety-seeking behavior.

Two types of scents are important to consumer reactions: those scents that are intrinsic to an evaluation object (e.g., scented product) and ambient scents, which are the main focus of this dissertation. An ambient scent is "a scent that is not emanating from a particular object but is present in the environment" (Spangenberg et al., 1996, p. 67). This kind of scent may affect responses to an entire store and its products, even those that have no intrinsic fragrance of their own (Gulas & Bloch, 1995; Parsons, 2009).

1.3.1 Ambient scent effects model

Gulas and Bloch (1995) developed a model of ambient scent effects that fits the S–O–R paradigm of Mehrabian and Russell (1974). The model (see Figure 1.3), which was later extended by Davies, Kooijman, and Ward (2003) and Ward, Davies, and Kooijman (2003), stipulates the way an ambient scent influences consumer responses.

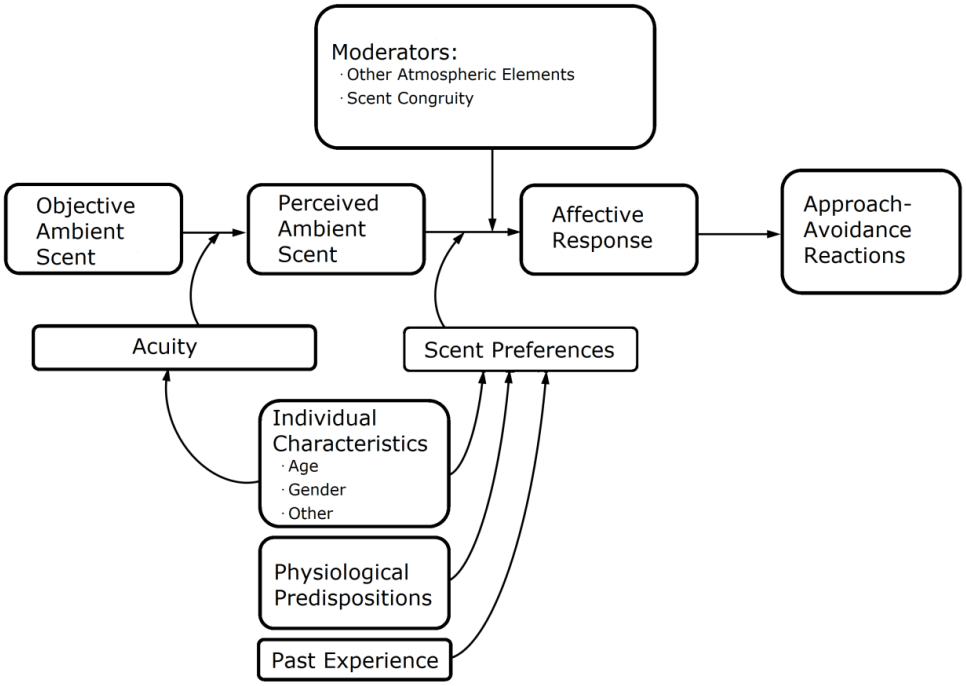

Figure 1.3. Model of ambient scent effects on consumer responses (Gulas & Bloch, 1995).

Gulas and Bloch (1995) argue that ambient scent in combination with scent preferences causes an affective response (i.e., PAD dimensions) in the consumer. This effect can be explained by affective priming (Smeets & Dijksterhuis, 2014). Priming refers to "the phenomenon that incidental stimuli can influence higher-order cognitive and behavioral outcomes without the individual's awareness or appreciation of this influence" (Smeets & Dijksterhuis, 2014, p. 1). The scent functions as the incidental stimulus that triggers an overall affective reaction, which can then be transferred to evaluations and approach behaviors. This effect takes place outside the awareness of the consumer. Pleasant scents trigger a positive affective reaction, whereas

unpleasant scents generate a negative affective reaction. Although there are individual differences in scent preferences, some smells are consistently viewed as pleasant (e.g., floral scents) or unpleasant (e.g., spoiled food). Scent preferences can be physiological in nature but can also be influenced by past experiences. For example, a consumer can have a preference for lavender because it reminds him of an enjoyable vacation in Provence. The relationship between ambient scent and affect is supported by Baron and Thomley (1994) and Baron (1997) who demonstrated that a pleasant fragrance induces positive affect, which in turn leads to increased willingness to help as well as increased task performance.

Additionally, ambient scent does not only influence affective responses but also cognitive responses such as elaboration and evaluation of the target object (e.g., Bone & Ellen, 1999). Gulas and Bloch (1995) categorize these cognitive responses under a non-behavioral category of approach responses. However, in line with Bitner (1992), we argue that affective and cognitive responses are both internal responses which can alter consumer behavior (i.e., approach or avoidance behavior). Moreover, these affective and cognitive responses are interdependent. For example, an affective response to an environment might influence a cognitive response to the environment (e.g., belief about that environment) and vice versa (Bitner, 1992). The relationship between on the one hand scent and on the other hand cognitive responses and approach behavior is supported by Spangenberg et al. (1996) who found that the presence of an ambient scent resulted in an enhanced evaluation of the store, the store environment, and the products in the store compared to a situation

where no ambient scent was added. Furthermore, the presence of an ambient scent increased the time spent exploring the products in a store, intention to revisit a store and intention to buy certain products, yet it decreases the perceived amount of time spent in a store (Spangenberg et al., 1996).

Moderating role of acuity

In their model, Gulas and Bloch (1995) also describe potential moderators of the ambient scent effects on consumer responses. First, the way in which an ambient scent is perceived depends on the objective ambient scent and the acuity of the consumers. Although people have difficulties identifying scent (de Wijk, Schab, & Cain, 1995), we are able to recognize 10,000 different scent combinations (Buck & Axel, 1991). The scent acuity of a consumer is influenced by individual characteristics such as age and gender. For example, women appear to be better at recognizing fragrances than men (Doty, Applebaum, Zusho, & Settle, 1985). Additionally, as people age, their sense of smell deteriorates. This means that older people will be less influenced by the presence of a scent (Chebat, Morrin, & Chebat, 2008).

Moderating effect of congruency

Second, the effect of a perceived ambient scent on consumer responses may be moderated by the congruency of the scent with the environment and the presence of other atmospheric cues. Several studies have revealed that scent only has a positive effect when it is congruent with the targeted product (e.g., Bosmans, 2006; Mitchell, Kahn, & Knasko, 1995). For example, approach behaviors of shoppers for men's and women's clothing increased when a gender-

congruent scent was present in the store (Spangenberg, Sprott, Grohmann, & Tracy, 2006) compared to when a gender-incongruent scent was present. Congruent scents are scents that are expected in a particular setting because the scent and the setting are thematically matched. Moreover, shopping is a holistic experience in which a consumer is simultaneously exposed to several atmospheric cues, and a pleasant scent may not have the desired effect when it is mismatched with other environmental elements. For example, when ambient scent and music are matched with each other in terms of their arousing quality (i.e., high/high or low/low) (Mattila & Wirtz, 2001) or consistent with a holiday (i.e., Christmas music/Christmas scent; Spangenberg, Grohmann, & Sprott, 2005), consumers experience increased pleasure, evaluate the store more positively and exhibit higher levels of approach behavior than when scent and music are mismatched. Congruency between atmospheric cues can be achieved in different ways (e.g., based on valence, arousal or semantic associations; Mattila & Wirtz, 2001; Krishna, Elder, & Caldara, 2010).

Congruency effects can be explained by the fact that an ambient scent can function as a prime (e.g., Schab, 1991; Mitchell et al., 1995; Smeets & Dijksterhuis, 2014). Priming refers to incidental perceptual stimulation that improves the accessibility of concepts that will be used for subsequent information processing (Smeets & Dijksterhuis, 2014). We already mentioned that scent can be an affective prime, which means that the scent can trigger a positive consumer reaction. Scents can also function as semantic primes (i.e., cognitive priming; Smeets & Dijksterhuis, 2014; Yi, 1990). When consumers perceive a scent, an automatic knowledge activation process may unconsciously

begin (Mitchell et al., 1995; Schifferstein & Blok, 2002). The scent then activates stored knowledge, making certain concepts temporarily more accessible. However, because people have difficulties identifying a scent, it is possible that the information that becomes more accessible does not fit with the objective scent. A cheese scent, for example, can be good prime for triggering cheese-related concepts (e.g., related food like a baguette). However, if one does not associate the cheese scent with cheese but perhaps with body odor, then different concepts will be triggered and another behavioral response is expected (Smeets & Dijksterhuis, 2014). Therefore, if semantic priming is intended, three recommendations are made. First, one has to use scents that are a good example of a well-known scent category, such as floral or fruity scents. Second, scents that are strongly associated with universally pleasant occasions should be used, like the scent of coconut, which is strongly linked with sunny vacations. Third, one should combine the scent with other-modality stimuli that have similar associations. For example, a cheese scent will trigger more cheese-related concepts when combined with a poster of different kinds of breads. The visual stimulus supports the olfactory stimulus, making it more likely that the right concepts are activated. However, other stimuli could be subtle to ensure that people do not become aware of the scent effect, as priming effects are unlikely to occur when cognitive processing of the scent is no longer implicit or automatic (Smeets & Dijksterhuis, 2014).

Semantic priming might also lead to conceptual fluency when the information activated by the prime (e.g., scent) fits with the target element (e.g., a store). Conceptual fluency is a particular form of processing fluency, which indicates the

experienced ease by which an external stimulus is processed (Schwarz, 2004). In particular, it refers to how readily the stimulus comes to mind and how easily its meaning is grasped (Lee & Labroo, 2004). This means that when a scent which is congruent with the target primes target-associated concepts and information the target and its meaning are conceptually fluent and can be processed easier because they are more accessible in the consumer's mind. Previous research on brand choice indicated that conceptual fluency facilitates consideration-set membership and increases brand choice (e.g., Lee, 2002; Nedungadi, 1990). Moreover, conceptual fluency can also enhance brand evaluation because conceptually fluent processing is a positive experience that can be transferred to the brand (e.g., Lee & Labroo, 2004; Whittleseea, 1993). On the other hand, incongruent scents can lead to processing disfluency and cognitive interference because the information activated by the incongruent scent does not match with the product and/or the decision task.

The positive effect of congruency between atmospheric cues can also be explained by the theory of conceptual fluency (De Bock, Pandelaere, & Van Kenhove, 2013; Whittlesea, 1993). When atmospheric cues are congruent, people can easily process the environment and, as a result, they experience a positive affective state that can be accredited incorrectly to the stimulus rather than to the ease of processing (Winkielman, Schwarz, Fazendeiro, & Reber, 2003). In contrast, incongruent cues can lead to processing disfluency because the associations activated by the cues do not match with each other (Mitchell et al., 1995).

1.4 Research objectives

Environmental (store) fragrancing is used by a growing number of retailers and has also been studied empirically (e.g., Hirsch, 1995; Spangenberg et al., 1996). Most links of the Gulas and Bloch (1995) model are supported by a small number of empirical studies (e.g., Bone & Ellen, 1999; Mattila & Wirtz, 2001; Spangenberg et al., 2005; Spangenberg et al., 2006). However, more research is needed to understand ambient scent effects on consumer behavior (Krishna, 2012; Krishna & Schwarz, 2014). Especially, finding additional moderators and shedding more light on possible interaction effects with other less examined atmospheric cues is crucial.

This doctoral research tries to fill the gaps in the literature and resolve the discrepancies in the findings by focusing on the following research questions:

RQ1: Can individual differences and product congruency moderate the effect of scent on consumer behavior?

RQ2: What is the interaction effect of scent with other atmospheric cues on consumer behavior?

RQ3: What is the influence of scent on consumers' memory (of a product category) and assortment perceptions?

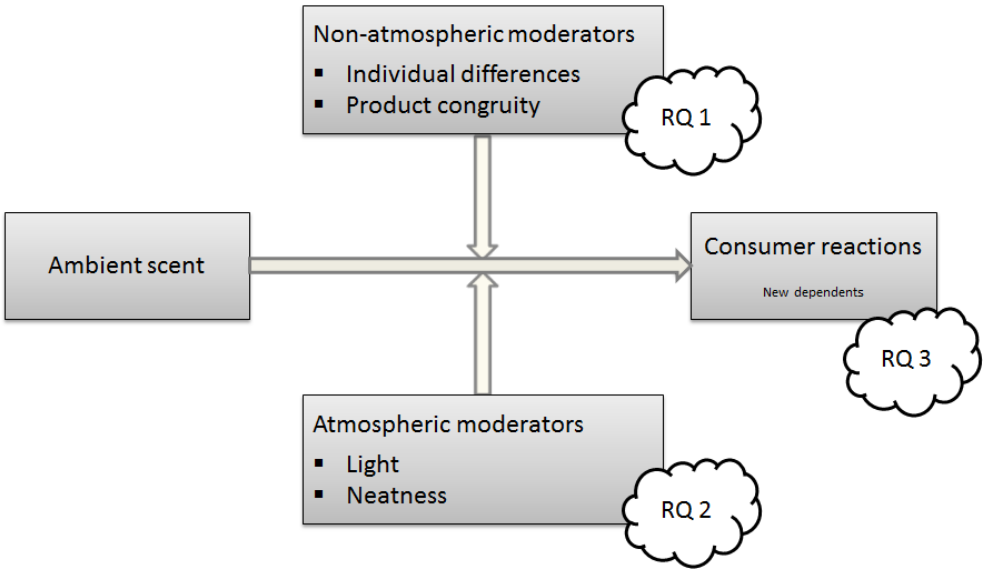

Figure 1.4. Research objectives of the dissertation.

A possible explanation for the limited research on scents is the fact that olfactory input is difficult to control (Krishna & Schwarz, 2014). Making sure that the intensity of a scent is the same across participants is hard and time consuming. In this dissertation, the intensity of the ambient scents is pretested beforehand in the same environment as the actual study. The optimal intensity level of the scents is achieved when respondents only noticed the ambient scent when told that a scent was present. However, one should keep in mind that there are individual differences in consumers' threshold of scent awareness (Smeets, Schifferstein, Boelema, & Lensvelt-Mulders, 2008).

Research question one will be discussed in chapters two to five, research question two in chapters six and seven, and research question three in chapter eight. The literature review of ambient scent effects provided in this chapter will be briefly repeated in the following chapters to make sure that the chapters can

be read as stand-alone research articles if desired. Next, a brief overview of the contents of this doctoral research is given.

1.4.1 Moderating role of individual differences and product congruency as non-atmospheric elements

Several elements may moderate the effect of scents on consumer behavior. First, the proposed ambient scent effects model of Gulas and Bloch (1995) states that the way that an ambient scent is perceived depends upon the objective ambient scent and the acuity of the consumers, which is influenced by individual differences such as age and gender. Gulas and Bloch's model (1995) is extended by arguing that individual differences (e.g., shopper style, Morrin & Chebat, 2005) can also influence the relationship between ambient scent and consumer reactions. We studied the possible moderating effect of shopping motivation and affect intensity as well as the level of scent expertise. We chose to study hedonic shopping motivation and affect intensity because they are strongly linked to affect and the sense of smell is directly connected with our emotions. Scent expertise, on the other hand, is important to study because scent experts are better at identifying scent and might therefore be more sensitive for the product-scent congruity effect.

Second, Gulas and Bloch (1995) stipulate in their model that the relationship between ambient scent perceptions and consumer responses can be moderated by the congruity of a scent with a store's offerings. This moderation was already confirmed for products with inherent scents (e.g., fruit in Bosmans, 2006). We studied the effect of thematic congruency between an ambient scent and

products without direct scent properties. Studying moderating effects enabled us to gain new knowledge and to nuance existing findings. Using pleasant ambient scents in a shopping environment can create promising opportunities. However, one must keep in mind that neither all consumers nor all products offered by a store may be positively affected by the presence of a scent. This research adds to the existing knowledge that the use of ambient scents and the choice of a particular ambient scent should be well-considered.

Affect intensity and shopping motivation

In chapter 2, we examine the possible moderating role that affect intensity and shopping motivation may play in the effect of scent on consumers' feelings, evaluations, and approach behaviors. Affect intensity refers to the degree to which people experience emotions (Moore, Harris, & Chen, 1995). Individuals scoring high on affect intensity respond more strongly to emotional stimuli than individuals scoring low on affect intensity. Because a pleasant ambient scent in a shopping environment is also an emotional stimulus, we expect that the presence of a pleasant ambient scent will have more effect on consumers with high affect intensity. Another individual difference that might affect the relationship between scents and consumer behavior is shopping motivation. Consumers with a hedonic shopping motivation are searching for happiness, fantasy and enjoyment. Hedonic shopping value lies in the shopping experience, rather than in the acquisition of the good (Arnold & Reynolds, 2003). Because a scent is diffused in a store to create a pleasant environment that produces sensorial and emotional experiences, we expect that hedonic shopping

motivation has a positive influence on the impact of an ambient scent in a store. A field experiment was conducted in a prestigious fashion store.

Scent expertise

Several studies found that a diffused scent only has a positive effect when it was congruent with the product under evaluation (e.g., Bosmans, 2006). However, this congruency effect may depend on how well consumers can recognize a scent. In chapter 3, we study the effect of scent expertise on product and taste evaluations of three products that are (in)congruent with an ambient scent and examine whether this effect is mediated by these groups' awareness of scents in their environment and/or by how well they are able to identify different scents. In this study, a banana scent was diffused in a room where consumers (laymen vs. novice scent experts vs. scent experts) had to evaluate a congruent (i.e., banana), a medium incongruent (i.e., apple), and an incongruent (i.e., tomato) product.

Ambient scent–product congruity

Many products offered by retailers have no inherent scent (e.g., office supplies). However, for these products, some kind of scent congruency can also have a positive effect on consumer behavior. Thematically congruent scent effects can be explained by odor priming. A scent can prime certain concepts for consumers, and once these constructs are activated, consumers are more sensitive to subsequent congruent elements, which often leads to corresponding behaviors (Dijksterhuis, Smith, van Baaren, & Wigboldus, 2005). In chapter 4, we assess the effect of a pleasant ambient scent (i.e., chocolate scent) on

specific approach and buying behavior toward thematically congruent (e.g., cookbooks) and incongruent books (e.g., history books). A field experiment was conducted for 10 days in a bookstore.

Ambient scent–product incongruity

As mentioned above, pleasant ambient scents improve consumer evaluations and approach behavior more when the scent is congruent with a product than when the scent is incongruent with a product. Nevertheless, in chapter 5, we suggest that incongruity does not always have a negative effect on consumer evaluations. In certain well-defined cases, product–scent incongruity can have a positive effect on consumer reactions. In line with Spangenberg et al. (2006), the effects of a gender-(in)congruent scent diffused in a men's and women's clothing store were studied. We worked with masculine and feminine perfumes as perfumes can possibly be considered as mating cues in this study (Capparuccini, Berri, & Mazzatenta, 2010; Milinski & Wedekind, 2001). Previous research showed that exposure to mating cues (e.g., pictures of sexy women to men) triggered a mating goal in the opposite sex (Maner, Gailliot, & DeWall, 2007). This mating goal may lead consumers to evaluate objects that help them signal their mating value (e.g., clothes) more positively. A field experiment was carried out in a men's and women's clothing store to test whether a gender-incongruent perfume can have a positive effect on consumer reactions.

1.4.2 Interaction effects with other atmospheric cues

A difference should be made between micro level and molar level research in retail environments. Micro level research focuses on the separate physical

characteristics (e.g., different atmospheric cues) that create a specific atmosphere. However, shopping is a holistic experience in which a consumer is exposed to a number of atmospheric cues at the same time (molar level). This means that the effect of a specific atmospheric cue might interact with another one.

Scent and light

Only a few studies have been carried out with respect to the interaction effects of fragrances with other atmospheric cues. For example, Mattila and Wirtz (2001) and Spangenberg et al. (2005) studied the joint effects of ambient scent and music. They showed that when music and ambient scent were congruent, customers' evaluations of the store, the environment and the products were more positive. In chapter 6, we examine interaction effects between ambient scent and overall light based on semantic congruity. Atmospheric cues can have semantic associations, and matching these associations can lead to more positive consumer reactions. The positive effect of semantic congruity between atmospheric cues can be explained by the theory of conceptual fluency (De Bock et al., 2013; Whittlesea, 1993). Conceptual fluency indicates the experienced ease by which an external stimulus is processed (Schwarz, 2004). When people easily process a stimulus (e.g., an environment), they experience a positive affective state that can be accredited incorrectly to the stimulus rather than to the ease of processing (Winkielman et al., 2003). Thus, congruent atmospherics can result in processing fluency and improved elaboration (Gottfried & Dolan, 2003; Mandler, 1982; Mitchell et al., 1995), leading to more positive consumer

reactions. Two studies were conducted in a simulated grocery store constructed in a retail design research lab.

Scent and tidiness

Although retailers know that consumers do not like cluttered stores, messy layouts are sometimes inevitable. In chapter 7, we examine whether retailers can overcome these negative elements by diffusing pleasant scents. Specifically, this study investigated the effect of pleasant scents (un)related to neatness on consumer evaluations of a tidy versus a messy store. Herz (2007) indicated that pleasant scents can decrease the intensity of environmental annoyances by inducing a pleasant mood. However, according to research on matching effects, favorable evaluations require the valence of a stimulus (e.g., the store) to be consistent with the valence of the contextual cue (e.g., the scent in the store; Brakus, Schmitt, & Zhang, 2008). This constraint means that consumers will respond more positively to a store environment with a pleasant scent only when the environment itself is pleasant (in this case, tidy). Another important aspect is that the processing of odors is not restricted to the limbic system, as a scent can also be associated with semantic and episodic knowledge (Degel, Piper, & Köster, 2001). For example, many consumers associate the scent of citrus with cleaning. When consumers perceive the scent, such a semantic association may be activated, even when they are not consciously aware of the scent (Holland, Hendriks, & Aarts, 2005). An experiment was carried out to test whether a pleasant ambient scent whether or not associated with neatness can overcome a negative store element such as messiness in the store.

1.4.3 Impact of scent on memory and assortment perceptions

Although not explicitly mentioned in the Gulas and Bloch (1995) model, recently more scholarly attention has also been paid to the impact of scents on memory. There is a strong link between olfactory processing and memory because scents are directly processed in the limbic system of the brain (e.g., Gerber & Menzel, 2000; Krishna, 2012). Previous research found that scent can improve memory and that this effect is mediated by attention (e.g., Morrin & Ratneshwar, 2000). However, in these previous studies, the respondents were exposed to only one product (with extra product information) or they saw various brands one after each other. In chapter 8, we focus on the impact of an ambient scent on memory of a large assortment of a particular product category presented to the respondents all at the same time. Moreover, we argue that changes in attention and processing can also lead to changes in assortment evaluations and product choices. To our knowledge, no prior research has studied the effects of an ambient scent on assortment variety perceptions and assortment satisfaction. However, both memory and assortment perceptions play an important role in brand and store choice. Additionally, we checked whether familiarity with the product category moderated the ambient scent effect. Two experiments were conducted to test the impact of ambient scent on memory and assortment perceptions.

In Chapter 9, a conclusion of this doctoral dissertation is provided. Figure 1.5 shows an overview of this doctoral research integrated in the model of Gulas and Bloch (1995).

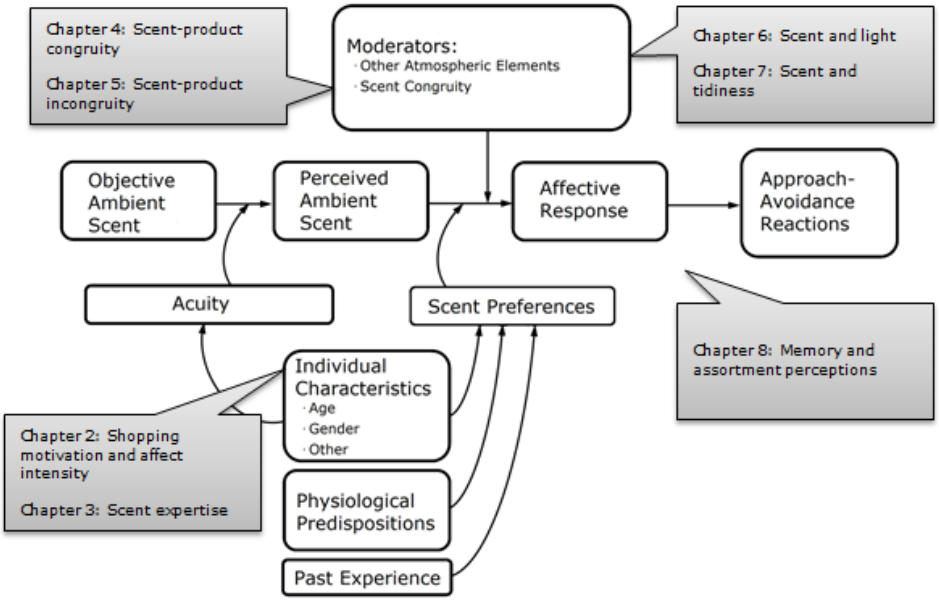

Figure 1.5. Overview of the doctoral researches integrated in the model of Gulas and Bloch (1995).

Chapter 2

The presence of a pleasant ambient scent in a fashion store: The moderating role of shopping motivation and affect intensity[1]

Marketing managers are making increasingly use of olfactory marketing instruments in the retail environment. However, the question is whether scents in the store are desirable for all consumer types. Research on the moderating role of individual differences on the impact of scents in the market place is scarce. This article focuses on how ambient fragrances in the store can influence customers' affective, evaluative and approach reactions, and considers the moderating role of shopping motivation and affect intensity. A field experiment reveals that a pleasant fragrance positively influences consumers' affective reactions, evaluations and intention to revisit the store, especially when the consumers score high on affect intensity. Strategically manipulating the store environment via ambient scents is an inexpensive yet effective way to positively influence consumer behavior. Retailers can use ambient scents to heighten their differentiating ability; however, the decision to diffuse a scent should be based on the target audience.

[1] This chapter is largely based on the journal article 'Doucé, L., & Janssens, W. (2013). The presence of a pleasant ambient scent in a fashion store: The moderating role of shopping motivation and affect intensity. *Environment & Behavior, 45*(2), 215-238.'

2.1 Introduction

Characteristics of a store's environment can have a substantial impact on consumers' shopping behavior. Music (e.g., Sweeney & Wyber, 2002), color (e.g., Crowly, 1993), lighting (e.g., Areni & Kim, 1994), crowding (Michon, Chebat, & Turley, 2005) and ambient scents (e.g., Seo, Roidl, Müller, & Negoias, 2010) are a few atmospheric cues that have been found to affect consumers. In practice, marketing managers have also shown interest in the use of scents in retail and service organizations. For example, a number of hotels such as Westin Hotels & Resorts diffuse fragrances into their lobbies to relax the guests by alleviating stress (Palmer, 2007). Travel agent Thomson scents three-quarters of its stores with a coconut aroma to convince customers to book their summer vacation (Roberts, 2008). Even department stores as Harrods in London, England (Rosenthal, 2008) and Bloomingdale's Inc. in New York City (Smith, 2009) have experimented with olfactory marketing, diffusing different odors into their various departments.

However, previous research has revealed mixed findings regarding the effect of ambient scent on consumer reactions (e.g., Morrin & Ratneshwar, 2000; Spangenberg et al., 1996). The setting in which the experiments took place may account for this. Ambient scent effects may vary depending on the product categories offered by the store. Atmospheric cues seem to have the greatest effect on consumer reactions when customers are either high affective involved or low involved with the store's offerings (Bruner, 1990). Our experiment is conducted in a high affective involvement setting. Secondly, we study the moderating effect of affect intensity and shopping motivation. To our knowledge,

no prior research has studied the moderating role of affect intensity and shopping motivation on the relationship between scent and consumer shopping behavior. However, it is most likely that scent effects will be influenced by these individual differences because they are, like scent, strongly linked to affect. Shopping motivation may affect this relationship because it determines consumers' openness to sensorial and emotional experiences (Babin, Darden, & Griffin, 1994). It is proposed that individuals who enjoy the shopping experience will be more positively affected by the presence of a pleasant ambient scent in the store than people who shop for utilitarian reasons. In addition, it is expected that consumers who respond more intensely to emotional stimuli will be more strongly affected by the presence of an ambient scent, because it is an emotional stimulus in the shopping environment.

Although some studies have been conducted in realistic (e.g., a casino (Hirsh, 1995) or a mall (Chebat & Michon, 2003)) or semi-realistic settings (Spangenberg et al., 1996), most research has been conducted in artificial laboratory situations (e.g., Morrin & Ratneshwar, 2003; Bosmans, 2006). Our study was conducted in an upscale clothing store to ensure ecological validity.

2.2 Olfaction research

Gulas and Bloch (1995) developed a model of ambient scent effects, which stipulates that the way in which an ambient scent is perceived depends on the objective ambient scent and the acuity of the consumers, which is influenced by individual characteristics such as age and gender. Subsequently, the perceived ambient scent in combination with scent preferences causes an affective

response in the consumer. Scents can generate affective reactions because they are directly processed in the brain's limbic system, which is the center of emotions and memory (Bosmans, 2006; Ehrlichman & Halpern, 1988). Bone and Ellen (1999) also developed a conceptual model in which ambient scent not only influences affective responses, but also cognitive responses such as elaboration and evaluation of the target object. Moreover, the relationship between ambient scent and consumer responses may be moderated by other atmospheric cues and the congruency of the scent with the environment (Bone & Ellen, 1999; Gulas & Bloch, 1995). Finally, the affective and cognitive responses alter consumer behavior, resulting in either approach or avoidance behavior.

2.2.1 Product type and scent: the affective, cognitive and behavioral effects

Most links of the Gulas and Bloch (1995) model are supported by empirical studies. Concerning affective responses, Baron and Thomley (1994) and Baron (1997) demonstrated that a pleasant fragrance induces positive affect, which in turn leads to increased willingness to help as well as increased task performance. However, in a marketing environment, the presence of a scent enhanced evaluation of the store, the store environment, and the products in the store, all without enhancing affective responses (i.e., pleasure and arousal; Spangenberg et al., 1996). Morrin and Ratneshwar (2000; 2003) also found that scent had no effect on mood. Instead, the presence of a scent only improved brand evaluations and brand memory through enhanced attention. A possible explanation is that these studies worked with low involvement products, i.e., school supplies (e.g. backpacks) and decor items (e.g. calendars) (Spangenberg

et al., 1996) and toiletry and household cleaning products (Morrin & Ratneshwar, 2003). In our research, the experiment was conducted in an upscale clothing store. Prestigious clothing is a high affective involvement product according to the Foote-Cone-Belding (FCB) grid (Belch & Belch, 2007; Vaughn, 1980), which has two dimensions; high/low involvement and a think/feel dimension. Together, these two dimensions create four quadrants, i.e., informative (think/high involvement) affective (feel/high involvement), habitual (think/low involvement) and satisfaction (feel/low involvement). Bruner (1990) stated that music has the greatest effect on consumer behavior when consumers are either high affective involved or low cognitive involved with the product. Because ambient scent is also an atmospheric element, it is most likely that scent influences consumers when they buy products based on emotional motives (e.g., prestigious clothing) or when they are low involved with the purchase decision. In the latter case, consumers have little motivation to process the current information and they evaluated the store and products based on peripheral cues (Petty & Cacioppo, 1986; Petty & Wegener, 1999). The store atmosphere (e.g., scents, music, visual elements) can act as such a peripheral cue, thereby influencing consumers' evaluation without affecting their mood. When buying products that provide psychological benefits (i.e., high affective involvement), consumers are increasingly guided by their emotions. Thus, in our experiment an ambient scent is expected to create enhanced affective and cognitive responses.

Previous research also demonstrated that pleasant (high arousing) environments lead to approach behavior while unpleasant (high arousing) environments lead

to avoidance behavior (Bone & Ellen, 1999; Spangenberg et al., 1996). For example, Hirsch (1995) found that gamblers spent more money in a casino with a pleasant scent than those in one without a fragrance. Furthermore, the presence of a pleasant scent increases time spent exploring the products in the store, intention to revisit the store and intention to buy certain products, but decreases perceived time spent in the store (Spangenberg et al., 1996). However, these studies were conducted in an artificial laboratory situation (e.g., Bosmans, 2006; Morrin & Ratneshwar, 2000), semi-realistic settings (e.g., Spangenberg et al., 1996) or in other consumer environments (Hirsch, 1995: a casino). By testing the effect of scents in a traditional retail context, we can generalize experimental findings.

Thus, we offer the following hypothesis:

H1: The presence of a pleasant ambient scent will lead to (a) enhanced positive affect, (b) enhanced arousal, (c) enhanced evaluation of the store environment, (d) enhanced evaluations of the products and (e) enhanced approach behavior (intention to revisit the store) compared to the absence of a pleasant ambient scent.

2.3 Individual differences

As the model of Gulas and Bloch (1995) specifies, the effect of an ambient scent depends on characteristics of the individual consumer. Previous research has already identified several individual differences that influence the relationship between the presence of a scent and consumer behavior. However, until now, no

study has examined the moderating role that affect intensity and type of shopping motivation play in the effect of scent on consumers' affective responses, evaluations and approach behavior. We chose to study hedonic shopping motivation and affect intensity because they are strongly linked to affect and the sense of smell is directly connected with our emotions.

2.3.1 Affect intensity

Affect intensity refers to the degree to which people experience emotions (Moore et al., 1995). Individuals scoring high on affect intensity respond more strongly to emotional stimuli than do low scoring individuals. For example, high affect intensity consumers show more emotionally intense reactions to positive and negative emotional appeals in advertisements than do low affect intensity consumers (Moore et al., 1995, Moore & Homer, 2000). They also evaluated ads with positive emotional appeals more positively. Moreover, Moore and Homer (2000) found that high affect intensity consumers felt more enjoyment when smelling freshly baked bread or perfume compared to low affect intensity consumers. Because a pleasant ambient scent in a shopping environment is also an emotional stimulus, we offer the following hypothesis:

H2: For consumers who experience intense emotions (high affect intensity), it is expected that the presence of a pleasant ambient scent will have a positive effect on (a) positive affect, (b) arousal, (c) evaluation of the store environment, (d) evaluations of the products and (e)

approach behavior (intention to revisit the store) compared with the absence of such a scent.

2.3.2 Shopping motivation

Another personal predisposition that might affect the relationship between scents and consumer behavior is shopping motivation. Tauber (1972) was the first to examine the motivation behind shopping behavior. This exploratory research found that people shop not only for utilitarian reasons, but also for entertainment and emotional value. At a generic level, consumers either shop because of necessity (task-fulfillment) or because of personal pleasure (recreation) (Wagner & Rudolph, 2010). Similarly, Babin et al. (1994) distinguish between utilitarian and hedonic shopping value, the latter being highly correlated with hedonic shopping motivation. Consumers with a utilitarian shopping motivation are goal oriented, rational and decision effective (Babin et al., 1994; Hirschman & Holbrook, 1982). They gain value from shopping when a product can be bought in a deliberate and efficient way. Consumers with hedonic shopping motivation are searching for happiness, fantasy and enjoyment (Babin et al., 1994). Hedonic shopping value lies in the shopping experience, rather than in the acquisition of goods. Holbrook (1999) developed a more comprehensive typology of the value construct. This framework suggests three underlying dimensions: extrinsic versus intrinsic (i.e., the shopping experience is prized because it helps to achieve a specific goal versus the shopping experience is appreciated for the experience itself); self-oriented versus other-oriented (the shopping experience is valued for its effect on oneself versus for its effect on others); and active versus reactive (i.e., value is gained as a result of an active

or reactive interaction with the products, services or store environment). These three dimensions lead to eight types of customer value (see Table 2.1).

Table 2.1. Customer value typology of Holbrook (1999)

		Extrinsic	*Intrinsic*
Self-oriented	*Active*	EFFICIENCY	PLAY
	Reactive	EXCELLENCE	AESTHETICS
Other-oriented	*Active*	STATUS	ETHICS
	Reactive	ESTEEM	SPIRITUALITY

Without the active/reactive dimension, Holbrook (2006) identifies four value dimensions: functional value (i.e., efficiency and excellence), hedonic value (i.e., play and aesthetics), social value (i.e., status and esteem), and altruistic value (i.e., ethics and spirituality). We focus on hedonic value because it arises from the shopping experience itself, specifically, from the fun or the aesthetic enjoyment felt during the shopping activity (Holbrook, 2006).

Because a scent is diffused in a store to create a pleasant environment that produces sensorial and emotional experiences, we expect that hedonic shopping motivation has a positive influence on the impact of an ambient scent in a store. Moreover, Wagner and Rudolph (2010) found that consumers with a high hedonic shopping motivation desire increased levels of sensory stimulation causing them to be more attracted to pleasant store environments.

Thus, we propose the following hypothesis:

H3: For consumers with high hedonic shopping motivation, it is expected that the presence of a pleasant ambient scent will have a positive effect on (a) positive affect, (b) arousal, (c) evaluation of the store environment, (d) evaluations of the products and (e) approach behavior (intention to revisit the store) compared with the absence of such a scent.

Thus, we expect a scent effect at high levels of affect intensity and hedonic shopping motivation. Hence, we no longer expect a simple effect of scent nor a simple effect for affect intensity or shopping motivation.

2.4 Method

2.4.1 Scent selection

Spangenberg et al. (1996) performed a pretest to determine the affective and arousing quality of five scent categories (i.e., floral, spices, woods, citrus and mints). They found that scents in the citrus and mint categories were evaluated as more pleasant and arousing than other fragrances. Moreover, lemon was found to be the most pleasant scent. Based on these findings, the "Fresh Office" scent - a slightly minty lemon scent marketed by Scents, an olfactory marketing firm in Belgium - was selected for this study. This scent is frequently used in practice to create a pleasant environment.

A pretest was conducted to verify the affective and arousing quality of the "Fresh Office" scent. There were 30 participants (10 men, 20 women) aged

between 19 and 54 years old. First, the subjects signed a consent form to screen for allergies. Next, they were asked to sniff the olfactory stimulus placed on a cotton ball in a vial. Finally, the participants evaluated the affective and activation dimensions of the scent, using relevant items from Fisher's (1974) 7-point semantic differential (e.g., negative/positive) (Spangenberg et al., 1996, previously used by Crowley (1993) in environmental marketing research). Results indicated that the participants found the scent more pleasant (M = 5.41) than the scale middle point (M = 4, $t(29)$ = 10.71, p < .001) and, more arousing (M = 5.55) than the scale middle point (M = 4, $t(29)$ = 12.94, p < .001).

In a separate pretest, the intensity of the scent was determined. As the salience of the extraneous source (here, the odor) increases, people become more aware that a source other than the store or product is responsible for their response and may correct for it (Bosmans, 2006). Therefore, it is necessary to check the intensity of the odor. The "Fresh Office" scent was diffused in the store where the experiment would take place and visitors were asked to answer two questions: "Did you spontaneously notice a scent in the store?" and "Now that we have mentioned the presence of a scent, do you detect it?" The intensity of the scent was lowered until all the respondents answered negatively to the first question and positively to the second.

2.4.2 Independent variables

Besides the presence or absence of the ambient scent, individual differences in shopping motivation and affect intensity were measured as moderators. Hedonic

shopping motivation was determined by means of a measurement scale developed by Arnold and Reynolds (2003). This scale consists of 23 items on a 7-point Likert scale (e.g., "To me, shopping is an adventure"; α = .92; M = 4.18, SD = .87), ranging from 1 = totally disagree to 7 = totally agree.

Affect intensity was measured with the 6-point short affect intensity scale developed by Geuens and De Pelsmacker (2002), who reduced the 40-item scale of Larsen and Diener (1987) to 20 items (e.g., "When I am feeling happy, I burst with joy"; M = 3.66, SD = .47). Cronbach's alpha indicated very good reliability (α = .87).

2.4.3 Dependent variables

Dependent measures were affective response towards the store environment (i.e., pleasure and arousal), evaluation of the store environment, evaluation of the products and intention to revisit the store.

Shoppers' affective reactions towards the store environment were measured with the "pleasure" (sum of six items; e.g., annoyed/pleased; α=.87) and "arousal" (sum of three items; relaxed/stimulated; α=.74) dimensions of the PAD scale developed by Mehrabian and Russell (1974). Using a 7-point semantic differential scale, the participants indicated the extent to which these emotions were triggered by the store.

The evaluation of the store environment was captured using Fisher's (1974) 13-item environmental quality scale (e.g., unattractive/attractive). In accordance with Spangenberg et al. (1996) and Mattila and Wirtz (2001), the

unpleasant/pleasant item was added. These 14 items were measured via a 7-point semantic differential scale and afterwards these items were summed (α=.97) to calculate an overall score of the evaluation of the in-store environment.

The evaluation of the products was assessed using a combination of two 7-point scales used in prior research, i.e., Bellizzi, Crowley and Hasty (1983) and Spangenberg et al. (1996) (outdated/up to date, low quality/high quality, bad/good, unpleasant/pleasant, unfavorable/favorable, unattractive/attractive and poor value/good value). This scale showed very good reliability (α=.91) and a summated scale (mean of items) was calculated and used in further analysis.

Approach behavior, specifically, the intention to revisit the store, was measured by asking the participants the following question: "Assuming you were looking for products like those sold at this store and you had the money, how likely would you be to revisit the store?" (unlikely/likely: 7-point scale) (Spangenberg et al., 1996). Means, standard deviations and intercorrelations among all the dependent variables are provided in Table 2.2.

Table 2.2. Means, standard deviations and intercorrelations for all the dependent variables

	M	*SD*	1	2	3	4
1 Pleasure	5.95	.67				
2 Arousal	4.29	1.30	.21			
3 Evaluation store environment	6.08	.74	.65	.16		
4 Evaluation products	6.20	.62	.67	.20	.77	
5 Intention to revisit the store	6.59	.79	.38	.15	.36	.36

Note Correlations greater than .14 are significant at $p<.05$ (two-sided) and correlations greater than .19 are significant at $p<.01$ (two-sided). All the dependent variables are measured with a 7-point semantic differential scale.

2.4.4 Participants and procedure

The data were collected in two parts. First, a field experiment was conducted in the summer of 2009 in Step 2, a prestigious clothing store (160m²) located in Belgium. This retailer sells both women's and men's clothing, jewelry and other accessories. The experiments were conducted over two consecutive weeks: the first week studied the control group and the second week studied the experimental group. These two weeks were identical in terms of shopper traffic and weather circumstances. The shop owner also made sure that no special promotions were launched during the two weeks of the experiment. In the first week, no scents were diffused in the store. In the second week, a pleasant ambient scent ("Fresh Office") was diffused through the entire store with the Aerostreamer500 fragrance appliance. The appliance works according to the

principle of warm evaporation (electrical). The liquid scent is heated on a metal plate so that it evaporates, then a fan distributes the fragrance. Changing conditions on a weekly basis was necessary to ensure that no scents were present in the control group. As the customers were leaving the store, they were asked to fill out a questionnaire concerning their affective reactions, evaluations and approach behavior towards the store environment and products. Additionally, the participants were notified that we would contact them again in a couple of days for an additional online survey. In all, 194 shoppers (20 men, 174 women) between the ages of 18 and 55 years old participated. A total of 105 participants visited the store in the first week and 89 in the second week.

To prevent any influence of scent on the self-reported rating of the shopping motivation and affect intensity of the respondents, participants were contacted two days later and asked to complete an online survey containing questions regarding hedonic shopping motivation and affect intensity. Of the 194 participants, 129 (12 men, 117 women) completed the online survey. Seventy-four participants visited the store in the control condition and 55 in the scent condition. Participants who completed both questionnaires had a chance to win a 50 euro gift certificate from Step 2 (the store where the experiment took place). A summary of the questions in our study are reported in Table 2.3.

Table 2.3. Questions per survey

In-store survey	7-point semantic differentials
Affective responses towards the store environment *(Mehrabian & Russell, 1974)*	
Pleasure (6 items)	Happy/unhappy
	Pleased/annoyed
	Satisfied/dissatisfied
	Contented/melancholic
	Hopeful/despairing
	Relaxed/bored
Arousal (3 items)	Stimulated/relaxed
	Excited/calm
	Frenzied/sluggish
Evaluation of the store environment (14 items) *(Fisher, 1974; Spangenberg et al., 1996)*	Attractive/unattractive
	Relaxed/tense
	Comfortable/uncomfortable
	Cheerful/depressing
	Colorful/drab
	Positive/negative
	Stimulating/boring
	Good/bad
	Lively/unlively
	Motivating/unmotivating
	Interesting/uninteresting
	Pleasant/unpleasant
	Open/closed
	Bright/dull

Table 2.3. Questions per survey (continued)

Evaluation of products (7 items) *(Bellizzi et al., 1983; Spangenberg et al., 1996)*	Good/bad Pleasant/unpleasant Favorable/unfavorable High quality/low quality Attractive/unattractive Good value/poor value Up-to-date/outdated
Intention to revisit the store (1 item)	
Online follow-up survey	Number of questions
Hedonic shopping motivation *(Arnold & Reynolds, 2003)*	23
Affect intensity *(Geuens & De Pelsmacker, 2002)*	20

2.5 Results

Our analysis is discussed in two stages. First, our hypothesis concerning the influence of a pleasant ambient scent on affective reactions, evaluations and approach behavior is tested. If this hypothesis is supported, this study will confirm the effect of scent in the market-place. Second, the moderating role of hedonic shopping motivation and affect intensity will be studied. The observed differences are reported up to a significance of $p < .10$.

2.5.1 Influence of a pleasant ambient scent on affective reactions, evaluations and approach behavior

Hypothesis 1 was tested using independent sample *t*-tests with pleasure, arousal, evaluation of the store environment, evaluation of the products and intention to revisit the store as dependent variables and scent as grouping variable. The presence of a pleasant ambient scent in the store had a positive

influence on all the dependent measures (all one-tailed $p < .10$) (see Table 2.4; Total sample). The effect sizes indicated a small effect (all $r < .30$; Field, 2005).

Table 2.4. Effect of ambient scent on affective reactions, evaluations and intentions to revisit the store

Dependent measures	Total sample					Follow-up online subsample				
	M(SD)		*t*-value	*p*-value*	*r*	*M(SD)*		*t*-value	*p*-value*	*r*
	No scent (n=105)	Scent (n=89)				No scent (n=74)	Scent (n=55)			
Pleasure	5.84 (.69)	6.08 (.62)	-2.49	.007	.18	5.90 (.72)	6.05 (.66)	-1.20	.116	.11
Arousal	4.17 (1.28)	4.42 (1.32)	-1.32	.094	.10	4.16 (1.24)	4.32 (1.31)	-.73	.235	.06
Evaluation store environment	6.01 (.81)	6.17 (.64)	-1.56	.060	.11	6.02 (.82)	6.19 (.61)	-1.34	.091	.12
Evaluation products	6.12 (.64)	6.29 (.59)	-1.94	.028	.14	6.12 (.66)	6.28 (.57)	-1.33	.088	.12
Intention to revisit the store	6.50 (.91)	6.70 (.61)	-1.75	.042	.13	6.64 (.69)	6.73 (.65)	-.77	.223	.07

* one-sided tests

2.5.2 Moderating role of affect intensity and hedonic shopping motivation

Before testing the hypotheses concerning the moderating role of hedonic shopping motivation and affect intensity, independent sample *t*-tests with pleasure, arousal, evaluation of the store environment, evaluation of the products and intention to revisit the store as dependent variables and scent as the grouping variable were repeated. This time, the *t*-tests were conducted for the sample of 129 participants who responded to the online survey, because information regarding the individual differences was only available for these participants. In this smaller sample, all hypothesized directions were still intact, although the positive impact of the pleasant ambient scent remained significant only for the customers' evaluation of the store environment and their evaluation of the products in the store (see Table 2.4).

To test the moderating role of hedonic shopping motivation and affect intensity, for each of the five dependent variables (pleasure, arousal, evaluation of the store environment, evaluation of the products and intention to revisit the store), a moderated regression analysis was conducted with scent (categorical variable, 0/1 coded), one of the individual differences (hedonic shopping motivation or affect intensity) (continuous variables, mean corrected) and the interaction term of these two variables as independent variables (Cronbach, 1987; Irwin & McClelland, 2001; McClelland, 1997). The results are shown in Table 2.5 and 2.6. As expected, ambient scent and affect intensity did not have a significant simple effect on the dependent variables when affect intensity was added to the analysis. When hedonic shopping motivation was considered, one significant

simple effect of ambient scent (evaluation of the products: $t(125) = 1.76$, $p < .10$) and three significant simple effects of hedonic shopping motivation (pleasure: $t(125) = 1.93$, $p < .10$; evaluation of the store environment: $t(125) = 2.80$, $p < .01$; and evaluation of the products ($t(125) = 3.34$; $p < .01$) were found.

Table 2.5. Summaries of moderated regression analyses (Affect intensity)

	Model		Scent		Affect intensity		Scent x affect intensity	
Dependent variables	*F*(3, 125)	*p*	*t*	*p*	*t*	*p*	*t*	*p*
Pleasure	1.67	.18	1.22	.23	.68	.50	.86	.39
Arousal	1.59	.20	.74	.46	1.48	.14	.08	.94
Evaluation store environment	2.24	.09	1.31	.19	.59	.56	1.23	.22
Evaluation products	4.18	.007	1.42	.16	1.18	.24	1.47	.14
Intention to revisit the store	2.66	.05	.79	.43	1.08	.28	1.14	.26

Note Scent variable was coded as 0-1.

Table 2.6. Summaries of moderated regression analyses (Hedonic shopping motivation)

Dependent variables	Model		Scent		Hedonic shopping motivation		Scent x hedonic shopping motivation	
	F(3, 125)	*p*	*t*	*p*	*t*	*p*	*t*	*p*
Pleasure	1.82	.15	1.34	.18	1.93	.06	-1.02	.31
Arousal	1.52	.21	.89	.37	1.61	.11	-.30	.77
Evaluation store environment	3.76	.01	1.55	.12	2.80	.006	-1.07	.29
Evaluation products	6.14	.001	1.76	.08	3.34	.001	-.745	.46
Intention to revisit the store	1.27	.29	.92	.36	1.10	.27	.22	.83

Note Scent variable was coded as 0-1.

The standard interaction effects are not relevant to test hypotheses H2 and H3. Interaction effects test whether the two slopes (here, no fragrance/fragrance) significantly differ, whereas we are interested in determining whether there is a scent effect at a specific level of the individual differences. Hence, the effect of ambient scent was examined at both a high and low level of the individual differences (one standard deviation above and below the mean). Tables 2.7 and 2.8 outline the summary statistics of all dependent variables.

Concerning the moderating role of affect intensity, the presence of a pleasant ambient scent had a positive influence on pleasure (r = .13), the evaluation of the store environment (r = .16), the evaluation of the products (r = .18) and the intention to revisit the store (r = .12) for customers who responded intensely to emotional stimuli (high affect intensity). Effect sizes indicated a small effect (all r < .30; Field, 2005). The presence of an ambient scent had no influence on customers who do not respond intensely to emotional stimuli (largest t-value $\leq$ −.47, all p > .10; two-tailed test because there was no expected direction). Hence, hypothesis 2 is largely supported.

Regarding the moderating role of hedonic shopping motivation, however, the presence of a pleasant ambient scent had no influence on customers with high hedonic shopping motivation (largest t-value $\leq$ −.80, all one-tailed $p \geq$ .10). However, the presence of an ambient scent had an unexpected positive influence on pleasure (r = .15), evaluation of the store environment (r = .16) and evaluation of the products (r = .16) of customers with low shopping motivation (two-tailed test because there was no expected direction). Effect

sizes indicated a small effect (all $r < .30$; Field, 2005). Hence, hypothesis 3 is not supported.

Table 2.7. Moderating role of affect intensity on the effect of ambient scent on affective reactions, evaluations and intentions to revisit the store

Dependent measures	Low affect intensity (*one standard deviation below the mean*)				High affect intensity (*one standard deviation above the mean*)			
	M		*t*-value	*p*-value**	*M*		*t*-value	*p*-value*
	No scent	Scent			No scent	Scent		
Pleasure	5.85	5.89	-.25	.802	5.96	6.21	-1.47	.072
Arousal	3.94	4.08	-.47	.641	4.38	4.56	-.58	.282
Evaluation store environment	5.97	5.98	-.06	.953	6.07	6.40	-1.79	.038
Evaluation products	6.04	6.03	.04	.969	6.21	6.52	-2.04	.022
Intention to revisit the store	6.55	6.51	.25	.806	6.71	6.94	-1.36	.087

* one-sided tests; ** two-sided tests

Table 2.8. Moderating role of hedonic shopping motivation on the effect of ambient scent on affective reactions, evaluations and intentions to revisit the store.

	Low hedonic shopping motivation (*one standard deviation below the mean*)				High hedonic shopping motivation (*one standard deviation above the mean*)			
	M		*t*-value	*p*-value**	*M*		*t*-value	*p*-value*
Dependent measures	No scent	Scent			No scent	Scent		
Pleasure	5.72	6.01	-1.68	.096	5.99	6.14	-.96	.408
Arousal	3.88	4.15	-.85	.398	4.39	4.53	-.42	.338
Evaluation store environment	5.75	6.08	-1.87	.064	6.25	6.31	-.34	.368
Evaluation products	5.86	6.12	-1.78	.077	6.35	6.56	-.72	.248
Intention to revisit the store	6.54	6.62	-.50	.618	6.72	6.86	-.80	.212

*one-sided tests; ** two-sided tests

2.6 Discussion and conclusion

The aim of this chapter was to first examine the impact of a pleasant ambient scent on affective reactions, evaluations and intentions to revisit the store in a high affective involvement retail environment and second, to determine whether shopping motivation and affect intensity have a moderating role in this effect. We expected that the presence of a pleasant ambient scent would lead to enhanced affective reactions, evaluation and behavioral intentions compared to the absence of a pleasant scent and our hypotheses were, for the most part, supported. Indeed, the presence of a pleasant ambient scent in the store positively impacted all dependent variables (i.e., pleasure, arousal, evaluation of the store environment, evaluation of the products and intention to revisit the store). These findings are in line with past research that identifies ambient scent as an important marketing instrument (e.g., Bosmans, 2006; Spangenberg et al., 1996; Spangenberg et al., 2006). Moreover, our research confirms that in a high affective involvement setting pleasant ambient scent positively influences affective reactions experienced in a retail environment as compared to studies conducted in a low involvement setting (e.g., Morrin & Ratneshwar, 2003; Spangenberg et al., 1996). In our subsample of 129 participants who completed the second survey regarding the individual differences in hedonic shopping motivation and affect intensity, this positive pleasant scent effect was also found in consumers' evaluations of both the store environment and the products. In addition, theory is advanced by the finding that affect intensity has a significant moderating influence on the relationship between scent and consumer reactions (in 4 out of 5 cases). More precisely, individuals who scored highly on affect

intensity were more sensitive to the presence of a scent in the shopping environment, leading to enhanced positive affect, evaluations and behavioral intentions. These results support and give substance to Gulas and Bloch's (1995) notion that individual consumer characteristics influence the effect of an ambient scent in a shopping environment.

Regarding shopping motivation, we found no effect of a pleasant ambient scent on customers with a high hedonic shopping motivation. Consumers who shop for entertainment and personal pleasure actively search for hedonic experiences. Since the experiment took place in a prestigious clothing store already filled with hedonic elements, it is possible that a pleasant ambient scent did not enhance the shopping experience for consumers with a high hedonic shopping motivation. In fact, high hedonic shoppers already highly rated all dependent variables except arousal in the control condition (≥6 on 7-point scale), which may have provided too little room for improvement by diffusing a scent (ceiling effect). On the other hand, for consumers with a low hedonic shopping motivation, the pleasant ambient fragrance had an unexpected positive effect on pleasure and evaluations although these consumers are more driven by non-hedonic motives and do not actively search for hedonic experiences. This might be because fragrances also alter consumer reactions when they are unconsciously perceived (e.g., Labbe, Rytz, Morgenegg, Ali, & Martin, 2007; Soars, 2009; Ward, Davies & Koojman, 2007). This means that for consumers with a high hedonic shopping motivation, the type of store they were in inhibited the scent effect. This may also imply that a pleasant ambient scent will affect both high and low hedonic shoppers in a more downscale store.

In support of the above discussed relationship between hedonic shopping motivation and the dependent variables in this prestigious clothing store, we found that hedonic shopping motivation had a positive influence on a few aspects of consumer behavior (i.e., pleasure and evaluation of the store environment and the products). As suggested above, this might be explained by the type of setting in which the experiment took place. An upscale clothing store may be more appreciated by consumers who score high on hedonic shopping motivation.

2.6.1 Limitations, further research and implications

In this study, a single scent in a single retail environment was used. Hence, we must be cautious to infer results from this scent and setting to other conditions (Soars, 2009). First, the experiment took place in a relatively small boutique and the respondents were customers who probably visit the store on a regular basis. Additionally, the fragrance used in this study appears to be not only pleasant but also arousing. A pleasant yet slightly arousing scent may not have the same result. Moreover, we did not verify whether the scent evoked a particular concept or memory. Future research could replicate this study with a variety of scents that exhibit differences in pleasantness, arousal, evocativeness, and congruency with the product (Mitchell et al., 1995; Schifferstein & Blok, 2002; Seo et al., 2010) in various types of stores and settings. It is possible that the presence of a pleasant scent in the store affected participants' willingness to take part in the study. Baron and Thomley (1994) found that exposure to a pleasant odor increased the time a participant was willing to spend volunteering in an experiment. Furthermore, we did not examine whether or not the ambient

scent had an effect on the store personnel. Bitner (1992) indicated that because the store personnel is also exposed to the retail environment, an atmospheric cue can trigger a positive reaction of the personnel, leading to greater effort and commitment. Subsequently, this positive response can influence the social interactions between the personnel and the customers. Because our experiment took place in a boutique that tries to assist the customer in their search for a particular product, the store personnel plays an important role in the shopping experience. Future research should also investigate the interaction of fragrances with other atmospheric cues because shopping is a holistic experience in which a consumer is exposed to several environmental elements at the same time. Although some studies have already explored the combined effect of scents and other atmospheric stimuli on shopping behavior (e.g., Fiore, Yah, & Yoh, 2000; Spangenberg et al., 2005), additional research is still needed. Future research should also focus on identifying other individual differences (e.g., sensory-processing sensitivity) that moderate the effect of fragrances on consumer behavior.

Using pleasant ambient fragrances in a shopping environment can create promising opportunities for retailers. An ambient scent is a malleable atmospheric cue; it can be altered relatively easily to change the atmospheric sensation a consumer may experience while shopping. Even consumers who do not search for hedonic experiences can be influenced by a pleasant ambient scent because it operates on a subconscious level. Moreover, retailers can use ambient scents to differentiate their store from their competitors. However, retailers must keep in mind that not all consumers will be affected by the

presence of a fragrance. Based on the target audience, a retailer should decide whether or not to disperse a scent. Additionally, our results with respect to hedonic shopping motivation and affect intensity have practical implications. For example, previous research shows that women score higher on affect intensity than men (Larsen & Diener, 1987; Moore, 2004), indicating that scent marketing would be more appropriate for stores with a female target audience.

Chapter 3

Tasting the smell: Effects of ambient scent on scent experts' evaluations of (in)congruent food products[2]

This research studies the effect of scent expertise (laymen vs. novice experts vs. experts) on product and taste evaluations of three products that are (in)congruent with an ambient scent and examines whether this effect is mediated by these groups' awareness of scents in their environment and by how well they are able to identify different scents. Scent experts might react differently to the presence of a scent that is (in)congruent with the product under evaluation because of an easier detection of the product-scent (in)congruity. Results show that novice experts and experts evaluate an incongruent product less positively than laymen. Laymen score lower than novice experts and experts on odor identification, and lower than experts on odor awareness but not lower than novice experts. The differences in the evaluation between the scent expertise groups cannot be fully explained by differences in their level of odor identification or level of odor awareness.

[2] This chapter corresponds to the journal article 'Adams, C., Doucé, L., Janssens, W., Vanrie, J., & Petermans, A. (2014). Tasting the smell: Effects of ambient scent on scent experts' evaluations of (in)congruent food products. *Food Quality and Preference, 38,* 92-97.' The first two authors contributed equally to this work.

3.1 Introduction

Retailers increasingly use pleasant ambient scents to improve their store environment (Smith, 2009). While previous research demonstrates that pleasant ambient scents may positively affect consumer reactions toward retail environments and products (e.g., Spangenberg et al., 1996), additional research shows that these positive effects cannot be attributed solely to the scent's pleasantness but may also depend on specific conditions or situations. A number of studies have found that the effect of a pleasant ambient scent also depends on the congruency, or fit, between the ambient scent and the product under evaluation (e.g., Bosmans, 2006; Mitchell et al., 1995). For example, a pleasant ambient scent can influence product evaluation in a positive manner as long as the ambient scent is congruent with the product (Bosmans, 2006). Individual differences between people also influence the effect of an ambient scent. Gulas and Bloch (1995) describe a number of individual differences in their scent model and acknowledge that these differences could have a moderating effect on scent processing (i.e., from objective to subjective ambient scent). In line with this model, Doucé and Janssens (2013) found that the presence of a pleasant ambient scent has more effect on consumers scoring high on affect intensity.

Another important individual difference closely related to scent processing is the level of scent expertise. This study investigates whether, and if so, to what extent, scent expertise plays a role in the process of how consumers evaluate a product in the presence of an ambient scent.

A typical 'scent expert' is someone who has a scent education and has developed the cognitive skills for describing and labeling scents (Marino-Sanchez et al., 2010). For example, wine tasters, who can be categorized as scent experts, are better at odor identification. Furthermore, in everyday life and with respect to the environment, scent experts are more likely to be aware of odors, as enhanced odor identification is related to increased odor awareness (Smeets et al., 2008). Scent experts can thus be expected to be more aware of scents in their environment and to process ambient scents differently from laymen. However, previous research concerning this topic is scarce. In this chapter, we present the results of research in which we asked laymen and scent experts to evaluate products in the presence of an ambient scent. We approached scent expertise from two points of view. First, we defined scent experts as people who have an education concerning their senses and in particular their sense of smell – in this case, wine experts who have had scent education as part of their wine education. We labeled the experts as either novice experts or experts, depending on their number of years of scent education. We expect that the scent expert level shows itself into a better performance on an objective measurement task (i.e., an odor identification test) as well as on a subjective self-report scale (i.e., an odor awareness scale). Hence, we hypothesize:

H1: The level of odor identification will be lower (a) for laymen than for novice experts, (b) for laymen than for experts, and (c) for novice experts than for experts.

H2: The level of odor awareness will be lower (a) for laymen than for novice experts, (b) for laymen than for experts, (c) for novice experts than for experts.

Second, we tried to identify whether these objective and subjective characteristics of scent expertise play a mediating role in the effect of (formally) being a scent expert on product and taste evaluation. To identify possible differences in the effect of an ambient scent, we conducted an experiment in line with previous work concerning the congruency between the ambient scent and the product under evaluation (Bosmans, 2006). We used three degrees of congruency: highly congruent (the product and ambient scent are the same), medium congruent (the product belongs to the same product category as the ambient scent), and incongruent (the product belongs to a product category different from that of the ambient scent). Besides product evaluation, we also included taste evaluation of the product as a dependent variable. This is done because of the interaction between the sense of smell and the sense of taste. Indeed, taste and smell are interrelated: when an individual swallows a product, the aromas of that product are transported through the retro-nasal passage, which connects the mouth to the nose (Murphy, Cain, & Bartoshuk, 1977; Rozin 1982). Hence, in summary, we propose the following research questions.

RQ1: Does the level of scent expertise influence the product evaluation and/or taste evaluation in the presence of an ambient (in)congruent scent?

RQ2: Is the relationship between scent expertise and product evaluation and/or taste evaluation in the presence of an ambient (in)congruent scent mediated by the level of odor identification and/or the level of odor awareness?

3.2 Method

3.2.1 Participants and procedure

We selected three groups of participants: laymen, novice scent experts, and scent experts. In line with Marino-Sanchez et al. (2010), we chose the experts and novice experts from a group of wine tasters. The difference between experts and novice experts was based on the time spent learning about wine-related scents and aromas. In the remainder of this chapter, 'novice experts' refers to people in their first months of wine education (i.e., Wine tasting and Aspirant-Sommelier), in which they learn to identify aromas. 'Experts' are people who successfully graduated from the Aspirant-Sommelier course and were at the time of the experiment continuing their education to obtain the certificate of Sommelier or Vintager. Both expert groups learned to identify scents based on the masterkit of 54 scents of Le Nez du Vin. This set contains a mixture of fruity (e.g., banana), floral (e.g., acacia), vegetal (e.g., green pepper), animal (e.g., leather), and toasty (e.g., roasted almond) aromas. The control group comprised laymen who were following courses at the same adult education institute but who had no former or current wine or scent education. In total, 35 novice experts (55% female, M_{age} = 34.10 years), 25 experts (20% female; M_{age} = 46.83 years), and 32 laymen (47% female, M_{age} = 41.81 years) participated. The average age differed between the three scent expertise groups ($F(2, 82)$ =

6.10, p = .003). The novice experts were younger than the experts (p = .003) and the laymen (p = .08). The fact that the mean age of the experts was higher than the mean age of the novice experts makes sense because of a larger period of scent education. Moreover, the gender ratio differed between the three scent expertise groups ($\chi^2(2) = 6.73$, p = .04). Specifically, the gender ratio differed for the scent experts compared to both the novice experts ($\chi^2(1) = 3.91$, p = .05) and the laymen ($\chi^2(1) = 6.50$, p = .01). The possible implications of these differences in age and gender ratio will be addressed in the discussion section.

The experiment was part of a larger study in which product descriptions and product evaluations were measured, and took place in classrooms in a Belgian adult education institute. Participants were first instructed to refrain from communicating with each other during the entire experiment. Then, in groups of ten, they entered a classroom where the ambient scent of banana was diffused by means of a scent dispenser provided by Scents, an olfactory marketing firm in Belgium. The dispenser converts a liquid scent into microscopically fine particles and sprays these particles into the room. In this classroom, participants had to evaluate a banana, an apple, and a tomato. These products were chosen as the congruent, medium congruent, and incongruent product, respectively. This product choice is in line with Bosmans (2006). Participants evaluated the product while being able to touch and look at the product as long as they deemed necessary. Next, they were given a piece of the product to taste. After evaluating the taste of the products, the participants proceeded to another similar classroom where no ambient scent had been diffused. There they completed the Odor Awareness Scale (OAS) (Smeets et al., 2008), after which

they took an odor identification test of 10 odors. These subjective (i.e., OAS) and objective (i.e., odor identification) measurements of scent expertise were performed at the end of the experiment to avoid possible priming effects.

3.2.2 Measurements

Respondents evaluated a banana (congruent with the ambient scent), an apple (medium congruent with the ambient scent), and a tomato (incongruent with the ambient scent). In line with Bosmans (2006), product evaluation was measured by means of four 9-point items (i.e., fresh, good, tasty and liking) A summated scale (mean of the four items) was calculated. This scale showed good reliability (α = .87) and was used in further analysis. After participants tasted a part of the product under study, taste evaluation was measured by a summated scale of the same four 9-point items (i.e., fresh, good, tasty and liking). This scale showed very good reliability (α = .93) and was used in further analysis.

Odor awareness was assessed by the 32-items Odor Awareness Scale (α = .91), developed by Smeets et al. (2008).

An odor identification test was designed in line with the Le Nez du Vin materials for wine training, a valid measuring tool for odor identification (McMahon & Scadding, 1996). Le Nez du Vin consists of a number of unlabeled bottles in which a specific scent is present, which are used to learn to identify various scents. We employed a similar approach and designed an odor identification test in which we put ten scents on cotton-tipped sticks and placed the sticks in dark glass bottles. We chose the scents from results of a pretest with 25 students

who had to identify 46 scents. From these 46 scents, we selected four scents that were easily recognizable (i.e., mint, chocolate, red berries, and cinnamon) and five scents that were difficult to recognize (i.e., wood, green apple, peach, rose, and lavender). We added the scent of banana to the test since this was the ambient scent used in the experiment.

3.3 Results

3.3.1 Influence of scent expertise level on evaluation

We conducted a series of one-way ANOVAs to test the impact of the level of scent expertise (layman vs. novice expert vs. expert) on product and taste evaluations. Table 3.1 shows the results. Main effects of scent expertise were found only for the incongruent product (i.e., tomato): a significant effect for product evaluation ($F(2,89) = 7.35$, $p = .001$, $\eta_p^2 = .14$, a large effect according to Cohen, 1988) and a marginally significant effect for taste evaluation ($F(2,89) = 2.86$, $p = .06$, $\eta_p^2 = .06$, a medium effect; see Cohen, 1988). For the product evaluation of the tomato, Tamhane post hoc tests (unequal variances) showed a significantly higher score for laymen ($M = 7.69$) than for novice experts ($M = 6.61$, $p = .005$, Cohen's d = .81) as well as a significantly higher score for laymen than for experts ($M = 6.40$, $p = .002$, Cohen's d = 1.00). The effect sizes indicate a large effect (Cohen, 1992). Tests showed no significant difference between novice experts and experts ($p = .94$). For the taste evaluation of the tomato, Bonferroni post hoc tests (equal variances) showed a marginally significant higher score for laymen ($M = 5.86$) than for novice experts ($M = 4.86$, $p = .07$, Cohen's d = .53). The effect size indicates a medium effect (Cohen, 1992). Hence, with respect to RQ1, we found that being

an expert negatively influences product and taste evaluations of the product incongruent with the ambient scent diffused in the environment.

Table 3.1. Impact of scent expertise on product and taste evaluations

Dependent variables	*F*	*p*	*M (SD)*		
			Layman	Novice expert	Expert
Product evaluation					
Banana	1.91	.15	6.49 (1.59)	7.11 (1.35)	6.56 (1.24)
Apple	.10	.91	6.70 (1.46)	6.84 (1.64)	6.70 (1.12)
Tomato	7.35	.001	7.69 (1.08)[ab]	6.61 (1.60)[a]	6.40 (1.49)[b]
Taste evaluation					
Banana	.35	.70	6.82 (1.75)	7.04 (1.47)	6.69 (1.63)
Apple	.60	.55	7.31 (1.61)	7.51 (1.53)	7.06 (1.64)
Tomato	2.86	.06	5.86 (2.05)[c]	4.86 (1.77)[c]	5.63 (1.36)

Means with same superscript are significantly different at $p < .01$.

Means with same superscript and in italic are significantly different at $p < .10$.

3.3.2 Mediating role of odor identification and odor awareness

Following Zhao, Lynch, and Chen (2010) and Hayes and Preacher (2014), we conducted a bootstrapping analysis – with 10,000 samples and a 90% confidence interval – to assess whether odor awareness and/or odor identification mediated the effect of scent expertise on product and taste evaluations (using MEDIATE for SPSS). Laymen were the reference group unless stated otherwise. A comprehensive overview of the results appears in Table 3.2 and Figure 3.1 for product evaluation of tomato, and in Table 3.3 and Figure 3.2 for taste evaluation of tomato.

Concerning the effect of scent expertise on odor identification, laymen scored lower on the odor identification test than novice experts (β = .88, p = .048) and lower than experts (β = .81, p = .09), confirming H1a and H1b. Tests showed

no difference in odor identification between novice experts and experts (β = -.07, p = .88). Compared to experts, laymen were also less aware of odors (β = 7.78, p = .07), supporting H2b. However, tests showed no significant difference in odor awareness between laymen and novice experts (β = 4.50, p = .25) or between novice experts and experts (β = 3.27, p = .44).

For tomato, as the ANOVAs show, we found similar results for the total effect[3] of scent expertise on product and taste evaluations. Laymen evaluated the tomato (β = -1.08, p = .002) and the taste of the tomato (β = -1.00, p = .02) more positively than novice experts. Laymen also evaluated the tomato (β = -1.29, p = .001) more positively than experts. These differences were also significant after adjusting for group differences in odor identification and odor awareness (i.e., direct effects).

To determine whether the effect of scent expertise on product and taste evaluations is mediated by odor identification and/or odor awareness, the indirect effects of the scent expertise groups were estimated. Although not all the total effects of scent expertise were significant, we looked into all indirect effects of scent expertise on product and taste evaluations (Hayes, 2009; Zhao et al., 2010). This measurement is necessary because mediators may exist that

[3] In line with Hayes (2013), we label the total effect as the effect of scent expertise (X) on product or taste evaluations (Y). The direct effect is the effect of scent expertise (X) on product or taste evaluations (Y) controlling for odor identification (M_1) and odor awareness (M_2). The indirect effect is the effect of scent expertise (X) on product and taste evaluations (Y) through odor identification (M_1) and/or odor awareness (M_2).

are not part of the model, and the indirect effects through those mediators may have opposite signs that cancel each other out, resulting in a non-significant total effect. For product evaluation of tomato, the confidence intervals for the indirect effects all included zero, indicating that no mediation occurred through odor identification or odor awareness. For taste evaluation of tomato, the bootstrap mediation test showed that the scent expert condition compared to the laymen indirectly influenced taste evaluation through odor awareness [-.52, -.01]. Thus scent experts are more aware of scents in their environment than laymen, and participants who are more aware of scents evaluated the taste of tomato less positively.

We conducted similar analyses for banana and apple. However, we found no significant total, direct, or indirect effects of scent expertise on evaluations.

Table 3.2. Unstandardized regression coefficients, standard errors, and model summary information for the effect of scent expertise on odor identification, odor awareness, and product evaluation of tomato

	Odor identification		Odor awareness		Total effect evaluation		Direct effect evaluation		Indirect effects through					
									Odor identification			Odor awareness		
	R^2 = .05 $F(2,89)$ = 2.36 p = .10		R^2 = .04 $F(2,89)$ = 1.71 p = .19		R^2 = .14 $F(2,89)$ = 7.35 p = .001		R^2 = .15 $F(4,87)$ = 3.88 p = .006							
	Coeff. (*SE*)	*p*	Coeff. (*SE*)	*p*	Coeff. (*SE*)	*p*	Coeff. (*SE*)	*p*	Coeff. (*SE*)	CI_{LOW}	CI_{UP}	Coeff. (*SE*)	CI_{LOW}	CI_{UP}
Constant	3.69 (.32)	< .001	108.78 (2.83)	< .001	7.69 (.25)	< .001	8.46 (1.05)	< .001	n/a	n/a	n/a	n/a	n/a	n/a
Laymen vs. Novice experts	.88 (.44)	.048	4.50 (3.91)	.25	-1.08 (.34)	.002	-1.09 (.35)	.003	.05	-.05	.27	-.04	-.24	.02
Laymen vs. Experts	.81 (.48)	.09	7.78 (4.27)	.07	-1.29 (.38)	.001	-1.27 (.39)	.002	.04	-.04	.26	-.07	-.32	.04
Odor identification	n/a	n/a	n/a	n/a	n/a	n/a	.05 (.09)	.54	n/a	n/a	n/a	n/a	n/a	n/a
Odor awareness	n/a	n/a	n/a	n/a	n/a	n/a	-.01 (.01)	.37	n/a	n/a	n/a	n/a	n/a	n/a

Bootstrapping analysis with 10,000 samples and a 90% confidence interval. Laymen as reference group.

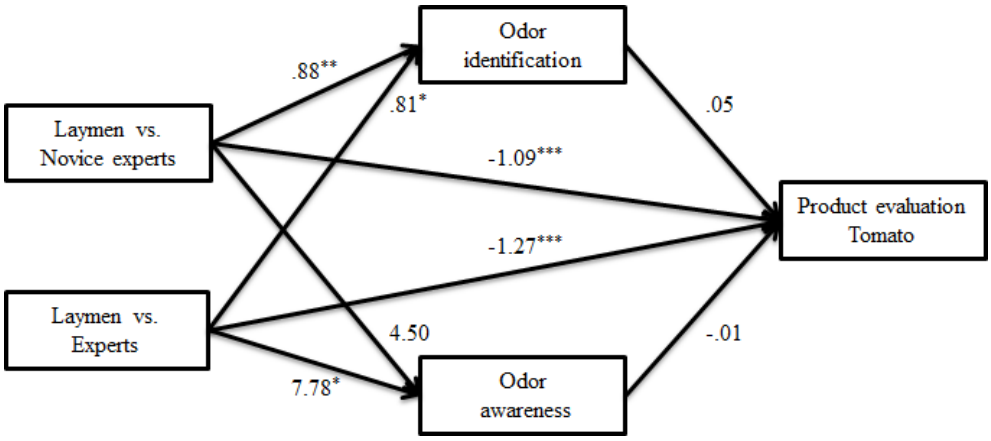

Figure 3.1. A statistical diagram of the parallel multiple mediator model - Product evaluation tomato.

Figures represent unstandardized beta coefficients.* $p < .10$, ** $p < .05$, *** $p < .01$. Laymen as reference group.

Table 3.3. Unstandardized regression coefficients, standard errors, and model summary information for the effect of scent expertise on odor identification, odor awareness, and taste evaluation of tomato

	Odor identification		Odor awareness		Total effect taste evaluation		Direct effect taste evaluation		Indirect effects through					
	R^2 = .05 $F(2,89)$ = 2.36 p = .10		R^2 = .04 $F(2,89)$ = 1.71 p = .19		R^2 = .06 $F(2,89)$ = 2.86 p = .06		R^2 = .10 $F(4,87)$ = 2.35 p = .06		Odor identification			Odor awareness		
	Coeff. (*SE*)	*p*	Coeff. (*SE*)	*p*	Coeff. (*SE*)	*p*	Coeff. (*SE*)	*p*	Coeff. (*SE*)	CI_{LOW}	CI_{UP}	Coeff. (*SE*)	CI_{LOW}	CI_{UP}
Constant	3.69 (.32)	< .001	108.78 (2.83)	< .001	5.86 (.31)	< .001	8.26 (1.31)	< .001	n/a	n/a	n/a	n/a	n/a	n/a
Laymen vs. Novice experts	.88 (.44)	.048	4.50 (3.91)	.25	-1.00 (.43)	.02	-.89 (.44)	.047	-.01	-.20	.13	-.10	-.37	.01
Laymen vs. Experts	.81 (.48)	.09	7.78 (4.27)	.07	-.23 (.47)	.63	-.05 (.48)	.91	-.01	-.19	.13	-.17	-.52	-.01
Odor identification	n/a	n/a	n/a	n/a	n/a	n/a	-.01 (.11)	.93	n/a	n/a	n/a	n/a	n/a	n/a
Odor awareness	n/a	n/a	n/a	n/a	n/a	n/a	-.02 (.01)	.08	n/a	n/a	n/a	n/a	n/a	n/a

Bootstrapping analysis with 10,000 samples and a 90% confidence interval. Laymen as reference group.

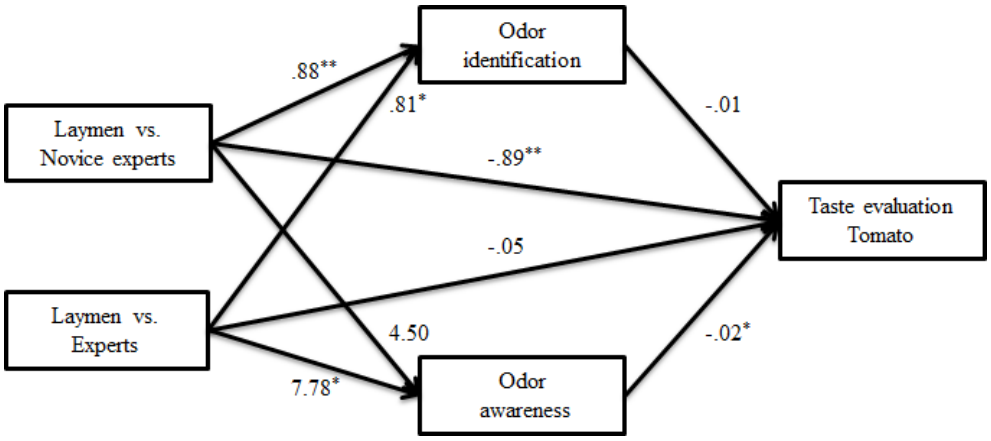

Figure 3.2. A statistical diagram of the parallel multiple mediator model - Taste evaluation tomato.

Figures represent unstandardized beta coefficients. * $p < .10$, ** $p < .05$. Laymen as reference group.

3.4 Discussion

The present study investigated the effect of scent expertise on product and taste evaluations of products (in)congruent with an ambient scent present in the environment. We only found an effect of scent expertise for the product incongruent with the scent. More precisely, laymen evaluate the product incongruent with the ambient scent more positively than novice experts and experts. We found no significant difference between novice experts and experts. Concerning taste evaluation, laymen evaluate the product incongruent with the ambient scent more positively than novice experts. Again, we found no significant difference between novice experts and experts. With respect to the evaluation of the highly or medium congruent products, results showed no differences between the scent expertise groups. These findings may be

explained by the fact that in the objective odor identification test, laymen, novice experts, and experts recognized the banana scent as a fruit scent (33.70%) more often than they could label it correctly as banana (20.70 %), suggesting a similar product-scent congruency for apple and banana. For the incongruent product (i.e., the tomato), novice experts detected the incongruence with the banana scent more, leading to more negative evaluations than by laymen. Additionally, we found no difference between novice experts and experts regarding the product and taste evaluations of the incongruent product. Looking at the scent education of the novice experts and experts, we can distinguish two types of education consistent with the definitions of LaTour, LaTour, and Feinstein (2011). Perceptual learning involves the sensory aspects of wine (i.e., color, smell, and taste), whereas conceptual training involves learning about the wine-making process. The first months of education emphasize perceptual learning, which involves learning to identify scents (odor identification). At the time of the experiment, novice experts and experts had both completed this module, and thus had a comparable level of education in odor identification. Hence, the main educational difference between novice experts and experts was in their level of conceptual learning.

Moreover, we wanted to explain the effect of scent expertise on product and taste evaluations by studying to what extent the scent expertise is reflected in odor identification and awareness. In line with prior research (Marino-Sanchez et al., 2010), we found that laymen scored lower on the scent identification test than novice experts and experts. Moreover, laymen also scored lower on the Odor Awareness Scale than experts but not novice experts. Thus, laymen not

only perform worse on an objective measure but are also less aware of scents in daily life.

Subsequently, we tested whether odor awareness and odor identification mediated the effect of scent expertise on product and taste evaluations. For product evaluation of tomato, we found no mediation of the scent expertise effect through odor awareness or odor identification. For taste evaluation of tomato, we found no mediating effect of odor identification. However, in the absence of a total effect of scent expert versus laymen on taste evaluation of tomato, we found an indirect effect of scent expert versus laymen through odor awareness. Thus, experts are more aware of scents in their environment than laymen, and participants who are more aware of scents seemed to detect the incongruence of the banana scent with the tomato when they tasted it, leading to more negative taste evaluations.

The evaluation differences between laymen and the two expert groups cannot fully be explained by odor identification and odor awareness, which could indicate that the level of scent expertise is more than a mere combination of the degree of odor identification and the degree of odor awareness. Apparently, other factors create an essential difference. A possible factor may be found in the multisensory nature of our perceptions. Besides being educated with respect to scent, wine experts are also trained in the combined use of the sense of taste and the sense of sight. Their sense of smell might be influenced by a more profound integration with the other senses (Krishna, 2012).

With respect to the possible influence of differences in age between the groups (i.e., laymen, novice experts, and experts), we reported in the method section that there was a significant difference between on the one hand the mean age of the novice experts (*M* = 34.10) and on the other hand the mean age of the experts (*M* = 46.83) and of the laymen (*M* = 41.81). Research showed that people between the ages of 20 and 40 have the most accurate olfactory capabilities (Doty, Shaman, Appleboum, Giberson, Siksorski, & Rosenberg, 1984). After 40 years of age, the consumers' olfactory capabilities decline notably. Hence, according to this reasoning, novice experts (which are younger in this study) should be better at odor identification compared to experts and laymen, and moreover, no difference in odor identification is expected between these latter two groups. However, the results indicate no difference in odor identification between novice experts and experts, and a difference in odor identification between laymen and experts. Consequently, the differences between mean age of the three groups are no viable alternative explanation for our findings.

The gender ratio of the three groups indicate that in the expert group more males (i.e., 80 % male participants) are present than females, while for the novice experts and the laymen the ratio was much more balanced. Research by Doty et al. (1985) demonstrated that females are better at odor identification than males. Taking the gender ratio of the three groups into consideration, we would expect that experts would score less on odor identification than novice experts and laymen. However, the results indicate that the expert group scored significantly *higher* than the laymen on odor identification, while the experts and

novice experts did not differ significantly, indicating that the gender ratio cannot be seen as an alternative explanation of our results.

Our research has some limitations. First, we were interested in how the evaluation of products (in)congruent with an ambient scent differed between scent experts and laymen, and therefore a 'no ambient scent condition' was not included in our study. However, further research could look at possible expert effects in conditions were no or other additional atmospheric cues than fragrances were added (e.g., music and music experts). Second, the products we chose for evaluation – tomato, apple, and banana – were all fruits and vegetables. Moreover, we selected wine experts as scent experts. Extrapolation of our results to other product categories and other scent experts (e.g., master chefs) must be done carefully, and our findings call for further research. Third, scent congruity can be operationalized in different ways: for instance thematic congruity (Doucé, Poels, Janssens, & De Backer, 2013), gender congruity (Spangenberg et al., 2006), or product congruity (Mitchell et al., 1995). We only studied product-scent congruity, but future research could also take a look at the effect of scent expertise on other types of scent congruity.

Our findings have some practical implications. Retailers who use ambient scents to improve the shopping experience must be aware that compared to laymen, scent experts react differently to the presence of ambient scents, especially when the scent is incongruent with the product under evaluation. However, as long as the ambient scent is congruent with the store's offerings, experts' and laymen's reactions can be expected to be similar. This implication can be interesting for both specialized retailers (e.g., wine shops) and mainstream

retailers (e.g., grocery store with for example a large wine department), even though the latter probably have fewer scent experts amongst their customers. Retailers who sell more than one product type should realize that ambient scents might shift towards adjacent departments where products incongruent with the scent are located. Moreover, our results suggest that retailers offering free tastings should understand that when customers become aware of the ambient scent, they might evaluate the taste of scent-incongruent products more negatively. This research adds to the existing knowledge that the use of ambient scents and the choice of a particular ambient scent should be considered carefully.

Chapter 4

Smelling the books: The effect of chocolate scent on purchase-related behavior in a bookstore[4]

The aims of this research were to (1) explore the different effects of an ambient scent of chocolate on general approach (i.e., the customer explores the products in the store) versus goal-directed behavior (i.e., the customer searches a specific product), and (2) investigate whether an ambient chocolate scent diffused in a retail environment has a positive effect on consumers' behavior toward thematically congruent products. A field study with 201 participants shows that a chocolate scent positively influences general approach behavior and negatively influences goal-directed behavior in a bookstore. Moreover, when gender is controlled for, the chocolate scent improves approach and buying behavior toward thematically congruent books and decreases approach and buying behavior toward incongruent books.

[4] This chapter corresponds to the journal article 'Doucé, L., Poels, K., Janssens, W., & De Backer, C. (2013). Smelling the books: The effect of chocolate scent on purchase-related behavior in a bookstore. *Journal of Environmental Psychology, 36,* 65-69.'

4.1 Introduction

Scents can influence people's attitudes and behavior (e.g., Holland et al., 2005). The scent of chocolate, for instance, evokes pleasure and arousal for most consumers (Knasko, 1995) and changes the behavior of visitors in a (cyber)shop. They stay longer, and they examine products they have picked up for a longer time (Vinitzky & Mazursky, 2011). Not surprisingly, a growing number of marketing managers have shown interest in the use of scents in a variety of marketplace contexts, such as movie theaters (Elliott, 2007) and retail store environments (Smith, 2009). Although research on ambient scent effects is substantial, investigators have paid relatively little attention to the combined effects of the store, its products, and scent (Krishna, 2012). The current study attempts to fill this research gap in two ways: (1) by examining possible differences in the effects of a chocolate scent on general approach behavior versus goal-directed behavior, and (2) by further unraveling the presently mixed results of thematically (in)congruent scent effects.

4.2 Chocolate as a pleasant ambient scent

In a retail setting, previous research has shown that ambient scents influence consumers' affective and cognitive reactions as well as their approach behavior toward products and stores (e.g., Spangenberg et al., 1996; Ward et al., 2007). A well-known theoretical basis for studying ambient scent effects is the Stimulus-Organism-Response paradigm (Gulas & Bloch, 1995; Mehrabian & Russell, 1974). This model states that affective and cognitive responses triggered by an ambient scent mediate the effects of the scent on approach behavior. In line with this model, research has found that the presence of a

pleasant ambient scent triggers a positive affective reaction (e.g., Baron, 1997; Doucé & Janssens, 2013) and/or a cognitive reaction such as enhanced attention, memory, and evaluation (Lwin, Morrin, & Krishna, 2010; Morrin & Ratneshwar, 2003). These affective and cognitive responses in turn lead to approach behavior, such as staying longer in the store and examining more products for a longer period of time (Vinitzky & Mazursky, 2011). Thus, a pleasant ambient scent may shift consumers' shopping goals from searching for specific products they want to buy (i.e., goal-directed behavior) to exploring stores in general and in detail (i.e., general approach behavior).

In this research, we focus on the scent of chocolate. Consumption of chocolate is known to positively influence mood (Parker, Parker, & Brotchie, 2006), and even the mere scent of chocolate leads to a higher positive mood and higher arousal (Knasko, 1995). Besides these affective reactions, the scent of chocolate may also elicit cognitive reactions. Especially the aroma of chocolate, compared to smells of other food, changes activity in the human central nervous system (Martin, 1998). The scent of chocolate can also reduce consumers' attention, perhaps implying that during the shopping trip consumers evolve from shopping for a specific product to enjoying the whole shopping experience. Combining these findings with the prediction of the Stimulus-Organism-Response paradigm, we assume that the scent of chocolate will lead to approach behavior. More specifically, we expect that:

H1: The presence of an ambient chocolate scent will have (a) a positive influence on general approach behavior, and (b) a negative influence on goal-directed behavior compared with no ambient scent.

4.3 Thematic congruency effects

The ambient scent model of Gulas and Bloch (1995) stipulates that the relationship between ambient scent perceptions and consumer responses can be moderated by congruency between the scent and the store's offerings. Several studies have revealed that scent has a positive effect only when it is congruent with the targeted product (e.g., Bosmans, 2006; Mitchell et al., 1995), even when the product itself has no inherent scent. For example, approach behaviors of shoppers for men's and women's clothing increased when a gender-congruent scent was present in the store (Spangenberg et al., 2006). Thus, only when the scent matches the product an effect can be expected.

In this study, we take a look at thematic congruency effects. These effects can be explained by odor priming, which means that when consumers perceive a scent, an automatic knowledge activation process may (unconsciously) begin (Schifferstein & Blok, 2002). A scent can prime certain concepts to consumers, and once these constructs are activated, consumers are more sensitive to subsequent congruent elements, which often lead to corresponding behaviors (Dijksterhuis et al., 2005). For example, when consumers smell chocolate, concepts associated with chocolate, such as cooking, become more readily accessible to the consumer's mind and cause consumers to react differently

when encountering a cookbook than if they had not smelled chocolate (Schifferstein & Blok, 2002). Odor priming might result in conceptual processing fluency when the information activated by the scent fits with a product. Conceptual processing fluency refers to the experienced ease by which the product comes to mind and is processed (Lee & Labroo, 2004). A product-congruent scent can activate concepts associated with the product, making the product conceptual fluent and easier to process. Earlier research on brand choice showed that conceptual fluency facilitates consideration-set membership and increases brand choice because the brand came to mind more readily (e.g., Lee, 2002; Nedungadi, 1990).

To our knowledge, only two previous studies have investigated the effect of thematic congruency between an ambient scent and the products offered in the store. These studies had mixed results. Fiore, et al. (2000) concluded that consumers are more likely to purchase sleepwear, and are willing to pay more for these products in the presence of a congruent fragrance than in the presence of an incongruent fragrance. In contrast, Schifferstein and Blok (2002) showed that ambient scents (e.g., grass) had no effect on the sales of incongruent magazines (e.g., women's magazines) and congruent magazines (e.g., nature and soccer magazines). However, even though the selected magazines were very gender-specific, the study did not take gender into account. Moreover, only the sales of the magazines were measured, and no other data on approach behavior were collected. An ambient scent may also increase approach behavior toward congruent products, potentially resulting in increased sales in the long run.

The current study focuses on the thematic (in)congruity effects of a chocolate scent on observed approach and buying behavior in a bookstore. More specifically, this work extends previous research by (1) observing actual behavior rather than using self-reported data, (2) controlling for gender, and (3) selecting broad and popular product categories (i.e., book genres). Taking the above into account, we expect:

H2: The presence of an ambient chocolate scent will lead to more (less) approach and buying behavior toward thematically congruent (incongruent) books compared with no ambient scent.

4.4 Method

4.4.1 Scent selection

In line with the arguments listed above, we selected a chocolate scent to be diffused in the store. A first pretest was conducted to verify the affective and arousing quality of the chocolate scent used in this study. Twenty participants (10 men and 10 women) were asked to sniff the scent (which was put on a cotton-tipped stick in a dark glass bottle) and to evaluate its pleasantness and its level of arousal on a 7-point semantic differential scale (i.e., unpleasant/pleasant and unaroused/aroused). Respondents found the chocolate scent pleasant (M = 5.80, SD = .89), significantly different from the scale midpoint of 4, $t(19) = 9.00$, $p < .001$, and having an average arousing effect (M = 3.70, SD = 1.13), not significantly different from the scale midpoint of 4, $t(19) = -1.19$, $p = .25$.

A second pretest was carried out to determine the intensity of the scent. If consumers think that a source other than the store or product, such as an ambient scent, influences their responses, they may correct for this influence on their behavior (Bosmans, 2006). Therefore, the ambient scent should not be salient. Before the experiment, the chocolate scent was dispersed in the bookstore at different levels of intensity and for several durations. Forty-eight customers replied to two questions: "Did you notice something special in the store atmosphere?" and "Now that we have mentioned the presence of a scent, do you detect the scent?" (Doucé & Janssens, 2013). The first question served as a test of whether respondents spontaneously reported scent-related elements. To determine an appropriate intensity of scent manipulation in the actual study, the intensity of the scent was lowered until none of the customers spontaneously noticed the chocolate scent. When we told those customers a scent was present, they noticed the scent and could all identify it as chocolate.

4.4.2 Incongruent and congruent book genres

A third pretest with 36 students was carried out to verify which book genres the respondents saw as most (in)congruent with the chocolate scent. More specifically, we wanted to know to what extent people believe that chocolate corresponds to a certain book genre. The students rated the congruency between chocolate and 10 book genres (i.e., *Comics & Graphic Novels; Romance Novels & Romantic Literature; Art & Photography; People & Society; Food & Drink (Cooking); Gardening, Animals, & Nature; Economy, Management & Law; Crime, Thrillers, & Mystery; History; Travel & Tourism*) on a 5-point Likert-type scale ranging from 1 = *not at all* to 5 = *extremely*. A repeated measures ANOVA

was carried out, Greenhouse-Geisser test statistic: $F(6.03, 211.02) = 49.08$, $p < .001$, and indicated that the two genres most congruent with chocolate scent were *Food & Drink (Cook) Books* ($M = 4.36$, $SD = .80$) and *Romance Novels & Romantic Literature* ($M = 3.78$, $SD = 1.15$). These two genres differed significantly from all others (highest p-value = .002). Evidence for choosing these two as the most chocolate-congruent book genres was also found in a multiple-response analysis, in which participants indicated the four genres they thought fit best with the scent of chocolate. The top two, *Food & Drink (Cook) Books* and *Romance Novels & Romantic Literature*, were chosen 94.40% of the time.

We carried out a similar analysis with respect to the least congruent book genre. Of the four book genres that were rated least congruent with chocolate (mean below 2), *History* ($M = 1.58$, $SD = .81$) and *Crime, Thrillers, & Mystery Books* ($M = 1.97$, $SD = 1.00$) were chosen as the incongruent book genres. These genres were also selected because they were equally as popular as the two congruent book genres and also equally present in the store.

Although the present study took place in a general bookstore and employs a broad range of genres, an association between gender and preferences for specific books might exist. For example, a large survey on reading behavior in the Netherlands showed that women prefer romantic literature (i.e., a congruent book genre), whereas men prefer history books (i.e., an incongruent genre; Peters & Witte, 2012). Therefore, we included gender as a control variable in the analysis of the effect of scent on approach and buying behavior toward (in)congruent books.

4.4.3 Participants and procedure

A field experiment was conducted for 10 days in a chain bookstore (2152 square feet) located in the main street of a municipality in Belgium. The bookstore did not have a coffee corner, and no shops associated with scents (e.g., a coffeehouse) were nearby. The interior design consisted of tables and shelves. Besides books, this retailer sold newspapers, magazines, DVDs, and lottery tickets. The store had only a few employees. The study applied a between-subjects design with two conditions: a control condition (no scent) and an experimental condition (chocolate scent). Both conditions were balanced between mornings and afternoons. The scent was dispersed with two scent dispensers provided by Scents, an olfactory marketing firm in Belgium. The scent appliance works according to the principle of microscopically fine atomization. The dispensers convert the liquid scent into microscopically fine particles and spray these particles into the room. One dispenser was placed near the entrance of the store above the cookbooks and the other dispenser was placed approximately in the middle of store above the crime, thrillers, and mystery books. This placement ensured that the scent was present throughout the entire store. The sex and the age of personnel, as well as the positions of the books in the store, did not change between the scent conditions. Additionally, the conditions were identical in terms of customers' age groups (≤40, 41-69, ≥70), $\chi^2(2) = .39$, $p = .82$, shopper traffic (not crowded [< 4 customers], crowded [between 4 – 7 customers], very crowded [> 7 customers]), $\chi^2(2) = .09$, $p = .96$, and weather circumstances (sunny, cloudy, rainy), $\chi^2(2) = 5.53$, $p = .06$. These criteria were observed because they may

vary by day or by every observation. The retailer did not change the music in the store (i.e., lounge music), nor did he launch any special promotions during the experiment.

Approach and buying behavior data were collected through direct observation and through the use of a self-developed coding scheme following the guidelines of Robson (2002). The direct observation was carried out by a researcher trained by the authors. This researcher only observed the customers and did not address them. A pretest checked the reliability of the researcher's observations. The rater who also carried out the observations in the main study and another independent rater observed the behavior of 10 customers. For those 10 test cases, an interrater reliability analysis using the Kappa statistic indicated that the two raters agreed almost perfectly (all Kappa ≥ .80, all $p \leq .01$; Landis & Koch, 1977). Because observations needed to be as unobtrusive as possible, only one researcher observed the customers in the main field study. This researcher did not know the hypotheses of our study.

The researcher observed general approach and goal-directed behavior. General approach behavior implies that consumers inspect the store environment more generally and that a specific behavioral target, such as examining one particular book, is absent. The observed general approach behaviors of customers were coded as (1) closely examining multiple books, (2) reading synopses of multiple books, (3) lingering in the store, (4) chatting with the personnel, or (5) asking the personnel questions after screening the store environment. Goal-directed behavior means that consumers have a shopping goal and do not deviate from this goal. The observed goal-directed behaviors were coded as (1) searching for

a specific book, (2) going directly to the cash register, or (3) asking questions of the personnel directly after entering the store. The researcher also observed specific approach and buying behavior toward thematically (in)congruent books. In line with Hall's (1968) guidelines about the use of public space, the researcher always kept a distance of more than 10 feet and avoided any interaction with the observed individuals. She observed every fifth customer who entered the store from a distance of approximately 13 to 16 feet.

Overall, the resulting sample of observed participants consisted of 201 customers (63 men and 138 women). The observer's estimation was that the customers' ages were between 14 and 80. The researcher studied 120 participants (44 men and 76 women) in the control condition without an ambient scent, and 81 participants (19 men and 62 women) in the experimental condition using the chocolate scent. Of the 201 observed participants, 119 (38 men and 81 women) bought either a congruent book or an incongruent book. For the analyses of the thematically (in)congruent scent effect on buying behavior, this subsample was used.

4.5 Results

Only a few customers made a negative remark, gave a compliment, lingered in the store without a specific interest or goal, or ordered a book (10 observations or less). For those dependent variables, no analyses were conducted.

Tests of independence performed on the overall sample showed a significant positive association between the presence of the chocolate scent and general approach behavior: (1) closely examining multiple books, $\chi^2(1) = 7.46$, $p = .01$,

φ = .19; (2) reading synopses of multiple books, $\chi^2(1) = 5.68$, p = .02, φ = .17; (3) chatting with the personnel, $\chi^2(1) = 6.71$, p = .01, φ = .18; and (4) asking questions after screening the store environment, $\chi^2(1) = 11.76$, p = .001, φ = .24. Additionally, scent had a negative effect on goal-directed behavior: (1) searching one specific book, $\chi^2(1) = 7.93$, p = .01, φ = -.20; (2) going directly to the cash register, $\chi^2(1) = 4.22$, p = .04, φ = -.15; and (3) asking questions directly after entering the store, $\chi^2(1) = 7.49$, p = .01, φ = -.19. Odds ratios are shown in Table 4.1. For example, customers were 2.22 times more likely to closely examine multiple books when the chocolate scent was present in the store compared with the control condition. Overall, the results confirm that the presence of an ambient chocolate scent has a positive influence on general approach behavior and a negative influence on goal-directed behavior, supporting H1a and H1b.

Table 4.1. Times more likely to demonstrate approach behavior in the scent condition compared with the control condition (odds ratio)

	Odds ratio[a]
General approach behavior:	
Closely examining multiple books	2.22
Reading synopses of multiple books	2.13
Chatting with personnel	2.76
Asking question after screening store environment	2.89
Goal-directed behavior:	
Searching for one specific book	.30
Going directly to cash register	.40
Asking question directly after entering store	.26

[a] Odds ratio of 1 indicates that the odds that a customer demonstrates the reported behavior are the same in both conditions. Hence, an odds ratio greater than 1 indicates that the odds that the specific behavior occurs are higher in the scent condition compared with the control condition. An odds ratio less than 1 indicates that the odds that the specific behavior occurs are lower in the scent condition compared with the control condition.

For the analyses of the effect of the thematically (in)congruent scent on approach behavior, we used the overall sample. To examine buying behavior, we used the subsample of customers who bought either a congruent book or an incongruent book. Using chocolate scent and gender as predictors, we conducted logistic regression analyses with indicator coding for the independent variables to predict approach and buying behavior toward (in)congruent books. As mentioned, an association between gender and preferences for the chosen book genres might exist. Therefore, gender was included as a control variable. For all dependent variables, tests of the full model against a constant-only model were statistically significant (marginally significant for examining incongruent books). Table 4.2 shows the results. Scent was a significant predictor for all dependent variables. For example, customers were 3.48 times more likely to examine

congruent books in the scent condition than in the control condition, and they were 1.92 (= 1/.52) times more likely to examine incongruent books in the control condition compared with the scent condition. Moreover, when a chocolate scent was present, customers were 5.93 times more likely to buy congruent books than in the control condition. Hence, the findings confirm H2.

Table 4.2. Summary of logistic regression analyses

A.	Examining congruent books – Tables			
	(Nagelkerke's R^2 = .12. Model $\chi^2(2) = 18.67$, $p < .001$)			
	B (*SE*)	Wald statistic	*p*	Exp(*B*) – Odds ratio
Scent	1.25 (.31)	16.30	< .001	3.48
Gender	.20 (.32)	.40	.53	1.22
B.	Examining congruent books – Shelves			
	(Nagelkerke's R^2 = .16. Model $\chi^2(2) = 24.89$, $p < .001$)			
	B (*SE*)	Wald statistic	*p*	Exp(*B*) – Odds ratio
Scent	1.17(.31)	14.54	< .001	3.22
Gender	.88 (.33)	6.87	.01	2.41
C.	Examining incongruent books – Tables			
	(Nagelkerke's R^2 = .03. Model $\chi^2(2) = 4.66$, $p < .10$)			
	B (*SE*)	Wald statistic	*p*	Exp(*B*) – Odds ratio
Scent	-.65 (.31)	4.38	.04	.52
Gender	.22 (.32)	.45	.50	1.24
D.	Examining incongruent books – Shelves			
	(Nagelkerke's R^2 = .03. Model $\chi^2(2) = 4.79$, $p < .10$)			
	B (*SE*)	Wald statistic	*p*	Exp(*B*) – Odds ratio
Scent	-.64 (.30)	4.71	.03	.53
Gender	.04 (.31)	.02	.90	1.04
E.	Buying behavior			
	(Nagelkerke's R^2 = .24. Model $\chi^2(2) = 22.31$, $p < .001$)			
	B (*SE*)	Wald statistic	*p*	Exp(*B*) – Odds ratio
Scent	1.78 (.44)	16.74	< .001	5.93
Gender	1.00 (.50)	4.00	.05	2.71

Note: Scent and gender were coded as 0/1 (scent: absent = 0/ present = 1; gender: male = 0/ female = 1). Buying behavior refers to buying either congruent book(s) (coded as 1) or incongruent book(s) (coded as 0).

4.6 Discussion and conclusion

This research assessed the effect of ambient chocolate scent on (1) general approach and goal-directed behavior in a bookstore and (2) specific approach and buying behavior toward thematically (in)congruent books. We found that

the presence of a chocolate scent has a positive influence on general approach behavior and a negative impact on goal-directed behavior in the store. These results are in line with the Stimulus–Organism–Response paradigm (Mehrabian & Russell, 1974) and the expectation that a chocolate scent will distract customers from their specific shopping goals toward enjoying the whole shopping experience. Moreover, our research confirms the positive effect of the scent of chocolate on approach and buying behavior toward thematically congruent books. Thus, an ambient scent can start an automatic knowledge activation process (i.e., odor priming), leading to an intensified positive scent effect for congruent book genres. For incongruent books, the chocolate scent has a negative effect on approach and buying behavior. These thematically (in)congruent scent effects were found while controlling for gender. With respect to this control variable, we found that women were more likely than men to approach and to buy congruent books (i.e., cookbooks and romantic literature). Overall, in line with the ambient scent model of Gulas and Bloch (1995), our findings show that scent-product congruency is of importance, even if the scent does not originate from the product.

4.6.1 Limitations and further research

Wanting to observe the customers as unobtrusively as possible, we were not able to verify exactly which concepts are evoked by the scent. Admittedly, while the findings can be explained by odor priming, the underlying processes were not directly tested. More research is needed to fully investigate whether this thematically congruent scent effect is caused entirely by odor priming, and whether this effect happens on a conscious or subconscious level. For example,

future research could provide insight into the neurological underpinnings of the processes that might be at hand here. Moreover, because we only observed the customers, we were not able to collect data about customers' actual goal when they walked into the store and were therefore not able to directly test whether the chocolate scent distracted the customers from their goals. Additionally, we did not check whether scent adaptation had an effect on the results. The ambient scent might only influence the customers immediately after entering the store, and not during their whole visit. Furthermore, our study was conducted with one pleasant scent associated with food. To extrapolate the findings to other pleasant scents, future research could for example test whether a pleasant non-food scent has similar effects on consumer behavior. In terms of producing extra outcome variables, future research could also try to measure visual attention (e.g., eye tracking) and more thoroughly evaluate sales (e.g., assess cash register details).

Regarding the risk of corrective behavior of customers when the scent is salient, we acknowledge that thresholds of scent perception differ between individuals. However, a pretest of the intensity of the scent gave us an indication of the appropriate scent level. We believe that the approach used in this study was the best available. With respect to the control condition, future research can select another scent without any congruence with the products, although finding a scent that is neutral for all book genres is not an easy task. Additionally, shopping is a holistic experience in which consumers are simultaneously exposed to several atmospheric cues, and the effect of one specific atmospheric cue might interact with another. Therefore, it is important to study interaction

effects of fragrances with other atmospheric cues (Orth, Heinrich, & Malkewitz, 2012). Although some studies have already explored the combined effect of scent and other atmospheric stimuli on shopping behavior, such as scent and music (Mattila & Wirtz, 2001; Morrison, Gan, Dubelaar, & Oppewal, 2011; Spangenberg et al., 2005), future research could also investigate the effect of a combination of several atmospheric cues that are (in)congruent with the store's offerings.

4.6.2 Implications

We contribute to the theory and the scarce and rather mixed results about thematically congruent scent effects by pointing out that the scent of chocolate as a pleasant ambient scent should be congruent with the store's offerings. Our findings also have practical implications. Retailers can make use of pleasant ambient scents to improve the store environment, leading consumers to explore the store and to engage in more approach behavior. However, for optimal results, retailers should also pay attention to whether the scent is thematically appropriate for the store's products (e.g., sea breeze for a surfing shop). Retailers offering more than one product type should be aware of the possible negative effects of a pleasant scent that is thematically incongruent with part of the store offerings.

Chapter 5

What to diffuse in a gender-specific store? The effect of male and female perfumes on customer value and behavior[5]

Sensory marketing can be an efficient way to involve consumers in the store environment. Diffusing a pleasant ambient scent that matches with the store setting is often used to create pleasant shopping experiences. The aim of this study is to extend scent marketing research: (1) by examining the effect of pleasant ambient scent on the different dimensions of customer value; and (2) by exploring whether product-scent incongruity can have a positive effect on consumer evaluations. A field experiment with 182 participants showed that a pleasant gender-incongruent ambient perfume positively influences different dimensions of customer value as compared to the absence of a perfume. Moreover, a gender-incongruent perfume also leads to a more positive evaluation of the play, product excellence, and social dimension of customer value as compared to a gender-congruent perfume. A pleasant gender-congruent ambient perfume, on the other hand, only has a positive effect on the aesthetic dimension of customer value as compared to the absence of a

[5] This chapter corresponds to the article 'Doucé, L., Janssens, W., Leroi-Werelds, S., & Streukens, S. (2015). What to Diffuse in a Gender-Specific Store? The Effect of Male and Female Scents on Customer Value and Behavior.', currently under review with Journal of Consumer Behaviour.

perfume. The observed ambient scent effects do not differ between men and women. These results are in contrast with existing literature. However, a possible explanation for this undocumented effect can be found in the mate attraction theory.

5.1 Introduction

Pleasant ambient scents can positively influence consumers' affective, cognitive, and behavioral reactions (e.g., Bitner, 1992; Bone & Ellen, 1999; Gulas & Bloch, 1995). However, an important moderator of these scent effects is the congruity between the scent and the store's offerings. Previous research has found that pleasant ambient scents improve consumer evaluations and approach behavior more when the scent is congruent with the setting than when the scent is incongruent with the setting (e.g., Bone & Jantrania, 1992; Bosmans, 2006; Doucé et al., 2013; Spangenberg et al., 2006). However, based on the mate attraction theory, this study suggests that incongruity does not always have a negative effect on consumer evaluations.

Furthermore, the effect of scents on customer value was studied. To date, little attention has been paid to this effect. This is a critical gap in the literature since customer value has been recognized as one of the most significant factors in the success of organizations (e.g., Gallarza, Gil-Saura, & Holbrook, 2011; Woodruff, 1997). Although previous studies already examined the effect of scents on particular facets of customer value, such as perceived product quality (e.g., Spangenberg et al., 1996), this is—to the best of the authors' knowledge—the first study that examines the effect of scents on all customer value types at the same time.

Thus, the aim of this study is to extend scent marketing research: (1) by examining the effect of pleasant ambient scent on the different dimensions of

customer value; and (2) by arguing that incongruity does not always have a negative effect on consumer evaluations.

5.2 Pleasant ambient scent effects

The store atmosphere, which can be influenced by scents, music, and other sensory elements, is an important aspect of the shopping experience. There is ample evidence that atmospheric cues within the store environment have a positive effect on consumer reactions and evaluations (e.g., Brengman, Willems, & Joye, 2012; Briand & Prass, 2010; Sherman, Mathur, & Smith, 1997; Turley & Milliman, 2000). Numerous scholars have shown positive pleasant ambient scent effects on consumers' attention, experienced pleasure, evaluations of the store (environment), evaluations of the products, time spent in the store, intentions to revisit the store, and other approach behavior (e.g., Doucé & Janssens, 2013; Morrin & Ratneswhar, 2003; Spangenberg et al., 1996). The theoretical paradigm used for studying ambient scent effects on shopping behavior is the stimulus-organism-response paradigm (Gulas & Bloch, 1995; Mehrabian & Russell, 1974). The ambient scent functions as the stimulus that triggers affective and cognitive consumer reactions. Subsequently, these reactions lead to approach or avoidance behavior (i.e., a positive or negative reaction, respectively).

The current study examines the effect of pleasant ambient scents on customer value. Customer value has been widely recognized as an essential ingredient for organizational success (Slater, 1997; Sweeney & Soutar, 2001; Woodruff, 1997). Furthermore, it has been proven to be a key antecedent of customer

satisfaction, (re)purchase intentions, word of mouth (Bolton & Drew, 1991; Cronin, Brady, & Hult, 2000; Lai, Griffin, & Babin 2009; Zeithaml, Berry, & Parasuraman, 1996), and ultimately the long-term profitability of the organization (Anderson, Fornell, & Lehmann, 1994; Kamakura, Mittal, de Rosa, & Mazzon, 2002.). Overall, customer value plays a key role at the heart of all marketing activities and, as a result, deserves the attention of every marketing researcher (Holbrook, 1999).

In this study, the definition and conceptualization of customer value developed by Holbrook (1999) was followed. He defines customer value as "an interactive relativistic preference experience" (Holbrook, 1999, p. 5). This implies that customer value (1) involves an interaction between a subject (a customer) and an object (a product, a service or a store); (2) is comparative, personal, and situation-specific; and (3) embodies a preference judgment (Holbrook, 1999). In line with this conceptualization, Holbrook (1999) suggests a framework based on various value types. The Holbrook approach was chosen for the following reasons. First, Holbrook's approach is considered to be "the most comprehensive approach to the value construct because it captures more potential sources of value than do other conceptualizations" (Sánchez-Fernández, Iniesta-Bonillo, & Holbrook, 2009, p. 97). Second, Holbrook's typology conceptualizes value from an experiential point of view, which is interesting for analyzing shopping incidents as those are highly experiential in nature (Babin et al., 1994; Jones, Reynolds, & Arnold, 2006; Rintamäki, Kuusela, & Mitronen, 2007). Third, Leroi-Werelds, Streukens, Brady, & Swinnen (2014) compared different approaches

for measuring customer value and based on their guidelines, Holbrook's approach is the best choice for this study.

5.3 Scent (in)congruity

When diffusing a pleasant ambient scent, the congruity of the scent with the store and/or its products is an important factor to take into account (Doucé et al., 2013; Gulas & Bloch, 1995; Mitchell et al., 1995). Congruent scents are scents that are expected in a particular setting because the scent and the setting are thematically matched. The scent can function as a prime, which means that once the consumer perceives the scent, it may start an automatic knowledge activation process. The scent then activates stored knowledge, making certain concepts temporarily more accessible. So, congruent scents increase the accessibility of attitudes and memories associated with the store, its products, and its brands. This fit between the scent and the store might lead to conceptual processing fluency. Conceptual processing fluency refers to how readily the stimulus and its meaning comes to mind (Lee & Labroo, 2004). When a congruent scent triggers attitudes and memories associated with the store and its products, the store and the products can be processed fluently. This positive experience of conceptually fluent processing can improve consumer reactions toward the store and its products (e.g., Lee & Labroo, 2004). For example, Spangenberg et al. (2006) showed that a masculine ambient scent diffused in a men's clothing department improves consumers' evaluations of and approach behavior toward men's clothing as compared to the presence of a feminine ambient scent and vice-versa. On the other hand, incongruent scents can lead to

cognitive interference, because the information activated by the incongruent scent does not match with the product and the decision task.

The current study argues that in certain cases, incongruent scents can have positive effects on consumer responses. Spence, Puccinelli, Grewal, and Roggeveen (2014) already indicated that incongruent environments can lead to positive consumer responses because these environments contain an element of surprise and are therefore more stimulating. This incongruent stimulation appears to be particularly beneficial in specific and unique places, like high-end design stores which for example sell a chair made from rope (Schifferstein & Spence, 2008). In line with Spangenberg et al. (2006), the effects of a gender-(in)congruent scent diffused in a men's and women's clothing store are studied. To make sure that the scents are perceived as much as possible as either masculine or feminine, we opted to use specific masculine and feminine scent blends. This is in contrast with the study of Spangenberg et al. (2006) in which singular scents were used (i.e., rose maroc and vanilla, which are perceived as masculine or feminine, respectively). Based on congruity effects, one could expect that a masculine perfume in a men's clothing store and a feminine perfume in a women's clothing store leads to more positive evaluations than when no scent is diffused in the particular clothing store.

Contrary to Spangenberg et al. (2006), this study argues that the presence of a gender-incongruent perfume also leads to more positive evaluations than when no scent is diffused. This study works with masculine and feminine perfumes and since perfumes are important in sexual communication, they can be seen as mating cues (Capparuccini et al., 2010; Milinski & Wedekind, 2001). For

example, in a focus group study conducted by Janssen, McBride, Yarber, Hill, & Butler (2008), men revealed that a woman's scent influences their sexual arousal. Additionally, a recent study based on self-questionnaires indicated that women use makeup, including perfume, either for camouflage or for seduction (Korichi, Pelle-de-Queral, Gazano, & Aubert, 2008). Furthermore, previous research showed that exposure to mating cues (e.g., pictures of sexy women) triggers a mating goal in men (Maner et al., 2007).

Human-mating research states that there are sex differences in mate preferences (Feingold, 1992). Two robust findings are that men express a greater preference for mates who are physically attractive and young because these cues are related to fertility and health, whereas women express a greater preference for mates who are wealthy and ambitious, as these cues are related to financial prosperity and social status (Saad, 2007). These differences are explained by the parental investment theory, which states that men prefer women who are fertile to increase the chance of gene transmission and women prefer men who can secure their offspring survival (Trivers, 1972). However, mate preferences are also dependent on the temporal context of the relationship (Buss & Schmitt, 1993). For example, women find physical attractiveness more important for short-term relationships (Urbaniak & Kilmann, 2003).

Human-mating involves two sub-goals: mate selection and mate attraction (Janssens, Pandelaere, Van den Bergh, Millet, Lens, & Roe, 2011). The mate selection goal means that men and women screen opposite (or same) sex individuals and this allows them to detect suitable mates. The mate attraction goal involves demonstrating one's own mating value to the opposite sex. For

men, the attraction goal leads them to signal their physical attractiveness (short-term relationships) and/or their access to financial resources (long-term relationships). For example, Roney (2003) found that after visual exposure to potential mates (i.e., mating cue), men attached more importance to ambition and social status. Similarly for women, the mate attraction goal activation leads them to signal their physical attractiveness. When this goal becomes activated, people will evaluate the stimuli that help them reach their goal more positively (Ferguson, 2008) and it is also more likely that they approach the goal-relevant stimuli (Ferguson & Bargh, 2004). So, the opposite-sex perfume (i.e., gender-incongruent scent) diffused in the store, can function as a mating cue, activating the mate attraction goal. This goal leads consumers to evaluate the clothing store more positively because the (chosen) clothes, and therefore the store, help consumers signal their mating value. Taken the above into account, the following hypotheses are proposed:

H1: The presence of a pleasant gender-congruent ambient perfume will lead to a more positive evaluation of customer value as compared to the absence of a pleasant ambient perfume.

H2: The presence of a pleasant gender-incongruent ambient perfume will lead to a more positive evaluation of customer value as compared to the absence of a pleasant ambient perfume.

Because it is unclear whether the congruity or the incongruity effect prevails, the following research question is formulated:

RQ1: Is the effect of a pleasant gender-congruent ambient perfume on customer value different from the effect of a pleasant gender-incongruent ambient perfume?

5.4 Method

5.4.1 Scent selection

Most perfumes are categorized as either masculine or feminine (Lindqvist, 2012). To make sure that the perfumes used in the main study are indeed perceived as masculine or feminine, and to ensure that the chosen perfumes are equally pleasant and stimulating,[6] a pretest was conducted. Sixteen perfumes (eight feminine and eight masculine), which are frequently used in practice and marketed by Scents, an olfactory marketing firm in Belgium, were selected. Participants were 50 respondents (25 women and 25 men) between 18 and 30 years old. They were asked to sniff the 16 perfumes and to evaluate the masculinity/femininity, pleasantness, and stimulating nature of the perfumes. Masculinity/femininity of the perfumes was measured by a 3-item, 7-point semantic differential scale. Items were masculine/feminine, unfeminine/feminine, and unmasculine/masculine (Friedman & Dipple, 1978). The pleasantness and stimulating nature of the perfumes were measured by a 7-

[6] Note: It is important that the reader knows that in Dutch, arousal can have two meanings: a more neutral meaning of stimulation and a meaning more related to the concept of sexual arousal. In scent marketing research, arousal is usually translated to stimulation to avoid the sexual connotation. As a result, stimulation measured in the pretest cannot be seen as an indication of sexual arousal.

point semantic differential (i.e., unpleasant/pleasant, unaroused/aroused). The perfumes were presented in random order (on a cotton-tipped stick in a dark glass bottle) and respondents were instructed to sniff the perfumes as many times as they liked while completing the survey. Between successive perfumes, participants smelled ground coffee to restore their scent palette (Krishna, Lwin, & Morrin, 2010). This technique is frequently used in the fragrance industry to neutralize the odors in the nose, preventing contamination from one scent to the next.

The aim of the pretest was to find a feminine and masculine perfume that was equally pleasant and stimulating. Of the 16 perfumes, *Hendrik* was chosen as the masculine scent and *Dreams* as the feminine scent. The *Hendrik* perfume is a fruity scent with cinnamon and sandalwood facets (based on a Hugo Boss perfume). The *Dreams* perfume is a green, fruity scent which contains aspects of Muscat and black currant. Further elements are white musk, vanilla, jasmine, lilies, and violets. Based on the overall sample, *Hendrik* (M = 5.20, SD = 1.78, $t(49) = 4.76$, $p < .001$) and *Dreams* (M = 5.14, SD = 1.59, $t(49) = 5.07$, $p < .001$) were found to be pleasant scents, significantly different from the scale midpoint of 4. Moreover, the *Hendrik* perfume and the *Dreams* perfume differed on masculinity/femininity ($M_{Hendrik}$ = 2.87, M_{Dreams} = 5.34, $t(49) = -7.00$, $p < .001$), but did not differ on pleasantness ($M_{Hendrik}$ = 5.20, M_{Dreams} = 5.14, $t(49) = .20$, $p = .84$) and stimulating nature ($M_{Hendrik}$ = 4.62, M_{Dreams} = 4.50, $t(49) = .41$, $p = .69$). When the perfumes were analyzed separately for male and female participants, similar results were found. Male participants found *Hendrik* (M = 5.00, SD = 1.80, $t(24) = 2.77$, $p = .01$) and *Dreams* (M = 4.84, SD = 1.65,

$t(24) = 2.55$, $p = .02$) pleasant scents, significantly different from the scale midpoint of 4. For men, the *Hendrik* perfume and the *Dreams* perfume also differed on masculinity/femininity ($M_{Hendrik} = 3.52$, $M_{Dreams} = 4.99$, $t(24) = -3.81$, $p = .001$), but did not differ on pleasantness ($M_{Hendrik} = 5.00$, $M_{Dreams} = 4.84$ $t(24) = .39$, $p = .70$) and stimulating nature ($M_{Hendrik} = 4.64$, $M_{Dreams} = 4.00$, $t(49) = 1.93$, $p = .07$). Likewise, female participants found the *Hendrik* perfume ($M = 5.40$, $SD = 1.78$, $t(24) = 3.93$, $p = .001$) and the *Dreams* perfume ($M = 5.44$, $SD = 1.50$, $t(24) = 4.79$, $p < .001$) more pleasant than the scale midpoint of 4. For women, the *Hendrik* perfume and the *Dreams* perfume also differed regarding masculinity/femininity ($M_{Hendrik} = 2.23$, $M_{Dreams} = 5.69$, $t(24) = -6.61$, $p < .001$) but did not differ on pleasantness ($M_{Hendrik} = 5.40$, $M_{Dreams} = 5.44$ $t(24) = -.09$, $p = .93$) and stimulating nature ($M_{Hendrik} = 4.60$, $M_{Dreams} = 5.00$, $t(49) = -.85$, $p = .40$).

5.4.2 Design, participants, and procedure

A field experiment was conducted in two clothing stores located in the same building in a small European city. The target groups of the clothing stores are young adults. The male clothing store was located on the ground level, whereas the female clothing store was located on the first floor. The study applied a between-subjects design with three scent conditions: no perfume (i.e., control condition), a gender-congruent ambient perfume (i.e., feminine scent in female clothing store and masculine scent in male clothing store), and a gender-incongruent ambient perfume (i.e., feminine scent in male clothing store and masculine scent in female clothing store). The ambient perfumes were diffused throughout the entire store making use of an Aerostreamer1000 fragrance

appliance. Based on the principle of warm evaporation (electrical), this appliance works by heating the liquid scent on a metal plate, and subsequently this fragrance is distributed by a fan. No special promotions were launched during the experiment.

Participants were 182 shoppers (91 men and 91 women). The interquartile range of the participants' age lies between 20 and 38 years, which matches with the target group of the stores. Male shoppers only evaluated the male clothing store and female shoppers only evaluated the female clothing store since they are the specific target group for the stores. When the shoppers left the store, they were asked to complete a survey containing evaluation variables and demographics. There were 61 participants (31 men and 30 women) in the control condition, 61 participants (30 men and 31 women) in the congruent scent condition, and 60 participants (30 men and 30 women) in the incongruent scent condition.

5.4.3 Dependent variables

The main dependent variable in this study was customer value. However, we also included satisfaction and repurchase intention as key outcomes of customer value (see Figure 5.1 for overall model), which is in line with the customer value literature (e.g., Cronin et al., 2000; Leroi-Werelds et al., 2014). As previously mentioned, the typology suggested by Holbrook (1999) was followed to conceptualize and operationalize customer value. Based on previous studies using the Holbrook typology (Gallarza & Gil-Saura, 2006; Leroi-Werelds et al., 2014; Sánchez-Fernández et al., 2009; Willems, Leroi-Werelds, & Streukens,

2012), seven value types were used to operationalize customer value: product excellence, service excellence, efficiency, aesthetics, social value, play, and altruistic value. When applying Holbrook's typology, it is important to note that the different value types may have either a reflective or a formative measurement model. This distinction has important consequences for the contents of the scale (Jarvis, MacKenzie, & Podsakoff, 2003). For the reflective value types, existing validated scales were used (e.g., altruistic value: Du, Bhattacharya, & Sen, 2007; excellence: Oliver, 1997; efficiency: Ruiz, Gremler, Washburn, & Carrión, 2008; social value: Sweeney & Soutar, 2001; play: Petrick, 2002) and adapted to the setting at hand. Regarding the formative value types (i.e., service excellence, aesthetics, and efficiency), it is important that all aspects in the construct's domain are adequately covered (Diamantopoulos & Winklhofer, 2001). To generate items, the literature was reviewed to include as many facets of the construct's domain as possible (e.g., Willems et al., 2012).

To assess customer satisfaction, Wirtz and Lee's (2003) 11-point scale was used. Repurchase intention was measured based on the work of Zeithaml et al. (1996). All individual items are listed in Table 5.2 and Table 5.3 and are evaluated on 7-point Likert scales unless otherwise indicated.

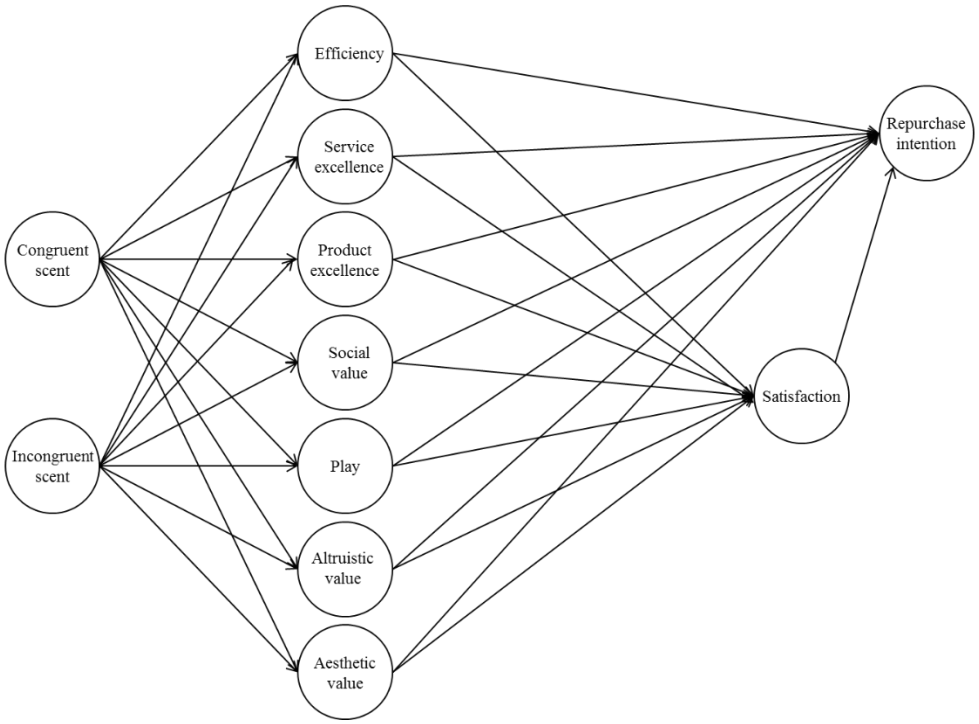

Figure 5.1. Structural model.

5.4.4 Analytical approach

Given the use of both formative and reflective measurement scales, a Partial Least Squares approach to Structural Equation Modeling (PLS-SEM) was used (cf. Hair, Ringle, & Sarstedt, 2011; Hair, Hult, Ringle, & Sarstedt, 2014). To analyze the effects of the experimental manipulations (i.e., no perfume, gender-congruent perfume, gender-incongruent perfume) on the metric variables in the model, the procedure outlined by Streukens, Wetzels, Daryanto, & de Ruyter (2010) was followed. Regarding the PLS-SEM analyses, the statistical significance of all estimates was assessed by calculating bootstrap percentile

confidence intervals based on 5,000 bootstrap samples (Preacher & Hayes, 2008).

Next, a MANOVA was conducted to assess whether or not the effect of pleasant ambient perfume differs as a function of gender (follow-up tests). Although it is technically possible to conduct these follow-up tests using PLS-SEM, the number of respondents per gender category is too limited to warrant a sufficient level of statistical power for this technique (see also Hair et al., 2014).

5.5 Results

5.5.1 Descriptive and bivariate correlations

Table 5.1 presents the mean, standard deviation, and bivariate correlation coefficients of the metric constructs employed within this study.

Table 5.1. Descriptives and bivariate correlations

		M	*SD*	1	2	3	4	5	6	7	8	9
1	Aesthetic value	5.68	.70	1.00								
2	Altruistic value	4.95	1.02	.52	1.00							
3	Efficiency	5.53	.75	.70	.59	1.00						
4	Play	5.15	1.01	.69	.54	.70	1.00					
5	Product excellence	4.67	1.21	.53	.60	.61	.59	1.00				
6	Service excellence	5.33	.88	.61	.60	.63	.60	.49	1.00			
7	Social value	4.38	1.37	.47	.47	.53	.58	.41	.40	1.00		
8	Satisfaction	7.54	1.37	.59	.55	.69	.71	.66	.63	.41	1.00	
9	Repurchase intent	5.44	1.15	.57	.50	.68	.71	.60	.58	.44	.82	1.00

5.5.2 Psychometric properties

In line with MacKenzie, Podsakoff, and Jarvis (2005), unidimensionality, internal consistency reliability, within-method convergent validity, and discriminant

validity were assessed for the reflective constructs under study, whereas item significance and discriminant validity were assessed for the formative constructs. The empirical results related to the assessment of the psychometric properties are presented in Table 5.2 and Table 5.3.

Starting with the reflective constructs, the results provide evidence for each construct's unidimensionality based on the procedure suggested by Sahmer, Hanafi, and Qannari (2006). Based on Nunnally and Bernstein's (1994) guidelines, internal consistency reliability is evidenced as all the composite reliability estimates exceed the recommended cut-off level of .70. Within method-convergent validity is supported as all average variance extracted values are above .50 (Fornell & Larcker, 1981). Finally, comparison of the average variance extracted value to the squared inter-construct correlation coefficients (cf. Fornell & Larcker, 1981) indicates the presence of discriminant validity.

Table 5.2. Psychometric properties reflective constructs

Construct and items	Loading	Bootstrap percentile CI
Altruistic value (λ_1 = 1.77; λ_2 = .23; α = .94; *ave* = .88)		
1. This store is a socially responsible company	.95	[.93; .96]*
2. This store makes a real difference through its socially responsible actions	.93	[.90; .95]*
Play (λ_1= 4.12; λ_2 = .49; α = .96; *ave* = .82)		
1. Shopping at this store makes me feel good	.89	[.85; .92]*
2. Shopping at this store gives me pleasure	.90	[.87; .93]*
3. Shopping at this store gives me a sense of joy	.90	[.86; .93]*
4. Shopping at this store makes me feel delighted	.94	[.92; .96]*
5. Shopping at this store gives me happiness	.90	[.87; .93]*
Product excellence (λ_1 = 4.15; λ_2 = .29; α = .96; *ave* = .83)		
1. The offerings of this store are of excellent quality	.89	[.84; .92]*
2. The offerings of this store is superior in comparison to that of other stores	.92	[.89; .94]*
3. This store has high standards for its offerings	.90	[.85; .93]*
4. This store is one of the best with respect to quality clothing	.93	[.90; .94]*
5. The offerings of this store are high quality	.92	[.89; .94]*
Social value (λ_1 = 3.62; λ_2 = .20; α = .97; *ave* =.90)		
1. Shopping at this store helps me to feel acceptable	.95	[.93; .96]*
2. Shopping at this store improves the way I am perceived by others	.96	[.95; .97]*
3. Shopping at this store makes a good impression on other people	.96	[.94; .97]*
4. Shopping at this store gives me social approval	.93	[.90; .96]*
Repurchase intent (λ_1 = 3.97; λ_2 = .51; α = .95; *ave* = .79)		
1. I intend to do business with this store again in the future	.95	[.91; .95]*
2. It is very likely that I return to this store in the future	.94	[.92; .96]*
3. This store is my first choice when shopping for clothes	.76	[.69; .82]*
4. I have no doubt I am going to visit this store again.	.87	[.81; .92]*
5. When I need new clothes, I will definitely return to this store	.93	[.90; .95]*

Notes: * loading significant at the 5% level; λ_1 and λ_2 denote respectively the first and second eigenvalue of the construct's inter-item correlation matrix; α represents the internal consistency reliability; *ave* refers to the average variance extracted.

Regarding the formative constructs, the main concern is the significance of the indicator weights. The results in Table 5.3 reveal that not all indicator weights are significantly different from zero. Although from a purely econometric perspective these items are candidates for deletion, they were kept in the measurement model as deleting them may alter the meaning of the construct (Diamantopoulos & Winklhofer, 2001). Furthermore, for the formative constructs, discriminant validity was evidenced as all the confidence intervals of the relevant latent variable correlations did not include an absolute value of 1 (Anderson & Gerbing, 1988).

Table 5.3. Psychometric properties formative constructs

Construct and items	Weight	Bootstrap percentile CI
Aesthetics		
1. The store's layout is appealing	.40	[.15; .63]*
2. The appearance of the staff is appropriate	.24	[-.08; .55]
3. The store is tidy	-.17	[-.57; .25]
4. The dressing rooms are clean	.31	[-.10; .70]
5. The store lighting is attractive	.18	[-.17; .51]
6. The shopping window looks attractive	-.20	[-.54; .15]
7. The offerings are presented in an appealing way	.42	[.05; .84]*
Efficiency		
1. This store is accessible	.11	[-.05; .28]
2. The store lay-out at this store makes it easy for customers to find what they need	.13	[-.05; .32]
3. This store's offerings are reasonably priced	.02	[-.21; .25]
4. This store offers good value for the price I pay	.46	[.21; .70]*
5. This store often has interesting bargains	.28	[.07; .51]*
6. This store's dressing rooms are comfortable	.00	[-.21; .19]
7. This store has convenient operating hours	.30	[.07; .53]*
8. Usually, waiting time at the cash registers is not too long	.03	[-.18; .24]
Service excellence		
1. The store's personnel is never too busy to respond to customer requests	-.02	[-.26; .23]
2. The store's personnel is approachable	-.08	[-.46; .29]
3. The store's personnel does its best to resolve any customer problem directly	.46	[.08; .81]*
4. The store's personnel is honest	.11	[-.22; .42]
5. The store's personnel offers prompt service to its customers	-.01	[-.36; .35]
6. The store's personnel listens to the customer	.13	[-.20; .46]
7. The store's personnel gives customers individual attention	.04	[-.25; .33]
8. The store's personnel is not pushy	.16	[-.12; .46]
9. The store's personnel is always courteous to customers	.39	[.07; .68]*
10. The store's personnel has the knowledge to answer customers' questions	.13	[-.12; .37]
11. The store's personnel does its best to solve customer complaints immediately	-.18	[-.45; .10]

Notes: * weight significant at the 5% level

5.5.3 Structural model assessment

Table 5.4 reports the results pertaining to the structural model. In general, the model reveals a statistically significant fit to the data for all endogenous constructs, except product excellence and service excellence, as evidenced by the percentile bootstrap confidence intervals constructed around the endogenous constructs' R^2 values (Ohtani, 2000). Turning to the individual structural model coefficients, the results indicate that compared to the absence of a perfume, a gender-congruent ambient perfume only has a significant impact on the value dimension aesthetics. In contrast, as compared to no perfume, a gender-incongruent ambient perfume has a significant impact on all value dimensions except product excellence and service excellence.

Table 5.4. Path coefficients

Dependent variables	Independent variables	Coeff.	Percentile Bootstrap CI	Conclusion coefficients
Aesthetics	Congruent	.20	[.01; .39]	Significant at 5%
R^2 = .06; CI = [.02; .10]*	Incongruent	.28	[.09; .45]	Significant at 5%
Altruistic value	Congruent	.08	[-.09; .24]	Not significant
R^2 = .02; CI = [.01; .03]†	Incongruent	.15	[.01; .28]	Significant at 10%
Efficiency	Congruent	.07	[-.12; .25]	Not significant
R^2 = .03; CI = [.01; .06]*	Incongruent	.21	[.02; .39]	Significant at 5%
Play	Congruent	.08	[-.09; .25]	Not significant
R^2 = .05; CI = [.03; .08]*	Incongruent	.26	[.11; .41]	Significant at 5%
Product excellence	Congruent	-.03	[-.20; .14]	Not significant
R^2 = .02; CI = [.00; .04]	Incongruent	.13	[-.04; .29]	Not significant
Service excellence	Congruent	.12	[-.07; .31]	Not significant
R^2 = .02; CI = [.00; .03]	Incongruent	.14	[-.05; .32]	Not significant
Social value	Congruent	.02	[-.15; .19]	Not significant
R^2 = .04; CI = [.01; .07]*	Incongruent	.22	[.06; .38]	Significant at 5%
Satisfaction	Aesthetics	.00	[-.16; .17]	Not significant
R^2 = .63; CI = [.58; .67]*	Altruistic	.03	[-.11; .17]	Not significant
	Efficiency	.24	[.09; .40]	Significant at 5%
	Play	.32	[.14; .48]	Significant at 5%
	Product excellence	.16	[.02; .29]	Significant at 5%
	Service excellence	.23	[.08; .39]	Significant at 5%
	Social	-.07	[-.17; .03]	Not significant
Repurchase intent	Aesthetics	-.01	[-.14; .13]	Not significant
R^2 = .74; CI = [.71; .77]*	Altruistic	-.11	[-.21; -.01]	Not significant
	Efficiency	.10	[-.05; .26]	Not significant
	Play	.16	[.02; .28]	Significant at 10%
	Product excellence	.22	[.11; .35]	Significant at 5%
	Service excellence	.06	[-.07; .20]	Not significant
	Social	.03	[-.08; .13]	Not significant
	Satisfaction	.52	[.38; .65]	Significant at 5%

Notes: * R^2 significant at the 5% level; † R^2 significant at the 10% level

To provide an answer on the formulated research question (i.e., Is the effect of a pleasant gender-congruent ambient perfume on customer value larger than the effect of a pleasant gender-incongruent ambient perfume?), the bootstrapped path coefficients were compared. The results of this analysis indicate that the effect of a gender-incongruent ambient perfume is larger than the effect of a gender-congruent ambient perfume for play: $\Delta\beta = .18$, 95% CI [.02; .46]; and for social value: $\Delta\beta = .20$, 95% CI [.02; .36]. Furthermore, a similar pattern was found for product excellence but the difference was only marginally significant: $\Delta\beta = .16$, 90% CI [.02; .30].

In terms of the outcome variables satisfaction and repurchase intention, the results show that not all value dimensions play a significant role. Whereas only the value dimensions play and product excellence have a direct impact on both satisfaction and repurchase intention, the value dimensions efficiency and service excellence solely influence satisfaction. Finally, the results also support the commonly evidenced relationship between satisfaction and repurchase intention.

5.5.4 Follow-up analyses

In these follow-up analyses, this study investigates whether the scent effect is the same for men and women. The parental investment theory (Trivers, 1972) states that women have a higher initial obligatory parental investment level than men, leading them to be more discriminating and selective in their mate choice. Therefore, it is possible that women may require more information about potential mates than subtle mating cues before a mating goal is activated. For

example, Roney (2003) found that visual exposure to attractive people of the opposite sex only affected men and not women, and argued that women needed more than minimal visual information before courting men. Additionally, previous research confirms that mating goals are activated by mixed-sex interactions, especially for men (Baumeister, Catanese, & Vohs, 2001; Karremans, Verwijmeren, Pronk, & Reitsma, 2009).

To gain insight into the possible gender-scent interaction effect on customer value, a 3 (pleasant ambient perfume: no vs. gender-congruent vs. gender-incongruent) x 2 (shopper gender: female vs. male) MANOVA with the seven dimensions of customer value as dependent variables was conducted. The interaction effect between ambient perfume and gender is not significant in the multivariate test (Wilks' Λ = .89, p = .11) as well as in the univariate analyses: aesthetics, $F(2, 176)$ = .78, p = .46; altruistic, $F(2, 176)$ = .14, p = .87; efficiency, $F(2, 176)$ = .29, p = .75; play, $F(2, 176)$ = .28, p = .76; product excellence, $F(2, 176)$ = 1.37, p = .26; service excellence, $F(2, 176)$ = .53, p = .59; social, $F(2, 176)$ = .71, p = .50. Hence, gender does not have a moderating effect on the pleasant ambient scent effects on customer value. Means and standard deviations are provided in Table 5.5. Note that the multivariate main effect of gender is significant (Wilks' Λ = .91, p = .03, η_p^2 = .09). Apparently, men evaluate the altruistic ($F(1, 176)$ = 5.39, p = .02, η_p^2 = .03), product excellence ($F(1, 176)$ = 5.76, p = .02, η_p^2 = .03), service excellence ($F(1, 176)$ = 5.65, p = .02, η_p^2 = .03), and social ($F(1, 176)$ = 3.79, p = .05, η_p^2 = .02) dimension of customer value more positively than women.

Table 5.5. Means and standard deviations of the six conditions for all customer value dimensions

	men			women		
	M (SD)			*M (SD)*		
Dependent variables	No perfume (n = 31)	Congruent perfume (n = 30)	Incongruent perfume (n = 30)	No perfume (n = 30)	Congruent perfume (n = 31)	Incongruent perfume (n = 30)
Aesthetics	5.46 (.63)	5.89 (.51)	5.82 (.66)	5.49 (.52)	5.63 (.93)	5.82 (.79)
Altruistic value	4.94 (1.13)	5.18 (.90)	5.27 (.94)	4.65 (.83)	4.73 (1.05)	4.97 (1.16)
Efficiency	5.48 (.80)	5.56 (.60)	5.75 (.70)	5.24 (.67)	5.53 (.83)	5.65 (.81)
Play	5.01 (.89)	5.08 (.92)	5.41 (.84)	4.83 (1.30)	5.07 (1.04)	5.51 (.90)
Product excellence	4.66 (1.32)	4.93 (1.16)	5.06 (1.14)	4.50 (1.13)	4.10 (1.20)	4.79 (1.16)
Service excellence	5.33 (.89)	5.48 (.79)	5.65 (.80)	4.99 (.84)	5.35 (.93)	5.20 (.94)
Social value	4.19 (1.22)	4.44 (1.29)	5.11 (.95)	4.12 (1.33)	4.01 (1.52)	4.46 (1.62)

5.4 Discussion

The aim of this study was to examine whether a pleasant incongruent ambient scent in certain well-defined cases can have a positive effect on customer value. It was expected that the presence of a pleasant ambient feminine or masculine perfume might give the male or female customer, respectively, an (implicit) impression that he/she is surrounded by individuals of the opposite sex. Consequently, this perfume may trigger the mate attraction goal, leading respondents to want to signal their physical attractiveness and leading them to evaluate stimuli that help them reach their goal more positively. The findings of this research confirm that a pleasant gender-incongruent ambient perfume positively influences different dimensions of customer value as compared to the absence of a perfume. Contrary to previous research examining scent congruity (e.g., Doucé et al., 2013; Spangenberg et al., 2006), the findings of this study show that a gender-incongruent perfume also leads to a more positive evaluation of the customer value dimensions play, product excellence, and social as compared to a gender-congruent perfume. The finding that a gender-incongruent perfume leads to better results than a gender-congruent perfume regarding these three dimensions corresponds with the theory that the perfume of the opposite sex might function as a mating cue. Play represents the pleasure the customers experience when shopping in the store; product excellence is the customers' evaluation of the quality of the clothes; and social value measures how much shopping in this store improves the customers' image. These three dimensions of customer value are particularly important for mate attraction. The perfume of the opposite sex leads customers to experience pleasure and

excitement, to want to improve their image (impression management), and to evaluate the products that help them reach their desired image more positively. Furthermore, as compared to the absence of a perfume, a pleasant gender-congruent ambient perfume only has a positive effect on one dimension of customer value—aesthetics—which represents the customers' evaluation of the store environment. For the other dimensions of customer value, no difference between no perfume and a gender-congruent perfume is found. Apparently, the positive effect of a gender-congruent perfume on aesthetics does not hold for the other customer value dimensions. Finally, the findings show that all of the observed ambient scent effects are independent of the gender of the respondent. Hence, men and women are both influenced by a gender-incongruent perfume.

5.4.1 Limitations, future research, and implications

This study focuses on a specific case of scent incongruity. Specifically, this research works with masculine and feminine perfumes. We argued that because these perfumes can function as mating cues, a scent that is incongruent with the store's offerings might have a positive effect on the target group's reactions. However, we did not verify whether a gender-incongruent perfume is indeed a mating cue. Additional research could check for example respondents' hormone level (saliva test) when exposed to a gender-incongruent perfume. This is needed to fully examine whether this positive incongruity effect is hormone driven, which is a better proxy for mating behavior. Moreover, a similar experiment can be carried out in a store selling products not associated with mating behavior (e.g., a hobby shop or a knitting shop). In such a setting, we

expect that gender-incongruent scents do not lead to enhanced consumer reactions. Future research should also focus on identifying other situations in which scent incongruity can have a positive effect on consumer evaluations.

Furthermore, we did not take into account the gender of the store personnel and whether or not the ambient scent also influenced the personnel. Bitner (1992) suggested that an atmospheric cue such as scents can trigger a positive response of the staff, influencing the social interactions between them and the customers. Although our experiment took place in a fashion store chain where the personnel only assists the customer when asked, the store personnel and particularly their gender might have been a relevant factor in this shopping experience because we diffused gender-(in)congruent scents that might trigger mate attraction behavior. Additional research examining the role of ambient scent effects on the store personnel is needed.

Future research could also investigate the combined effect of scents and other atmospheric stimuli on shopping behavior. Shopping is a holistic experience in which a consumer is simultaneously exposed to several environmental elements. Some studies have already explored the interaction effects of ambient scents with other atmospheric cues (e.g., Mattila & Wirtz, 2001; Morrison et al., 2011; Spangenberg et al., 2005). However, most research has been concentrated on the combination music and scent. Hence, additional research exploring other combinations of atmospheric stimuli is still needed—specifically with respect to their possible implicit mating cue properties.

The findings of this study also have theoretical and practical implications. First, the effect of pleasant ambient scent on different customer value facets is an important finding. Customer value has been recognized as one of the most essential ingredients for organizational success (e.g., Gallarza et al., 2011). However, no previous research looked at ambient scent effects on all customer value facets at the same time. Second, this study contributes to the theory about (in)congruent ambient scent effects by showing that when the scent might function as a mating cue, a pleasant incongruent scent positively influences consumer evaluations. Therefore, retailers selling products that help individuals signal their physical attractiveness (e.g., clothing, jewelry, and lingerie stores) can make use of pleasant gender-incongruent perfumes to heighten the store's appeal.

Chapter 6

The effect of multisensory congruity between light and scent stimuli in a store atmosphere on consumer reactions[7]

This study aims to extend existing research on multisensory congruity effects between atmospheric cues by examining the effect of a semantic match between overall light and ambient scent present in a store on consumer reactions. In Study 1, light and scent were (mis)matched based on their perceived association with a warm or cold temperature. In Study 2, light and scent were (mis)matched based on their perceived association with a warm or cold temperature as well as their perceived association with a dim or bright illuminance level. Results show that matching light and scent stimuli led to more positive consumer reactions compared to a mismatch between the stimuli or compared to a situation where no ambient scent is added. Our research supports the importance of perceiving the store environment holistically and suggests that the description of an atmospheric cue can be quite complex. Retailers who want to create in-store experiences using pleasant atmospheric stimuli should be aware that atmospheric stimuli are never perceived in isolation and that the choice of atmospheric stimuli should be well-considered.

[7] This chapter corresponds to the article 'Doucé, L., & Janssens, W. (2015). The effect of multisensory congruity between light and scent stimuli in a store atmosphere on consumer reactions', currently under review.

6.1 Introduction

Previous research demonstrated that sensory cues in the store environment such as music (Garlin & Owen, 2006), lighting (Xu & Labroo, 2014), and scent (Doucé & Janssens, 2013) can have an influence on consumer reactions. However, much of the sensory marketing research has focused on the effect of a single sense. A distinction can be made between micro level and molar level research in retail environments. Micro level research focuses on the separate physical characteristics (e.g., different atmospheric cues) that create a specific atmosphere. However, shopping is a holistic experience in which a consumer is exposed to a number of atmospheric cues at the same time (molar level). This means that the effect of a specific atmospheric cue might be enhanced by or interact with another one. Only a few recent studies have been carried out with respect to the multisensory interaction effects between atmospheric cues (e.g., Krishna, Elder, & Caldara, 2010; Krishna & Morrin, 2008, Mattila & Wirtz, 2001).

Our research extends previous work by focusing on the combined effects of overall light and ambient scent. We aim to test whether semantic congruity across these atmospheric stimuli (e.g., warm light combined with a warm scent) has a positive effect on consumer reactions compared to semantic incongruity (e.g., warm light combined with a cold scent). Recently, congruity effects have received more scholarly attention; however, more research is still needed (Spence et al., 2014) and should examine matches in semantic associations instead of congruity in valence or arousal (Krishna et al., 2010). Atmospheric cues can have semantic associations, and matching these associations can lead to more positive consumer reactions. Our research shows that both light and

scent can be considered warm or cold as well as dim or bright and that when there is a match, consumers react more positively.

6.2 Store atmospherics

Retailers increasingly try to design the store environment in such a way that it triggers an emotional sensory reaction that enhances positive consumer behavior, such as staying longer in the store and spending more (Brand, 1963; Kotler, 1973; Spence et al., 2014). A frequently used framework to explain the effects of atmospheric elements on consumer behavior is the stimulus–organism–response (S–O–R) paradigm (Donovan & Rossiter, 1982; Mehrabian & Russell, 1974). This paradigm states that atmospheric stimuli in the store environment (S) influence consumers' internal evaluations (O), which in turn lead to a positive or a negative behavioral response (R). Within this paradigm, previous research showed that a variety of atmospheric elements can influence consumers' affective responses toward the store (Doucé & Janssens, 2013), evaluations and attitudes (Sweeney & Wyber, 2002), time spent in the store (Spangenberg et al., 1996), number of items approached (Summers & Herbert, 2001), impulse buying (Peck & Childers, 2006), and other reactions (for an integrative review, see Krishna, 2012; Spence et al., 2014; Turley & Milliman, 2000).

The current study focuses on the interaction between two atmospheric stimuli, that is, overall light and ambient scent. First, we will review relevant literature exploring light and scent separately. Next, we will discuss research on multisensory interaction effects on consumer reactions.

6.3 Light

Light has primarily been studied in the context of work environments and received less attention within consumer behavior research (Boyce, 2003; Quartier, Vanrie, & Van Cleempoel, 2014). However, lighting can influence consumer reactions and behavior. A distinction can be made between research that examined the effect of distinct or ambient light sources on products within the store and research that focused on the impact of overall lighting in a store.

Supplemental lighting on products can draw attention to the products and positively influence the number of items touched or picked up by customers (Areni & Kim, 1994; Summers & Herbert, 2001). Moreover, distinct or ambient lighting can also affect evaluations of food products (Otterbring, Löfgren, & Lestelius, 2014) and perceived taste of wine (Oberfeld, Hecht, Allendorf, & Wickelmaier, 2009). Food products shown in a freezer with warm light were evaluated more positively than food products displayed in a freezer with cold light (Otterbring et al., 2014), whereas consumers' perceived taste of a white wine was more positive in both cold and warm lighting settings than in a neutral white lighting condition (Oberfeld et al., 2009).

Additionally, overall lighting in a store can have a substantial impact on store image (Baker et al., 1994), perceived atmosphere (Custers, de Kort, Ijsselsteijn, & de Kruiff, 2010; Quartier et al., 2014), store evaluations (Briand & Pras, 2010), and the route consumers take through the store (Taylor & Sucov, 1974). For example, consumers evaluated a store with bright and cool lighting as more pleasant and lively than that same store with soft and warm lighting (Briand &

Pras, 2010). On the other hand, when the store had soft and warm lighting, it was perceived as more upmarket than when it had bright and cool lighting. Moreover, brightness can decrease perceived coziness and increase perceived tenseness of a store environment (Custers et al., 2010). This study extends previous research by focusing on the effect of different types of overall lighting in a retail setting on affective, evaluative, and behavioral consumer responses. Moreover, we investigate the effect of overall lighting in combination with ambient scent.

6.4 Ambient scent

An ambient scent is "a scent that is not emanating from a particular object but is present in the environment" (Spangenberg et al., 1996, p. 67). An ambient scent diffused in a store environment can lead to positive affective, cognitive, and behavioral consumer reactions (Bone & Ellen, 1999; Spangenberg et al., 1996; Spence et al., 2014); however, a pleasant scent may not always be enough. Several scholars showed that the relationship between ambient scent and consumer responses can be moderated by the congruity between the scent and the other atmospheric cues present in the store (Doucé, Janssens, Swinnen, & Van Cleempoel, 2014; Krishna et al., 2010; Mattila & Wirtz, 2001; Spangenberg et al., 2005). This multisensory congruity is the main focus of this article. Specifically, we examine whether congruity between semantic associations triggered by light and scent can lead to more positive consumer reactions compared to a situation where light and scent are incongruent or a situation where no ambient scent is added.

6.5 Semantic congruity between light and scent

As mentioned above, a shopping experience is a holistic experience in which a consumer is exposed to several atmospheric cues at the same time and the reaction to one atmospheric cue is likely to change in the presence of other atmospheric elements (Spence et al., 2014). This means that the way consumers perceive an atmospheric element depends on the presence of other atmospheric cues. For example, bright and cold (i.e., bluish) light may indicate a discount image, and thus might be an indication of cheap offerings (Baker et al., 1994). But in combination with a fresh mint scent, the scent might reframe the meaning of the light from signaling cheap to signaling freshness or excitement. Therefore, it is essential to take into account the multisensory interactions between atmospheric cues. These multisensory interactions fit within the research field of crossmodal correspondences, which is defined as "the tendency for a feature or attribute in one sensory modality (e.g., smell) to be matched (or associated) with a sensory feature or attribute in another sensory modality (e.g., vision)" (Spence, 2012, p. 37).

Some research has been done with respect to the interaction effects between atmospheric stimuli. For example, Mattila and Wirtz (2001) studied the joint effects of ambient scent and music. They showed that when music and ambient scent were congruent in terms of their arousing quality (i.e., high/high or low/low), consumer reactions were more positive than when music and ambient scent were incongruent. People prefer congruity, because they like confirmation of their expectations. This confirmation leads to a positive affective reaction which can be transferred to the object under evaluation (Bitner, 1992; Fiske,

1982; Meyers-Levy & Tybout, 1989). Congruity between atmospheric cues can be achieved in different ways. Besides congruity in valence or arousal (e.g., Mattila & Wirtz, 2001), atmospheric cues can also be congruent based on their semantic associations (e.g., feminine/masculine scent/touch; Krishna et al., 2010; Christmas music/Christmas scent, Spangenberg et al., 2005). Semantic (in)congruity refers to a situation in which atmospheric stimuli match (mismatch) in terms of their meaning (Spence, 2011). Atmospheric cues may obtain semantic meaning because of their shared associations with experiences and this semantic meaning may influence consumers' perceptions and behavior (Krishna et al., 2010). For example, Holland et al. (2005) suggested that a citrus scent led respondents to leave fewer crumbs on the table after eating cookies because the scent activated a semantic association of cleaning. Previous research mainly examined semantic congruity between one atmospheric cue (e.g. scent) and a product or behavior (Doucé et al., 2013; Holland et al., 2005; Mitchell et al., 1995; Schifferstein & Blok, 2002; Spangenberg et al., 2006). Some recent studies focused on the effects of semantic congruity between atmospheric cues (e.g., Krishna et al., 2010; Spangenberg et al., 2005). However, Krishna et al. (2010) studied congruity between semantic associations of scents and haptic perceptions on product level. They showed that scents and textures of a paper can be associated with masculinity or femininity and that a match between these associations leads to a better evaluation of the texture of the paper. In addition, they also found that scents can be associated with coldness or hotness and that a match between the association of the scent with the temperature of a product leads to a higher perceived product efficacy. Spangenberg et al. (2005) examined congruity effects between scent and music

and found that a Christmas scent in combination with Christmas music had a positive influence on consumer reactions toward the store and the products.

The positive effect of semantic congruity between atmospheric cues can be explained by the theory of conceptual fluency (De Bock et al., 2013; Whittlesea, 1993). Atmospheric cues can obtain semantic meaning (Krishna et al., 2010), and these semantic associations can lead to conceptual fluency because the associated concepts are more accessible in the consumer's mind. Conceptual fluency is a particular form of processing fluency, which indicates the experienced ease by which an external stimulus is processed (Schwarz, 2004). When people easily process a stimulus (e.g., an environment), they experience a positive affective state that can be accredited incorrectly to the stimulus rather than to the ease of processing (Winkielman et al., 2003). So, congruent atmospherics can lead to processing fluency and improved elaboration (Gottfried & Dolan, 2003; Mandler, 1982; Mitchell et al., 1995), which results in more positive consumer reactions. In contrast, incongruent cues can lead to processing disfluency because the associations activated by the cues do not match with each other (Mitchell et al., 1995).

To our knowledge, no prior research investigated semantic congruity effects between light and scent. The aim of this study is to extend existing research on multisensory interaction effects by examining whether a semantic match between overall light and ambient scent present in a store environment leads to more positive affective reactions (i.e., pleasure and arousal experienced in the store), more positive evaluations of store and products, and more approach

behavior of the customers. The discussion above leads to the following hypothesis:

H1: A semantic match between light and scent stimuli (i.e., 'warm/warm' or 'cold/cold' in study 1; 'warm, dim/warm, dim' or 'cold, bright/cold, bright' in study 2) will have a positive effect on (a) pleasure experienced in the store, (b) evaluation of the store environment, (c) evaluation of the store, (d) evaluation of the products, and (e) approach behavior, compared to mismatch conditions (i.e., 'warm/cold' or 'cold/warm' in study 1; 'warm, dim/cold, bright' or 'cold, bright/warm, dim' in study 2) and compared to the no added scent conditions.

We did not formulate a specific hypothesis with respect to the matching effect of light and scent on arousal because arousal can be positively or negatively valenced (Spangenberg et al., 1996).

The effect of congruity between light and scent stimuli in the store atmosphere is tested in Study 1 and 2. Study 1 was conducted with 180 undergraduate students. Light settings were manipulated through correlated color temperature (warm light versus cold light). However, positive matching effects were found for the warm light/warm scent combination but not for the cold light/cold scent combination. The fact that the illuminance level of the light settings was held constant at 415 lux (i.e., dim lighting) might explain these results. This was investigated in Study 2. Study 2 made use of a more general population: 240 participants between 22 and 79 years old. Light settings were manipulated

through correlated color temperature and illuminance levels (warm, dim light versus cold, bright light). Correlated color temperature and light illuminance are often associated with each other (Briand & Pras, 2010). Modifying both lighting elements together allows us to enhance the congruent feeling of the store environment.

Both studies took place in a simulated grocery store. Every participant received a shopping task and a budget of 20 credits (a fictive monetary unit). A lab assistant measured the time that the participants spent in the store and how many credits the subjects spent in the store. Afterwards, the participants had to indicate how many time and credits they thought they spent in the store. However, because we worked with a small simulated store, respondents only stayed a limited amount of time in the store. Additionally, respondents informed us that they had difficulties working with the fictive monetary unit. These problems related to our experimental setup might explain why we found no or inconsistent congruity effects between light and scent on time and credits spent in the store. Hence, we do not include these dependent measures in the remainder of the chapter.

6.6 Study 1

6.6.1 Design and independent variables

Study 1 took place in a simulated grocery store (approximately 614 square feet) constructed in a retail design research lab. The product categories present in the store included food, drinks, personal care, and home care. In this study, we chose to operationalize light-scent congruity through perceived (color)

temperature. A 2 (warm light versus cold light) x 3 (no scent versus warm scent versus cold scent) full factorial between-subjects design was used.

Light

Light can be measured in correlated color temperature (expressed in Kelvin [K]). Correlated color temperature describes the ambiance that a lamp creates (Briand & Pras, 2010). A lower color temperature (2700 K–3000 K) leans to more yellow light and is perceived as warm light, whereas a higher color temperature (4000 K–6500 K) leans to more bluish light and is perceived as cold light.

The correlated color temperature of the different light settings used in this study was calculated from the spectral irradiance. The spectral irradiance was measured directly under a fixture in the room. A spectrometer (model QEPro of Ocean optics) with a cosine corrector was used. In the warm light condition, the correlated color temperature was 3000 K. In the cold light condition, the correlated color temperature was 4000 K.

Correlated color temperature is often associated with light illuminance (Briand & Pras, 2010). However, in this first study, we only wanted to manipulate the correlated color temperature of the light settings. Therefore, the illuminance level was held constant at 415 lux across the different light settings. The illuminance was measured with an illuminance meter (model P-9710 of Gigahertz Optics). The illuminance values were measured in a rectangular grid with 40cm distance between the measurement points.

A pretest was conducted to verify the perceived pleasantness, arousing nature, and temperature of the light settings. Thirty undergraduate students (12 men and 18 women, M_{age} = 20.33 years) were asked to evaluate both light settings in the simulated store on three 7-point semantic differential scales (i.e., unpleasant/pleasant, unarousing/arousing, and cold/warm). The order of the light settings was randomized. Results showed that the warm lighting setting (3000 K) was indeed perceived as warm (M = 6.40, SD = .62), significantly different from the scale midpoint of 4 ($t(29)$ = 21.15, p < .001), while the cold lighting setting (4000 K) was indeed perceived as cold (M = 2.40, SD = 1.00), significantly different from the scale midpoint of 4 ($t(29)$ = -8.73, p < .001). The warm and cold lighting setting also significantly differed on perceived temperature ($t(29)$ = 16.69, p < .001). In terms of arousing nature, the warm and cold lighting setting were not significantly different from each other (M_{warm} = 4.27, SD_{warm} = 1.34; M_{cold} = 4.50, SD_{cold} = 1.50; $t(29)$ = .48, p = .64). Yet, the warm lighting setting was perceived as more pleasant than the cold light setting (M_{warm} = 5.13, SD_{warm} = 1.07; M_{cold} = 3.97, SD_{cold} = 1.43; $t(29)$ = 2.87, p = .008).

Scent

In order to find two scents that matched the lighting settings, a series of pretests were conducted. The first pretest was part of a larger study examining different shape and sensory dimensions of sixteen scents (Adams, 2014). For this study, we focus on the perceived temperature of the scents measured by a semantic differential visual analogue scale of 100 mm (i.e., cold/warm). The 16 scents were selected from four scent categories (i.e., floral notes, fresh notes,

woody notes, and oriental notes; Edwards, 2014), and a few blends (e.g., coffee, feminine perfume, masculine perfume) were also added to the selection. In this first exploratory pretest, the 16 scents were divided in four groups of four scents. Each scent was placed on a cotton-tipped stick in a dark glass bottle and was evaluated by a minimum of 36 undergraduate students. Figure 6.1 shows that only three scents were perceived as cold (i.e., rosemary, mint, and wood), and nine scents were perceived as warm (i.e., red berries, banana, peach, vanilla, coffee, masculine perfume, apple, feminine perfume and chocolate).

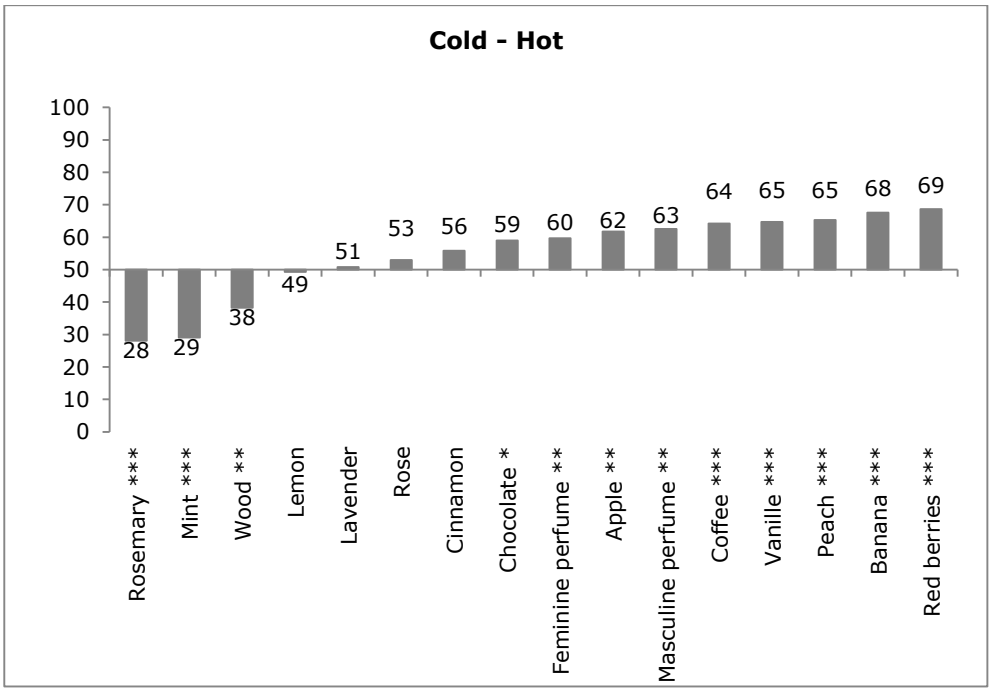

Figure 6.1. Pretest 1: Cold-hot score of 16 scents (0-100 scale).

* Scent is significantly different from the scale midpoint of 50 at $p < .05$

** Scent is significantly different from the scale midpoint of 50 at $p < .01$

*** Scent is significantly different from the scale midpoint of 50 at $p < .001$

In the second pretest, we verified the perceived pleasantness, arousing nature, and again the perceived temperature of three cold and four warm scents of the first pretest (i.e., rosemary, mint, wood, banana, vanilla, coffee, and apple). Thirty undergraduate students (19 men and 11 women, M_{age} = 21.37 years) were asked to evaluate the scents on three 7-point semantic differential scales (i.e., unpleasant/pleasant, unarousing/arousing, and cold/warm). The order of the scents was randomized. Results showed that only the mint scent was perceived as cold and the banana, vanilla, coffee, and apple scent were all perceived as warm scents (see Figure 6.2). We selected the coffee scent as the warm scent because mint and coffee did not differ from each other in terms of perceived pleasantness (M_{coffee} = 4.13, SD_{coffee} = 1.55; M_{mint} = 4.20, SD_{mint} = 1.92; p = .87) and arousing nature (M_{coffee} = 3.87, SD_{coffee} = 1.59; M_{mint} = 4.17, SD_{mint} = 1.84; p = .54).

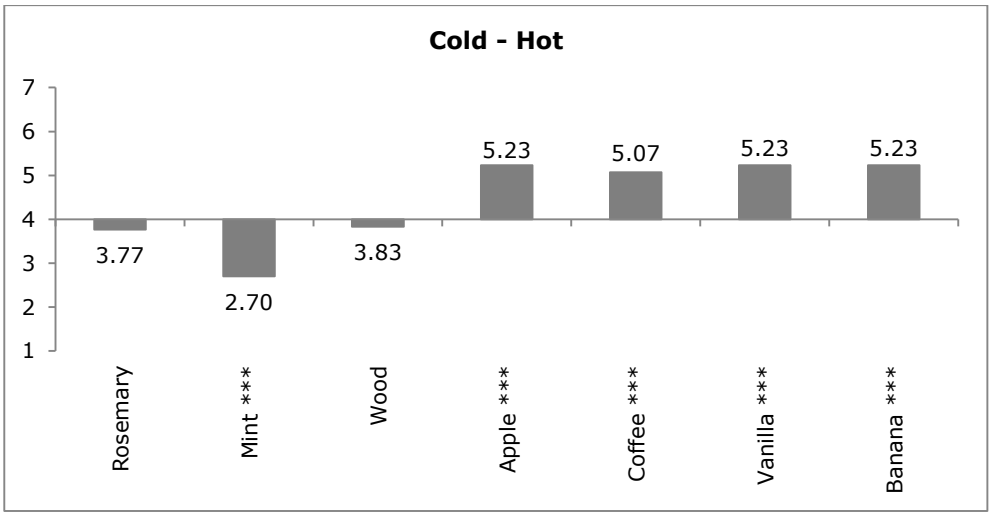

Figure 6.2. Pretest 2: Cold-hot score of seven scents (7-point scale).

*** Scent is significantly different from the scale midpoint of 4 at p < .001

After starting the experiment, the scent supplier informed us that the wrong coffee scent was delivered. Instead of a regular coffee scent, a cappuccino scent was used. The cappuccino scent and the coffee scent are very similar. However, to make sure that the cappuccino scent was also perceived as a warm scent, we conducted an extra test. Thirty undergraduate students (15 men and 15 women) were asked to evaluate the cappuccino scent on their perceived pleasantness, arousing nature, and temperature by means of a 7-point semantic differential scale (i.e., unpleasant/pleasant, unarousing/arousing, and cold/warm). Results showed that the cappuccino scent was also perceived as a warm scent (M = 5.77, SD = .82), significantly different from the scale midpoint of 4 ($t(29)$ = 11.84, $p < .001$). Moreover, the cappuccino scent and the mint scent did not differ from each other in terms of perceived pleasantness ($M_{cappuccino}$ = 4.60, $SD_{cappuccino}$ = 1.83; M_{mint} = 4.20, SD_{mint} = 1.92; $t(58)$ = .83, p = .41) and arousing nature ($M_{cappuccino}$ = 4.13 , $SD_{cappuccino}$ = 1.46; M_{mint} = 4.17, SD_{mint} = 1.84; $t(55.09)$ = -.08, p = .94). So, we worked with the cappuccino scent as the warm scent and the mint scent as the cold scent.

In two additional separate pretests, the optimal intensity level of the cappuccino scent and the mint scent was determined. When a scent is too intense, people may correct their behavior because they become more aware that the scent, and not the store, is responsible for their responses (Bosmans, 2006). Consequently, the ambient scent should not be salient. The scents were diffused in the retail design research lab making use of an Aerostreamer1000 fragrance appliance marketed by Scents, an olfactory marketing firm in Belgium. Based on the principle of warm evaporation (electrical), this appliance works by heating the

liquid scent on a metal plate. Next, a fan distributes the scent. The intensity of the fragrance appliance can be controlled by adjusting the quantity of liquid that falls on the metal plate and the speed of the fan. For each scent, about 15 respondents were asked two questions: "Did you notice something special in the room?" and subsequently, "Now that we have mentioned the presence of a scent, do you detect the scent?" (Doucé & Janssens, 2013). The first question verified whether respondents spontaneously mentioned scent-related elements, indicating that the scent was too salient. The optimal intensity level of the scents is achieved when respondents answer negatively to the first question and positively to the second. Results showed that the intensity of the fragrance appliance should be set on the lowest level for each scent. Moreover, the ventilation of the retail lab needed to be set on level 6 (maximum power) for the mint scent and on level 4 for the cappuccino scent.

6.6.2 Participants, procedure and dependent measures

Participants were 180 undergraduate students (convenience sample of 86 men and 94 women). Participants entered the retail lab one at a time and were instructed to go shopping for lunch for the next day. For this task, they received a budget of 20 credits (a fictive monetary unit). Each product's price was also displayed on the shelves in terms of credits. This imposed budget ensured that participants' own financial resources did not bias the results. After the shopping task, the participants were instructed to fill in a questionnaire containing affective reactions (i.e., pleasure and arousal), evaluations, (i.e., evaluation of the store environment, evaluation of the store, and evaluation of the products), approach behavior, and demographics.

Participants' affective reactions towards the store were measured with the "pleasure" (means of six 7-point semantic differential items) and "arousal" dimensions (means of three 7-point semantic differential items) of Mehrabian and Russell's (1974) PAD scale. The "dominance" dimension was omitted because of a lack of empirical support (Donovan et al., 1994). The evaluation of the store environment (means of 14 7-point semantic differential items) was assessed by Fisher's (1974) 13-item environmental quality scale plus the additional item of Spangenberg et al. (1996; unpleasant/pleasant). Six additional items suggested by Briand and Pras (2010) were included but were left out of the final factor analysis because this resulted in a too divergent factor solution. Store evaluation was measured by the mean of five 7-point semantic differential items (Spangenberg et al., 1996; Spangenberg et al., 2005). Product evaluation was assessed with a combination of two 7-point semantic differential scales (e.g., Bellizzi et al., 1983; Spangenberg et al., 1996). Respondents indicated that price-related items were difficult to answer because they had to pay with credits instead of real money. Therefore, two price-related items (i.e., low prices/high prices and poor value/good value) were deleted. A summated scale (mean of items) of the six remaining items was calculated and used in further analyses. In line with Donovan and Rossiter (1982), approach behavior was measured by eight items on a 7-point Likert scale, ranging from 1 = totally disagree to 7 = totally agree. A factor and reliability analysis suggested the deletion of two items. A summary of the scale items used in our study and the results of the reliability analysis are provided in Table 6.1. All Cronbach's alphas are above .75, indicating good reliability.

Table 6.1. Scales of dependent measures and reliability results Study 1 and Study 2

Dependent measures	7-point scale	Cronbach's alpha	
		Study 1	Study 2
Pleasure (6 items; Mehrabian & Russell, 1974)	Happy/unhappy Pleased/annoyed Satisfied/dissatisfied Contented/melancholic Hopeful/despairing Relaxed/bored	.86	.90
Arousal (3 items; Mehrabian & Russell, 1974)	Calm/excited Relaxed/stimulated Frenzied/sluggish *Jittery/dull* *Wide-awake/sleepy* *Aroused/unaroused*	.76	.76
Store environment evaluation (14 items; Fisher, 1974; Spangenberg et al., 1996)	Attractive/unattractive Relaxed/tense Comfortable/uncomfortable Cheerful/depressing Colorful/drab Positive/negative Stimulating/boring Good/bad Lively/unlively Motivating/unmotivating Interesting/uninteresting Pleasant/unpleasant Open/closed Bright/dull	.95	.96

Note. Items in italics are deleted based on factor analysis or respondents' feedback.

Table 6.1. Scales of dependent measures and reliability results Study 1 and Study 2 (continued)

Store evaluation (5 items; Spangenberg et al., 1996; Spangenberg et al., 2005)	Good/bad Favorable/unfavorable Positive/Negative Like/dislike Modern/outdated	.92	.95
Product evaluation (6 items; Bellizzi et al., 1983; Spangenberg et al., 1996)	Good/bad Pleasant/unpleasant Favorable/unfavorable High quality/low quality Attractive/unattractive Up-to-date/outdated *High prices/low prices* *Good value/poor value*	.89	.91
Approach/Avoidance behavior (6 items; Donovan & Rossiter, 1982)	I enjoyed shopping in this store. I wanted to stay as long as possible in this store. I wanted to leave this store as soon as possible. I felt friendly and talkative to a stranger in this store. I avoided looking around and exploring the store as much as possible. This is a place where I might try to avoid other people, and avoid having to talk to them. *I spent more time in the store than I originally intended.* *I spent more money than I originally set out to spend.*	.86	.86

Note. Items in italics are deleted based on factor analysis or respondents' feedback.

6.6.3 Results and discussion

A 2 x 3 MANOVA with light and scent as fixed factors and pleasure, arousal, evaluation of the store environment, store evaluation, product evaluation, and approach behavior as dependent variables was conducted. The multivariate tests showed no significant interaction effect (Wilks' lambda = .96, $F(12, 338) = .61$, $p = .84$), nor a significant main effect of scent (Wilks' lambda = .93, $F(12, 338) = 1.01$, $p = .44$). However, a significant main effect of light was found (Wilks' lambda = .93, $F(6, 164) = 2.24$, $p = .04$). A summary of the results of the subsequent univariate analyses can be found in Table 6.2. A significant main effect of light was found for pleasure ($F(1, 174) = 4.21$, $p = .04$, $\omega^2 = .02$), evaluation of the store environment ($F(1, 174) = 5.57$, $p = .02$, $\omega^2 = .02$), and store evaluation ($F(1, 174) = 5.91$, $p = .02$, $\omega^2 = .03$), whereas the effect for arousal ($F(1, 174) = 2.85$, $p = .09$, $\omega^2 = .01$) and product evaluation ($F(1, 174) = 3.29$, $p = .07$, $\omega^2 = .01$) was marginally significant. The effect sizes indicate a small effect (Cohen, 1988). However, it should be noted that the models were only significant for evaluation of the store environment and store evaluation. Respondents' reactions were more positive in the warm light condition than in the cold light condition, except for arousal. This finding might be explained by the fact that the light pretest revealed that the warm light setting was perceived as more pleasant than the cold light setting.

Table 6.2. Summary of 2 x 3 ANOVA results, Study 1

	Model		Light		Scent		Light x scent interaction	
Dependent variables	*F*(5, 174)	*p*	*F*(1, 174)	*p*	*F*(2,174)	*p*	*F*(2,174)	*p*
Pleasure	1.11	.36	4.21	.04	.53	.59	.13	.88
Arousal	1.57	.17	2.85	.09	2.33	.10	.18	.84
Store environment evaluation	2.25	.05	5.57	.02	1.74	.18	1.10	.33
Store evaluation	2.28	.05	5.91	.02	1.58	.21	1.16	.32
Product evaluation	.95	.45	3.29	.07	.48	.62	.26	.77
Approach behavior	1.17	.32	1.19	.28	.82	.44	1.52	.22

However, to gain more insight into the data, we also examined the specific differences between the scent conditions in the warm light condition and in the cold light condition. Testing simple effects in the presence of a nonsignificant interaction is appropriate if a priori expectations exist and if the main effect is not significant (Iacobucci, 2001). This means that we can study the specific differences between the scent conditions in the warm light condition and in the cold light condition for all the dependent variables except arousal, as we did not formulate a priori expectations for arousal. Means and standard deviations appear in Table 6.3. Inspection of the means revealed that when the store has warm lighting, the presence of a warm scent led to more positive reactions than the presence of a cold scent or the presence of no scent. We found a (marginally) significant difference for evaluation of the store environment, store evaluation, and approach behavior. Matching the warm light settings in the store with a warm scent led to enhanced evaluation of the store environment (M_{match} = 4.38, SD_{match} = 1.06; $M_{mismatch}$ = 3.92, $SD_{mismatch}$ = .92; p = .07), enhanced evaluation of the store (M_{match} = 4.56, SD_{match} = 1.11; $M_{mismatch}$ = 3.95, $SD_{mismatch}$ = .93; p = .03), and enhanced approach behavior (M_{match} = 4.47, SD_{match} = 1.08; $M_{mismatch}$ = 4.01, $SD_{mismatch}$ = .88; p = .06) compared to a mismatch between warm light and a cold scent. Matching the warm light settings in the store with a warm scent also led to enhanced evaluation of the store environment (M_{match} = 4.38, SD_{match} = 1.06; $M_{no\ scent}$ = 3.84, $SD_{no\ scent}$ = .85; p = .03) compared to a situation with warm light and no added scent. When the store has cold lighting, no significant differences were found.

Table 6.3. Study 1: Effect of light and scent on affective reactions, evaluations, and approach behavior

Dependent variables	Warm light			Cool light		
	M (SD)			*M (SD)*		
	No scent[a] (n = 30)	Warm scent[b] (n = 30)	Cool scent[c] (n = 30)	No scent[d] (n = 30)	Warm scent[e] (n = 30)	Cool scent[f] (n = 30)
Pleasure	4.46	4.69	4.58	4.25	4.33	4.34
	(.68)	(.95)	(.92)	(.98)	(.93)	(.77)
Arousal	2.72	3.08	3.20	3.07	3.39	3.33
	(1.10)	(1.14)	(1.15)	(1.03)	(.92)	(.91)
Store environment evaluation	3.84[b]	4.38[ac]	3.92[*b*]	3.65	3.74	3.73
	(.85)	(1.06)	(.92)	(1.06)	(.98)	(.89)
Store evaluation	4.12	4.56[c]	3.95[b]	3.77	3.87	3.84
	(.97)	(1.11)	(.93)	(1.15)	(1.24)	(.92)
Product evaluation	4.76	4.79	4.53	4.47	4.46	4.42
	(.84)	(1.02)	(.84)	(.91)	(1.03)	(.79)
Approach behavior	4.16	4.47[c]	4.01[*b*]	3.96	4.05	4.18
	(.98)	(1.08)	(.88)	(.89)	(.97)	(.78)

Comparisons were made for the congruent condition within each level of light. Superscripts indicate a significant difference at $p < .05$ (and in italics when $p < .10$) with the mean of the respective column (no corrections were made). For arousal, it was not appropriate to make these comparisons because of a nonsignificant interaction effect and no a priori expectations.

In this first study, we found partial support for our hypothesis. Matching warm light with a warm scent led to enhanced consumer reactions compared to mismatching warm light and a cold scent. However, the match between cold light and a cold scent did not have a positive effect. A possible explanation for this finding can be found in the manipulation of the light settings. We opted to hold the illuminance level of the light settings constant at 415 lux (i.e., dim lighting) because we only wanted to manipulate the color temperature. However, correlated color temperature and light illuminance are often correlated with each other (Briand & Pras, 2010). Cold lighting is preferred with a higher illuminance level (i.e., bright lighting), whereas warm lighting is preferred with a lower illuminance level (i.e., dim lighting; Briand & Pras, 2010; Kruithof, 1941). Other combinations are considered unpleasant. In Study 1, we worked with a cold and dim light setting and a warm and dim light setting. However, following the reasoning above, the cold and dim light setting itself implies a mismatch. In a follow-up analysis, we retrospectively checked the illuminance level associated with the scents (i.e., the perceived brightness associated with the scents). The cold mint scent was associated with brightness (M = 4.83, SD = 1.84; significantly different from the scale midpoint of 4 ($t(29)$ = 2.48, p = .02), whereas the warm cappuccino scent was also associated with dimness (M = 3.33, SD = 1.79; significantly different from the scale midpoint of 4 ($t(29)$ = -2.04, p = .05). Hence, the cold and dim light setting also mismatches with the cold and bright scent. These two mismatches might explain the fact that we did not find a positive light−scent matching effect in the cold light setting. Therefore, in Study 2, light settings are manipulated through correlated color temperature and illuminance levels.

6.7 Study 2

The objective of Study 2 was twofold. The first goal was to see whether the positive matching effect could be found for the cold light-scent setting when the mismatch on illuminance level was deleted. Therefore, light settings were manipulated via both correlated color temperature and illuminance levels (warm and dim light versus cold and bright light). A second aim of Study 2 was to generalize the results to an overall population. Study 1 was carried out with undergraduate students. Although a student sample is not necessarily problematic (Spangenberg et al., 1996), Study 2 was carried out with a sample from the general population.

6.7.1 Design and independent variables

Study 2 took place in the same simulated grocery store as Study 1. Light−scent congruity was now operationalized through (color) temperature and illuminance level. The design was a 2 (warm, dim light versus cold, bright light) x 3 (no scent versus warm, dim scent versus cold, bright scent) full factorial between-subjects design.

Light

The warm, dim light setting was the same as in Study 1, that is, 3000 K and 415 lux. The cold, bright light setting had a correlated color temperature of 4000 K and an illuminance level of 657 lux. As in Study 1, a pretest was performed to verify the perceived pleasantness, arousing nature, temperature, and brightness of the light settings. Every respondent had to evaluate one light setting and one

scent (the results of the scent pretest will be discussed below), making use of four 7-point semantic differentials (i.e., unpleasant/pleasant, unarousing/arousing, cold/warm, and dim/bright). Light settings and scents were randomized. There were 54 participants (20 men and 34 women) aged between 18 and 60 years. Each lighting setting was evaluated by 27 participants (10 men and 17 women). The warm, dim lighting setting (3000 K and 415 lux) was indeed perceived as warm (M = 5.33, SD = 1.11; significantly different from the scale midpoint of 4, $t(26) = 6.25$, $p < .001$) as well as dim (M = 3.07, SD = 1.92; significantly different from the scale midpoint of 4, $t(26) = -2.51$, $p = .02$). The cold bright lighting setting (4000 K and 657 lux) was indeed perceived as cold (M = 3.30, SD = 1.79; significantly different from the scale midpoint of 4, $t(26) = -2.04$, $p = .05$) as well as bright (M = 6.15, SD = 1.17; significantly different from the scale midpoint of 4, $t(26) = 9.57$, $p < .001$). The warm, dim light and the cold, bright light also significantly differed from each other in perceived temperature ($t(43.36) = 5.02$, $p < .001$) and perceived brightness ($t(42.90) = -7.11$, $p < .001$). The lighting settings did not differ in pleasantness ($M_{warm/dim}$ = 5.07, $SD_{warm/dim}$ = 1.21; $M_{cold/bright}$ = 4.78, $SD_{cold/bright}$ = 1.50; $t(52) = .80$, $p = .43$). In line with precious research (Briand & Pras, 2010), the cold, bright light (M = 4.37, SD = 1.50) was perceived as slightly more arousing than the warm, dim light ($M_{warm/dim}$ = 3.67, $SD_{warm/dim}$ = 1.27; $t(52) = -1.86$, $p = .07$).

Scent

The pretests of Study 1 made clear that the warm cappuccino scent was also perceived as dim, while the cold mint scent was also perceived as bright. We

conducted another pretest with a sample from the general population to check the perceived pleasantness, arousing nature, temperature, and brightness of both scents. As mentioned above, every participant had to evaluate one light setting (the results of the light pretest are discussed above) and one scent, using four 7-point semantic differentials (i.e., unpleasant/pleasant, unarousing/arousing, cold/warm, and dim/bright). Each scent was evaluated by 27 participants (cappuccino scent: 11 men and 16 women; mint scent: 9 men and 18 women). The cappuccino scent was indeed perceived as warm (M = 5.74, SD = .98; significantly different from the scale midpoint of 4, $t(26)$ = 9.19, $p < .001$) and dim (M = 3.19, SD = 1.69; significantly different from the scale midpoint of 4, $t(26)$ = -2.51, p = .02). The mint scent was indeed perceived as cold (M = 3.07, SD = 1.11; significantly different from the scale midpoint of 4, $t(26)$ = -4.35, $p < .001$) and bright (M = 5.07, SD = 1.52; significantly different from the scale midpoint of 4, $t(26)$ = 3.68, p = .001). Moreover, the cappuccino scent and the mint scent differed on perceived temperature ($t(52)$ = 9.36, $p < .001$) and perceived brightness ($t(52)$ = -4.32, $p < .001$) but did not differ on pleasantness ($M_{cappuccino}$ = 5.00, $SD_{cappuccino}$ = 1.11; M_{mint} = 4.52, SD_{mint} = 1.87; $t(42.32)$ = 1.15, p = .26) and arousing quality ($M_{cappuccino}$ = 4.37, $SD_{cappuccino}$ = 1.24; M_{mint} = 4.41, SD_{mint} = 1.78; $t(46.50)$ = -.09, p = .93).

6.7.2 Participants, procedure and dependent measures

Participants were recruited by an editorial announcement in a local newspaper, which was also posted on the newspaper's website. This announcement contained information about the purpose and the location of the study as well as

contact information and a subscription link. This resulted in a sample of 240 participants (94 men and 146 women) aged between 22 and 79 years. The respondents received a gift certificate of 10 euro. The same procedure and dependent measures from Study 1 were used in Study 2. As in Study 1, all Cronbach's alphas are greater than .75, indicating good reliability (see Table 6.1).

6.7.3 Results and discussion

A 2 x 3 MANOVA with light and scent as fixed factors and pleasure, arousal, evaluation of the store environment, store evaluation, product evaluation and approach behavior as dependent variables was conducted. The multivariate tests showed no significant main effect of light (Wilks' lambda = .97, $F(6, 229) = 1.00$, $p = .42$) or scent (Wilks' lambda = .95, $F(12, 458) = .98$, $p = .47$). However, the overall interaction effect between the two factors is significant (Wilks' lambda = .83, $F(12, 458) = 3.61$, $p < .001$). The univariate analyses revealed a significant interaction effect for every dependent variable, except for arousal (see Table 6.4). Specifically, there was a significant interaction effect for pleasure ($F(2, 234) = 12.44$, $p < .001$, $\omega^2 = .09$), evaluation of the store environment ($F(2, 234) = 14.11$, $p < .001$, $\omega^2 = .10$), store evaluation ($F(2, 234) = 14.94$, $p < .001$, $\omega^2 = .11$), product evaluation ($F(2, 234) = 11.11$, $p < .001$, $\omega^2 = .08$), and approach behavior ($F(2, 234) = 10.39$, $p < .001$, $\omega^2 = .08$).The effect sizes indicate a medium effect (Cohen, 1988). Because the interaction effect is nonsignificant for arousal and we did not formulate a priori expectations, a simple effects analysis for arousal is not appropriate (Iacobucci, 2001).

Table 6.4. Summary of 2 x 3 ANOVA results, Study 2

	Model		Light		Scent		Light x scent interaction	
Dependent variables	*F*(5, 234)	*p*	*F*(1, 234)	*p*	*F*(2, 234)	*p*	*F*(2, 234)	*p*
Pleasure	5.59	< .001	.81	.37	1.14	.32	12.44	< .001
Arousal	1.43	.21	.36	.55	1.24	.29	2.15	.12
Store environment evaluation	6.58	< .001	.21	.65	2.23	.11	14.11	< .001
Store evaluation	7.06	< .001	1.24	.27	2.08	.13	14.94	< .001
Product evaluation	4.75	< .001	.003	.95	.75	.47	11.11	< .001
Approach behavior	4.64	< .001	.37	.54	1.03	.36	10.39	< .001

Matching light and scent stimuli (i.e., warm and dim light/warm and dim scent or cold and bright light/cold and bright scent) led to more pleasure experienced in the store, a more positive evaluation of the store environment, a more positive evaluation of the store, a more positive evaluation of the products, and more approach behavior compared to mismatched conditions (i.e., warm and dim light/cold and bright scent or cold and bright light/warm and dim scent) and compared to the no added scent conditions (all $p < .05$). The match between cold, bright light and a cold, bright scent ($M = 4.92$, $SD = 1.05$) also improved product evaluations compared to no scent/cold, bright light condition ($M = 4.52$, $SD = 1.10$), however, this difference was not significant ($p = .11$). Means and standard deviations are provided in Table 6.5 and Figure 6.3. In sum, the results support our hypothesis and demonstrate a positive multisensory semantic congruity effect between light and scent.

Table 6.5. Study 2: Effect of light and scent on affective reactions, evaluations, and approach behavior

Dependent variables	Warm, dim light			Cool, bright light		
	M (SD)			*M (SD)*		
	No scent[a] (n = 40)	Warm, dim scent[b] (n = 40)	Cool, bright scent[c] (n = 40)	No scent[d] (n = 40)	Warm, dim scent[e] (n = 40)	Cool, bright scent[f] (n = 40)
Pleasure	4.19 [bf] (1.11)	4.85 [acde] (.97)	3.83 [bf] (1.24)	4.31 [bf] (1.13)	4.14 [bf] (.94)	4.79 [acde] (.96)
Arousal	2.64 (1.19)	2.89 (1.21)	2.98 (1.22)	2.96 (1.37)	3.23 (1.13)	2.61 (1.16)
Store environment evaluation	3.60 [bf] (1.20)	4.39 [acde] (1.37)	3.25 [bf] (1.29)	3.52 [bf] (1.21)	3.53 [bf] (1.03)	4.40 [acde] (1.09)
Store evaluation	3.35 [bf] (1.20)	4.48 [acde] (1.51)	3.07 [bf] (1.51)	3.71 [bf] (1.34)	3.44 [bf] (1.20)	4.34 [acde] (1.29)
Product evaluation	4.27 [bf] (.93)	5.04 [acde] (1.06)	4.23 [bf] (1.31)	4.52 [b] (1.10)	4.13 [bf] (1.14)	4.92 [ace] (1.05)
Approach behavior	4.08 [bf] (.99)	4.76 [acde] (1.18)	3.94 [bf] (1.27)	4.08 [bf] (.86)	3.87 [bf] (1.01)	4.58 [acde] (1.04)

The matching conditions (warm, dim light/scent and cool, bright light/scents) were compared to all the other conditions. Superscripts indicate a significant difference at $p < .05$ with the mean of the respective column (no corrections were made). For arousal, it was not appropriate to make these comparisons because of a nonsignificant interaction effect and no a priori expectations.

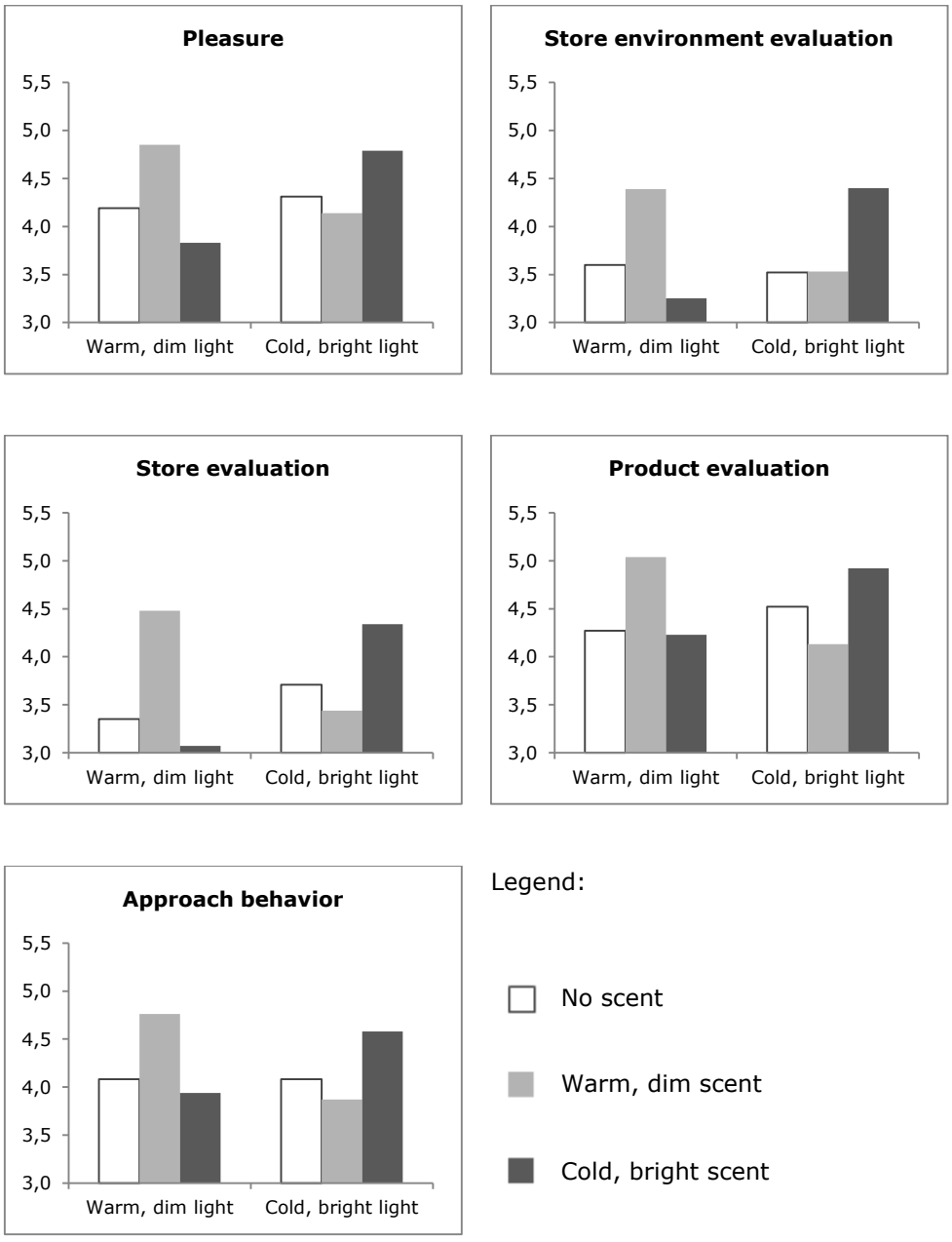

Figure 6.3. Study 2: Effect of light and scent on dependent variables.

6.8 General discussion

The main goal of this study was to explore multisensory semantic congruity effects across two atmospheric stimuli (i.e., overall lighting and ambient scent) in a retail setting. Atmospheric cues can have semantic associations. Our pretests showed that light and scent can be perceived as either warm or cold and either dim or bright. In our first study, light and scent were matched in terms of associated temperature (i.e., warm versus cold). However, we only found a positive congruity effect for the warm light and warm scent condition. This finding might be explained by the fact that the illuminance level of the light settings (i.e. brightness) was held constant at 415 lux (i.e., dim lighting). Correlated color temperature is often correlated with light illuminance (Briand & Pras, 2010), meaning that cold lighting is often preferred to be bright, whereas a warm lighting is often preferred to be dim. In the second study, we therefore manipulated both perceived temperature (warm versus cold) and illuminance level (dim versus bright) associated with the atmospheric cues. Modifying both semantic associations together allowed us to enhance the congruous feeling of the store environment. We found that multisensory semantic congruity between light and scent leads to enhanced affective, evaluative and behavioral consumer responses compared to semantic incongruity or compared to a situation where only one atmospheric cue is present.

Lots of earlier research focused on the effects of one atmospheric cue on consumer behavior; however, a customer perceives the store environment holistically. The effect of one specific atmospheric cue depends on the presence of other atmospheric cues (Mattila & Wirtz, 2001; Spence et al., 2014). Our

research supports this reasoning and indicates the importance of multisensory interactions between overall lighting and ambient scent. Additional research could investigate other multisensory interactions between atmospheric cues. In particular, future research could explore whether adding an extra congruent atmospheric cue (e.g., warm music versus cold music) to the store environment further improves customer reactions. Moreover, our research matches atmospheric cues based on semantic associations. We establish that lighting and scent are associated with a particular perceived temperature and illuminance level. Our results also suggest that the description of an atmospheric cue might be complex. For example, besides light being just warm or cold, additional qualifiers can also be relevant (e.g., brightness). In terms of conceptual fluency, other atmospheric cues should then be chosen in such a way that the matching is adequate (e.g., a warm, dim light needs a warm, dim scent). Additional research can focus on other semantic associations of atmospheric cues. Finally, as our two studies were conducted in a controlled laboratory setting, future research should explore the magnitude of multisensory congruity effects in a field setting to generalize our findings.

Our findings also have some practical implications. Retailers who want to create in-store experiences with pleasant atmospheric stimuli should be aware that atmospheric stimuli are never present in isolation and that the choice of atmospheric stimuli should be considered carefully. Retailers should match the chosen atmospheric cues not only in terms of valence but also in terms of semantic associations in order to obtain optimal results.

Chapter 7

Influencing consumer reactions towards a tidy versus a messy store using pleasant ambient scents[8]

Although retailers know that consumers do not like cluttered stores, messy layouts are sometimes inevitable. This research examines whether diffusing pleasant scents can overcome consumers' negative response to a messy store. Specifically, this study investigates the effect of pleasant scents (un)related to neatness on consumer evaluations of a tidy versus a messy store. An experiment with 198 respondents revealed that a pleasant scent not associated with neatness (i.e., black cherry scent) functions as a positively valenced prime, causing consumers to evaluate the products in the tidy store more positively than the products in the messy store. Additionally, when diffused in a messy store, a pleasant ambient scent has a negative effect on consumers' product evaluation, because of a mismatch between the pleasant scent and the unpleasant messy layout. However, this negative effect can be canceled out by diffusing a pleasant scent that is associated with neatness (i.e., a lemon-tangerine scent).

[8] This chapter corresponds to the journal article 'Doucé, L., Janssens, W., Swinnen, G., & Van Cleempoel, K. (2014). Influencing consumer reactions towards a tidy versus a messy store using pleasant ambient scents. *Journal of Environmental Psychology, 40*, 351-358.'

7.1 Introduction

Messy retail layouts are sometimes inevitable, especially at times such as bargain periods. However, a messy display can lower consumers' design perceptions, and perceptions of poor design can in turn have a negative effect on several dimensions of perceived customer value, such as perceived time and effort costs, psychic costs, service quality, and merchandise quality (Baker, Parasuraman, Grewal, & Voss, 2002). We examine whether retailers can overcome these negative elements by diffusing pleasant scents. Scents in general can generate (memory related) affective reactions as they are in a first stage directly processed in the brain's limbic system, which is the center of emotions and memory (Bosmans, 2006; Ehrlichman & Halpern, 1988). Herz (2007) indicated that pleasant scents can decrease the intensity of environmental annoyances by inducing a pleasant mood. For example, McDonnell (2007) found that a pleasant ambient scent can neutralize negative elements of a shopping experience such as queues. However, according to research on matching effects, favorable evaluations require the valence of a stimulus (e.g., the store) to be consistent with the valence of the contextual cue (e.g., the scent in the store) (Brakus et al., 2008). This constraint means that consumers will respond more positively to a store environment with a pleasant scent only when the environment itself is pleasant (in this case, tidy). Another important aspect is that the processing of odors does not end in the limbic system, as a scent can also be associated with semantic and episodic knowledge (Degel et al., 2001). For example, many consumers associate the scent of citrus with cleaning. When consumers perceive the scent, such a semantic association

may be activated, even when they are not consciously aware of the scent (Holland et al., 2005). This study examines whether pleasant ambient scents have the same beneficial effects on store and product evaluations in a tidy versus a messy store, and makes a difference between pleasant scents associated with neatness or not. It is important to study scent effects in these different store conditions because retailers frequently have to deal with messy stores, especially in bargain periods.

7.2 Priming effects

The store's offerings are never seen or evaluated in isolation, but they are always embedded in an environment or context that often include ambient scents, music, lights, etc. This context can have affective as well as cognitive priming effects on consumer behavior (Yi, 1990). With respect to the affective priming effect, a context can trigger an overall affective reaction which can subsequently be transferred to the consumers' evaluations of elements embedded by that context (e.g. products in a store), and eventually to their approach behavior (i.e., by affect transfer). With regard to the cognitive priming effect, the context can also make certain concepts more readily accessible in the brain of consumers. Once these concepts are activated, these constructs guide consumers' evaluations of and behavior toward the store and products. An ambient scent in a store can be such a contextual element, and can influence consumers' store and product evaluations via affective as well as cognitive priming.

7.2.1 Affective priming effects

A relevant theory for studying affective priming effects is the Stimulus–Organism–Response (S–O–R) paradigm (Donovan & Rossiter, 1982; Mehrabian & Russell, 1974), which provides the most common theoretical basis for studying the effects of atmospheric cues on shopping behavior. In the retail context, the paradigm holds that a store atmosphere (including pleasant scents) (S) can influence consumers' emotional responses (O), which in turn lead to approach or avoidance responses (R). Approach responses are positive responses to a store environment, whereas avoidance responses are negative responses to the store environment. Prior research has demonstrated that the positive affect associated with a pleasant ambient scent transfers to the items being evaluated (Doucé & Janssens, 2013; Morrin & Ratneswhar, 2000). Moreover, as Friedman and Förster (2010) indicated, a scent and its associated pleasantness can function as an implicit affective cue, indicating that a pleasant ambient scent can also have a positive effect on consumer evaluations without evoking conscious feelings of pleasure.

7.2.2 Valence match and processing fluency

A pleasant context, however, does not always lead to more positive reactions. The reaction triggered by the context (e.g., the ambient scent) may depend on the valence (i.e., affective tone) of the stimuli under evaluation (e.g., the store and its products). An affective prime activates the corresponding affect, leading to easier activation of concepts with a similar affect (Fazio, 2001). This response implies that the match between the affective tone of the contextual cue (e.g., scent) and the affective tone of a stimulus (e.g., the store) could generate

processing fluency (De Bock et al., 2013). Processing fluency refers to the experienced ease of processing an external stimulus (Schwarz, 2004). When people readily process the environment, they experience a positive affective state that can be misattributed to the environment rather than to the ease of processing (Winkielman et al., 2003). Thus, a pleasant scent diffused in a pleasant store environment can lead to processing fluency and subsequent more positive store and product evaluations, whereas a pleasant scent present in an unpleasant store environment can lead to processing disfluency and subsequent less positive store and product evaluations.

Prior research has applied the construct of processing fluency to the context of scent cues. For example, in the study of Herrmann, Zidansek, Sprott, and Spangenberg (2013) processing fluency was manipulated by diffusing either simple (therefore easier to process) or complex ambient scents in a store and found that simple scents increased sales, while more complex scents had no effect on spending. Our study extends existing research by applying the processing fluency construct to the interaction effects of pleasant ambient scents with the store environment (store messiness).

7.2.3 Cognitive priming effects

Odor priming is a process whereby "an odor unconsciously starts an automatic knowledge activation process" (Schifferstein & Blok, 2002, p. 540). A scent can activate certain concepts to consumers, which causes consumers to be more sensitive to subsequent elements that fit with the activated information (Dijksterhuis et al., 2005). For example, a citrus scent is strongly associated

with cleaning behavior, because this scent is often added to cleaning products. Thus, if one (unconsciously) perceives a citrus odor, knowledge related to citrus (e.g., cleaning) will become more easily accessible, and will result in a different response to the subsequent encounter of a tidy or messy environment. Holland et al. (2005) found that unconscious exposure to a citrus scent of all-purpose cleaner increases the accessibility of the cleaning concept automatically (i.e., listing more activities concerning cleaning and reacting more rapidly to cleaning-related words in a lexical decision task) and affects actual cleaning-like behavior (i.e., leaving fewer crumbs on the table after eating a crumbly cookie).

Our study examines the effect of a pleasant scent (un)related to neatness on consumer evaluations of a tidy versus a messy store. Based on the valence match and processing fluency theory, we expect that the presence of a pleasant scent not associated with neatness (i.e., black cherry scent) has a positive effect on consumer responses when the scent is present in a tidy store and a negative effect in a messy store. For a pleasant scent associated with neatness (i.e., lemon-tangerine citrus scent), we also expect a positive effect in the tidy store. Moreover, we expect that this positive effect in the tidy store will be greater for a pleasant scent associated with neatness than for a pleasant scent not associated with neatness, because the lemon-tangerine scent makes neatness more accessible in the customers' mind, increasing the salience of the tidiness of the store. Therefore, customers are more likely to notice the tidiness of the store and take it into consideration when evaluating the store and its products. However, in the messy store, the effect of a scent associated with neatness has two possible outcomes. On the one hand, the scent may have a negative effect

on consumer responses because the activation of neatness makes the customers more likely to notice the messiness. Moreover, a scent that activates neatness can evoke an expectation of a well-organized environment. In line with the expectation disconfirmation theory (Oliver, 1980), we can assume that when the environment doesn't meet that expectation, feelings and evaluations will be the same or worse than when no scent is present (Bitner, 1992). On the other hand, in a messy store the scent may have a positive effect on consumer reactions. Because the scent activates neatness in the customers' mind, it can also give the impression that the store has been cleaned recently, leading customers to think the store isn't so messy after all. This reasoning leads to the following hypotheses:

H1: In a tidy store, compared to the no-scent condition, (a) the presence of a pleasant scent not associated with neatness as well as (b) the presence of a pleasant scent associated with neatness will improve respondents' affective, evaluative, and approach reactions toward the store and its products. This improvement will be (c) greater for the pleasant scent that enhances the accessibility of the neatness concept than for the pleasant scent that isn't associated with neatness.

H2: In a messy store, compared to the no-scent condition, the presence of a pleasant scent not associated with neatness will lower respondents' affective, evaluative, and approach reactions toward the store and its products.

As mentioned above, diffusing the scent associated with neatness in the messy store has two possible contradictory outcomes. Therefore, in lieu of a hypothesis, we formulate the following research question:

RQ1: What is the effect of a pleasant scent associated with neatness on respondents' affective, evaluative and approach reactions toward the store and its products in a messy store (a) compared to the use of a pleasant scent that is not associated with neatness and (b) compared to the no-scent condition?

While H1, H2, and RQ1 compared the scent effects for each store condition, the following section focuses on the differences between a tidy and messy store for each scent. We expect that a tidy store always evokes more positive consumer reactions than a messy store, because consumers do not like cluttered environments (Baker et al., 2002). However, because of the affective and cognitive effects of the scent that is not associated with neatness, we believe that the effect of tidiness will be greater when such scent is present in the store.

H3: Respondents' affective, evaluative, and approach reactions toward the store and its products will be more positive in a tidy store compared to a messy store for all three scent conditions: (a) no scent, (b) a pleasant scent not associated with neatness, and (c) a pleasant scent associated with neatness.

H4: The improvement of the respondents' reactions in the tidy versus the messy store will be greater when a pleasant scent not associated with neatness is present compared to the no-scent condition.

Given the two contradictory outcomes of the scent associated with neatness in the messy store, we formulate the following research question:

RQ2: Is the improvement of the respondents' reactions in the tidy versus the messy store greater when a pleasant scent associated with neatness is present (a) compared to the improvement when a pleasant scent that is not associated with neatness is present and (b) compared to the improvement in the no-scent condition?

7.3 Pretests

7.3.1 Scent selection

To determine pleasant scents that may or may not be associated with neatness, we conducted a pretest. We selected several scents from the four scent categories (Edwards, 2014), which are floral notes, fresh notes, woody notes and oriental notes. Participants were 25 undergraduate students, who received two cinema tickets (value of €15) for their participation. They were asked to sniff the scents and to evaluate the scents' association with neatness as well as their pleasantness and arousing nature. The association with neatness was measured by a 7-point Likert-type item, ranging from 1 = not at all to 7 = totally. The pleasantness and arousing nature of the scents were each measured

by a 7-point semantic differential (i.e., unpleasant/pleasant; non-arousing/arousing). The scents were presented in random order (on a cotton-tipped stick in a dark glass bottle) and respondents were instructed to sniff the scents as many times as they liked while completing the survey. Between successive aromas participants smelled coffee grounds to restore their scent palettes (Krishna et al., 2010). This technique is frequently used in the fragrance industry to neutralize the odors in the nose, preventing contamination from one odor to the next.

Orange, lemon-tangerine, grapefruit, bergamot, and water lily were the scents most associated with neatness (all $M \geq 5.32$). A lemon scent is particularly connected with the feeling of cleanliness, probably because of lemon's acidity and its use in former times to clean things, such as to polish silver (Krishna, 2010; Lwin & Wijaya, 2010). Therefore, we selected the lemon-tangerine scent as the scent associated with neatness. Moreover, this scent had a high association with neatness ($M = 5.44$, $SD = 1.33$), which was significantly different from the scale middle point of 4 ($t(24) = 5.43$, $p < .001$, $r = .74$). Participants also rated the lemon-tangerine scent as more pleasant ($M = 5.08$, $SD = 1.32$; $t(24) = 4.09$, $p < .001$, $r = .64$) and as more arousing ($M = 4.88$, $SD = 1.27$; $t(24) = 3.47$, $p = .002$, $r = .58$) than the scale middle point of 4.

The pleasant scent not associated with neatness was selected by searching for a scent that was as pleasant and as arousing as the lemon-tangerine scent, but differed on the association with neatness. These criteria led to the selection of the black cherry scent as the scent not associated with neatness ($M = 3.92$, $SD = 1.50$), not significantly different from the scale middle point of 4 ($t(24) = -.27$,

p = .79). Respondents found the black cherry scent more pleasant (M = 5.52, SD = 1.33; t(24) = 5.73, p < .001, r =.76) and more arousing (M = 4.64, SD = 1.15; t(24) = 2.78, p = .01, r = .49) than the scale middle point of 4. Moreover, the lemon-tangerine scent and black cherry scent differed on association with neatness (t(24) = 5.25, p < .001, r = .73), but did not differ on pleasantness (t(24) = -1.19, p = .25) and arousing quality (t(24) = .86, p =.40).

A separate pretest (N = 15) was conducted to verify the fit of both scents with casual clothing. The association of lemon-tangerine scent (M = 2.40, SD = 1.72) and black cherry scent (M = 2.47, SD = 1.55) with casual clothing did not differ (t(14) = -.10, p = .92).

7.3.2 Scent intensity

In separate pretests, we determined the intensity of the scents. This is done because when a scent becomes too intense, people may become more aware that the scent, and not the store, is responsible for their responses. Consequently, they may correct their behavior (Bosmans, 2006). Therefore, the ambient scent should not be salient. For the black cherry scent as well as for the lemon-tangerine scent a separate pretest was carried out. Each scent was diffused in a room similar to those used in the main experiment, with an Aerostreamer1000 fragrance appliance marketed by Scents, an olfactory marketing firm in Belgium. The appliance works according to the principle of warm evaporation (electrical). The liquid scent is heated on a metal plate, making it evaporate. Next, a fan distributes the scent. The intensity of the fragrance appliance can be adjusted by the amount of liquid that falls on the

metal plate and the speed of the fan. For each scent about 10 respondents were asked two questions: "Did you notice something special in the room?" and "Now that we have mentioned the presence of a scent, do you detect the scent?" (Doucé et al., 2013). The first question checked whether respondents spontaneously reported scent-related elements. Spontaneously mentioning the scent meant that the scent was too salient. The intensity of the scents was lowered until respondents answered negatively to the first question and positively to the second. In the main study, the intensity of the fragrance appliance was set on the lowest level for each scent. The black cherry scent was diffused for 2 minutes and the lemon-tangerine scent was diffused for 2 minutes and 45 seconds before the respondents entered the room. Once the scents were diffused, the rooms were not ventilated until the end of the test.

7.3.3 Store environment

The participants of the main study saw three pictures of an actual clothing store located in a Belgian city. With the consent of the owner, we manipulated the messiness of the store. Messiness is a multi-faceted concept. To ensure that the photos of the clothing store conveyed the right degree of messiness, we conducted a pretest. Sixty-two respondents (45 women and 17 men) were shown three photos of the same store in either a tidy condition or a messy condition. They were asked to evaluate the store environment on various characteristics of messiness: "dirty," "disorganized," "complex," "cluttered," "turbulent," "messy," "disorderly," and "untidy," using a scale from 1 = *not at all* to 7 = *very much*. A summated scale (mean of items) was calculated (α = .92). Results indicated that the messy store (M = 4.53, SD = .88) was indeed

perceived as messier than the tidy store (M = 2.80, SD = 1.15; $t(60) = 6.61$, $p < .001$, $r = .34$), and both stores were significantly different from the scale middle point of 4 (messy store: $t(30) = 3.33$, $p = .002$, $r = .52$; tidy store: $t(30) = -5.78$, $p < .001$, $r = .73$).

7.4 Method

7.4.1 Participants and procedure

A 3 (no scent vs. pleasant scent not associated with neatness vs. pleasant scent associated with neatness) x 2 (tidy store vs. messy store) between-subjects full factorial design was conducted. Subjects were 199 undergraduate students who participated in the study in exchange for course credit. The data of one participant were discarded because he left most of the questions unanswered. The participants (100 men and 98 women; M_{age} = 19.13 years) entered a room that was either scented or unscented. Next, they filled in the manipulation checks, saw three photos of a clothing store in either a tidy condition (see Figure 7.1) or a messy condition (see Figure 7.2) and completed a survey containing dependent variables and demographics.

Figure 7.1. Photos of the tidy store condition.

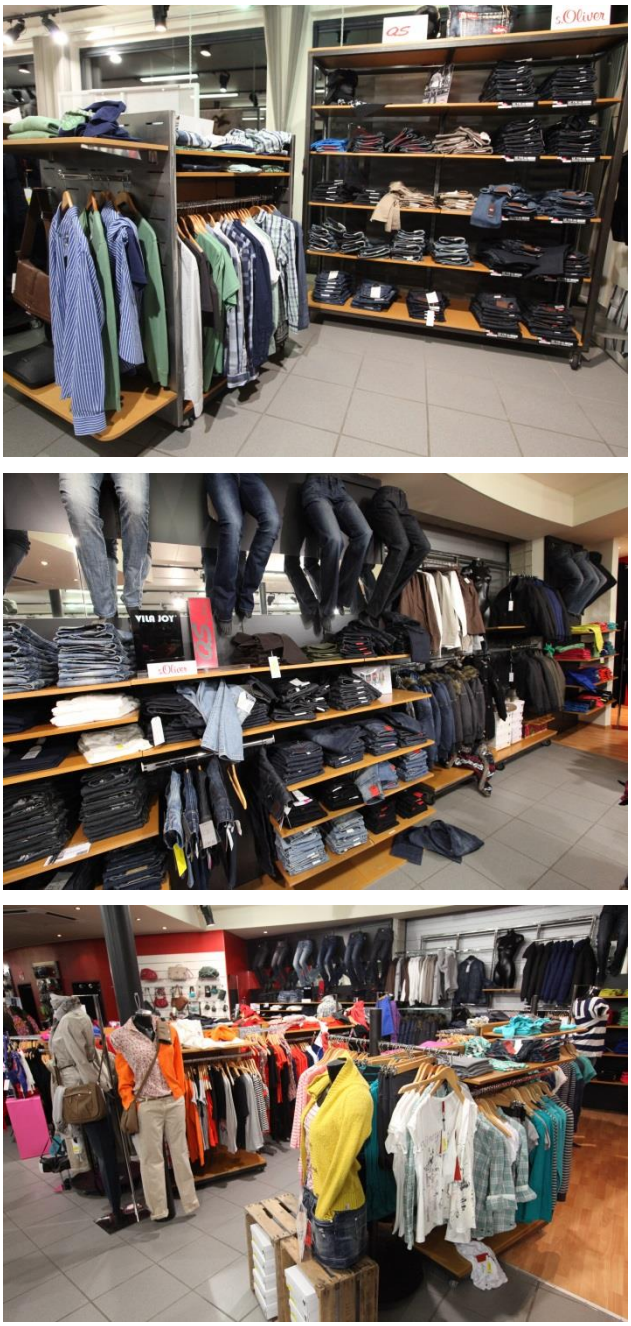

Figure 7.2. Photos of the messy store condition.

7.4.2 Manipulation checks

The scent pretest showed that both scents are pleasant, and therefore, they can trigger a positive affective reaction (affective priming). Moreover, the lemon-tangerine scent is associated with neatness, which may activate the neatness concept in the mind of the consumers. These results are very clear with respect to the scents' affective and cognitive priming capabilities, we nevertheless opted to include manipulation checks. However, these results must be viewed with caution, because including manipulation checks at the beginning or at the end always has drawbacks. Measuring affective and cognitive effects at the end can suffer from biasing effects of the tidy/messy store pictures, whereas measuring them at the beginning could suffer from a scent exposure period that is too short. Nevertheless, we included manipulation checks at the beginning in an effort to gain more insight into the underlying process. The affective priming effect of the scent was measured by assessing respondents' feelings using a 7-point semantic differential scale (mean of four items; e.g., good/bad; α = .88; Yi, 1990). The cognitive priming effect was measured by an open-ended question in which respondents were asked to indicate the elements they find important when choosing a clothing store. Responses were recoded into a dichotomous variable (i.e., mentioning tidiness of the store or not).

7.4.3 Dependent variables

Dependent measures were affective response toward the store (i.e., pleasure and arousal), evaluation of the store environment, evaluation of the store, evaluation of the products, and self-reported approach behavior. For every

measure, a summated scale (means of items) was calculated and used in further analyses. All items were measured using 7-point semantic differential scales. Respondents' affective reactions were captured with the "pleasure" dimension of Mehrabian and Russell's (1974) PAD scale (e.g., unhappy/happy; α = .90). The "arousal" dimension was not used in our analysis as it can be positively as well as negatively valenced (Spangenberg et al., 1996). The "dominance" dimension was also left out because of a lack of empirical support (Donovan et al., 1994). The evaluation of the store environment (α = .96) was measured by Fisher's (1974) 13-item environmental quality scale (e.g., unattractive/attractive) plus the item added by Spangenberg et al. (1996; unpleasant/pleasant). The evaluation of the store (α = .95) was assessed with six items (e.g., dislike/like; Spangenberg et al., 1996; Spangenberg et al., 2005). The evaluation of the products (α = .88) was measured by the mean of six items (e.g., bad/good; Bellizzi et al., 1983; Spangenberg et al., 1996). Self-reported approach behavior (α = .92) was measured by asking four questions, such as "Would you enjoy shopping in this store?" (Donovan & Rossiter, 1982; Spangenberg et al., 2005). Table 7.1 provides a summary of the scale items used in our study.

Table 7.1. Scales of manipulation checks and dependent variables

	7-point scale
Affective priming (4 items; Yi, 1990)	Happy/unhappy Pleased/displeased, Comfortable/uncomfortable Good/bad
Pleasure (6 items; Mehrabian & Russell, 1974)	Happy/unhappy Pleased/annoyed Satisfied/dissatisfied Contented/melancholic Hopeful/despairing Relaxed/bored
Store environment evaluation (14 items; Fisher, 1974; Spangenberg et al., 1996)	Attractive/unattractive Relaxed/tense Comfortable/uncomfortable Cheerful/depressing Colorful/drab Positive/negative Stimulating/boring Good/bad Lively/unlively Motivating/unmotivating Interesting/uninteresting Pleasant/unpleasant Open/closed Bright/dull
Store evaluation (6 items; Spangenberg et al., 1996; Spangenberg et al., 2005)	Good/bad Favorable/unfavorable Positive/Negative Like/dislike Modern/outdated Pleasant/ unpleasant

Table 7.1. Scales of manipulation checks and dependent variables (continued)

Product evaluation (6 items; Bellizzi et al., 1983; Spangenberg et al., 1996)	Good/bad Pleasant/unpleasant Favorable/unfavorable High quality/low quality Attractive/unattractive Up-to-date/outdated
Approach/Avoidance behavior (4 items; Donovan & Rossiter, 1982; Spangenberg et al., 2005)	Would you like to visit this store? Would you enjoy shopping in this store? Would you like to stay in this store and explore the products? Would you like to buy something in this store?

7.5 Results

7.5.1 Manipulation checks

To test whether scent had an affective priming effect, an ANOVA was conducted with scent condition as a fixed factor and respondents' feelings before they saw the store pictures as the dependent variable. We found no effect of scent on respondents' feelings ($F(2,195) = .12$, $p = .88$). Concerning scents' cognitive priming effect, a logistic regression analysis was carried out using scent condition as predictor and, as the dependent variable, mentioning tidiness of the store as an important element when choosing a clothing store. Results indicated at the 90% level of significance that when a lemon-tangerine scent was present, respondents were 2.49 times more likely to mention tidiness of the store as an important store element than when a black cherry scent was present ($\beta = -.91$, $Wald = 3.38$, $p = .07$). We found no significant differences in mentioning

tidiness of the store between the black cherry scent and the no-scent conditions (β = -.69, *Wald* = 1.93, p = .17) or between the lemon-tangerine scent and the no-scent conditions (β = -.22, *Wald* = .28, p = .60). However, as mentioned, the exposure time to the scent between entering the experimental room and the manipulation check could have been too short to evoke explicit affective and cognitive priming effects. Nevertheless, the combination of the scent and the tidy/messy store pictures are assumed to trigger these reactions at a later stage.

7.5.2 Experimental findings

A two-way ANOVA with scent and store messiness as fixed factors was conducted for each of the dependent variables. For the tests related to the research questions, Bonferroni corrections for multiple group testing were made. We found a significant main effect of store messiness for each of the dependent variables. Compared to a messy store, a tidy store led to enhanced pleasure (F(1,192) = 17.42, p < .001, ω^2 = .08), enhanced evaluation of the store environment (F(1,192) = 11.52, p = .001, ω^2 = .05), enhanced evaluations of the store (F(1,192) = 16.27, p < .001, ω^2 = .07), enhanced evaluations of the products (F(1,192) = 13.05, p < .001, ω^2 = .06), and enhanced self-reported approach behavior (F(1,192) = 15.93, p < .001, ω^2 = .07). On the other hand, an ambient scent did not have a significant main effect on the dependent variables (all p > .26). The interaction effect between scent and store messiness was significant only for product evaluation (F(2,192) = 4.24, p = .02, ω^2 = .03). Overall, the effect sizes indicate a medium effect (Cohen, 1988). A summary of the 3 x 2 ANOVA results can be found in Table 7.2.

Table 7.2. A summary of the 3 x 2 ANOVA results

Dependent variables	Model		Scent		Store messiness		Scent x store messiness interaction	
	F(5, 192)	*p*	*F*(2, 192)	*p*	*F*(1,192)	*p*	*F*(2,192)	*p*
Pleasure	3.94	.002	.03	.98	17.42	< .001	1.34	.26
Store environment evaluation	2.81	.02	.03	.97	11.52	.001	1.54	.22
Store evaluation	3.88	.002	.03	.97	16.27	< .001	1.92	.15
Product evaluation	4.66	< .001	1.37	.26	13.05	< .001	4.24	.02
Approach/avoidance behavior	3.72	< .001	.43	.65	15.93	< .001	1.22	.30

However, we are mainly interested in the specific simple effects as formulated in H1 and H2. Therefore, we looked at the specific differences between the scent conditions in both the tidy store and the messy store. As indicated by Iacobucci (2001), it is appropriate to test simple effects in the presence of a nonsignificant interaction when a priori expectations exist and when the main effect is not significant. Summary statistics appear in Table 7.3. Although inspection of the respective means suggests that, compared with the no-scent condition, respondents' reactions to the tidy store were more positive when a pleasant scent (lemon-tangerine or black cherry) was present, none of these differences was significant. We also did not find a significant difference between lemon-tangerine scent and the black cherry scent (lowest p = .12). Thus, H1 is not supported. Consumers' affective, evaluative and approach reactions are not different in the three scent conditions. Similarly, when the respondents saw a messy store, the respective means suggest that their reactions were more negative when a pleasant scent (lemon-tangerine or black cherry) was present compared with the no-scent condition. Moreover, the presence of a lemon-tangerine scent led to more positive reactions than the presence of a black cherry scent (RQ1b). However, none of the differences was significant (all p > .15), except for product evaluation. More precisely, the products in the messy store were evaluated more negatively when black cherry scent was present (M =3.58, SD = 1.11) compared with the no-scent condition (M= 4.36, SD = 1.07; p = .002). No difference occurred in product evaluation in the messy store between the no-scent condition (M = 4.36, SD = 1.07) and the lemon-tangerine scent condition (M= 4.02, SD = .93; p =.18). Hence, H2 is only supported for product evaluation.

Table 7.3. Effect of ambient scent and store messiness on affective reactions, evaluations, and approach behavior

	Tidy store			Messy store		
	M (SD)			*M (SD)*		
	No scent[a]	Black cherry scent[b]	Lemon-tangerine scent[c]	No scent[d]	Black cherry scent[e]	Lemon-tangerine scent[f]
Pleasure	4.24	4.55	4.33	3.87	3.63	3.84
	(1.08)	(1.05)	(.88)	(1.16)	(.95)	(.79)
Store environment evaluation	3.87	4.17	4.07	3.67	3.26	3.45
	(1.14)	(1.21)	(1.15)	(1.12)	(1.15)	(1.26)
Store evaluation	3.90	4.40	4.21	3.63	3.24	3.35
	(1.42)	(1.25)	(1.15)	(1.48)	(1.28)	(1.33)
Product evaluation	4.46	4.68[e]	4.39	4.36[e]	3.58[bd]	4.02
	(.92)	(1.06)	(1.04)	(1.07)	(1.11)	(.93)
Approach/Avoidance behavior	3.84	4.17	4.23	3.44	3.02	3.39
	(1.43)	(1.29)	(1.35)	(1.46)	(1.48)	(1.39)

Estimated marginal means, standard deviations (between brackets), and simple effect tests where appropriate.

Superscripts indicate the significant difference at $p < .05$ with the mean of the respective column (no corrections were made except for all comparisons with the lemon-tangerine scent in the messy store condition (Bonferroni correction)).

With respect to H3, we evaluated the specific differences between the store messiness conditions for each of the different scent conditions. However, because of a nonsignificant interaction effect and a significant main effect of store messiness, the simple effects of the store messiness conditions for each of the different scent conditions cannot be interpreted unambiguously (except for product evaluation because of a significant interaction effect; Iacobucci, 2001). For product evaluation, we found that when a pleasant scent not associated with neatness (i.e., black cherry) was present, the respondents who saw the tidy store responded more positively than the respondents who saw the messy store ($p < .001$). We did not find this difference when a pleasant scent associated with neatness was present ($p = .16$) nor when no scent ($p = .67$) was present. Hence, for product evaluation only H3b is supported.

Additionally, we performed a more robust check by comparing the tidy versus the messy store difference in a scent condition (i.e., cherry or lemon-tangerine) with the no-scent condition (H4 and RQ2). This comparison enables us to evaluate the scent effect in a more exact way, because we control for any possible tidy versus messy store differences independent from the scents used. For the reasons mentioned above, we only interpreter the results for product evaluation. We found that the positive effect of store tidiness (tidy store-messy store) is significantly higher in the black cherry scent (difference = 1.11) condition compared to the no-scent condition (difference = .11) for evaluation of the products ($t(192) = 2.83$, $p = .005$, $r = .20$). Hence, H4 was supported for product evaluation. Regarding RQ2, we did not find a significant difference between no scent (difference = .11) and lemon-tangerine scent (difference =

.36; Bonferroni corrected p = 1.00) or between cherry scent (difference = 1.11) and lemon-tangerine scent (difference = .36; Bonferroni corrected p = .12) for product evaluation. For the other dependent variables, we found similar results for H3 and H4. However, as mentioned above, the nonsignificant interaction effect combined with the significant main effect of store messiness made it impossible to unambiguously interpret the store messiness effect for each of the different scent conditions.

7.6 Discussion

The aim of our research was to study the effect of a pleasant scent, whether related to the neatness concept or not, on consumer evaluations of a tidy versus a messy store. Although respondents' reactions did not significantly differ between the scent conditions when they saw a tidy store, in the messy store they evaluated the products more negatively when a pleasant scent not associated with neatness was present in the store environment than when no scent was present. Moreover, consumers only evaluate the products in a messy store more negatively than the products in a tidy store when a pleasant scent not associated with neatness is present. This pleasant scent not associated with neatness (i.e., black cherry) functions as a positively valenced prime, causing consumers to evaluate the products in the tidy store condition (pleasant, so valence matched with the contextual cue) more positively than the products in the messy store condition (unpleasant, not matched with the scent). These findings are in line with earlier research on the valence match between contextual cue and stimulus (Brakus et al., 2008; De Bock et al., 2013). When checking the tidy versus the messy store difference between a scent condition

(i.e., black cherry or lemon-tangerine) and the no-scent condition, we also found a significant difference between cherry scent and no scent, and not between lemon-tangerine scent and no scent. This result means that the more positive evaluation of the products in a tidy store compared to the products in a messy store in the black cherry scent condition is explained by the presence of the pleasant scent not associated neatness and not by the store's tidiness.

In conclusion, the negative effect of a pleasant ambient scent in a messy store on consumers' product evaluation disappears when the pleasant scent is associated with neatness. The cognitive association of the lemon-tangerine scent with neatness might give the consumers in the messy store the impression that the store is not so messy.

7.6.1 Limitations and future research

This study was conducted with students who received course credit for their participation. Future research may use non-student samples. Nevertheless, we believe our results are robust. As Spangenberg et al. (1996) already stated using students as participants is only problematic when they do not have the knowledge, experience, or education background representative of the general population, and these differences affect their reactions towards the dependent variables. However, they argued that there is no scientific evidence indicating that students react differently to scents than non-students. We just need to be aware that the students in our study were young people (M_{age} = 19.13 years), and that as people grow older, they will be less influenced by ambient scent in the store environment because their sense of smell deteriorates (Chebat et al.,

2008). Although we pretested whether the scents were associated with neatness, we did not verify exactly which concepts were evoked by the scents in the main study. We were unable to measure this effect because we did not want to draw attention to the scent. Furthermore, while the findings can be explained by the valence match of stimuli and cue leading to process fluency, we did not test this directly. Future research could gain insight into the neurological underpinnings of the observed effects and the elaboration process by using physiological measures like fMRI. With respect to the absence of a negative effect of the lemon-tangerine scent in a messy store, possibly the store was not messy enough to find a negative effect, and hence such an effect only takes place from a critical amount of messiness onwards. However, an exploratory inspection of a scatterplot of the respective data shows that the effects were linear over the whole range of perceived messiness, indicating that there was no such critical value for perceived messiness.

7.7 Conclusions

Our research extends existing research studying interaction effects of atmospheric cues (Morrison et al., 2011; Spangenberg et al., 2005) by examining whether negative store elements can be overcome by diffusing pleasant scents. Indeed, shopping is a holistic experience in which consumers are exposed to a number of atmospheric cues at the same time. Our research shows that a pleasant ambient scent has a negative effect on consumers' product evaluation when it was mismatched with other environmental elements (i.e., a black cherry scent present in a messy store). So, the same contextual cue can have opposite affective, evaluative, and behavioral consequences,

depending on the valence (i.e., affective tone) of the stimulus under evaluation. Additionally, we found that when a scent is associated with the negative element the retailer is trying to overcome, the match effect between scent and store is less pronounced. As a result, retailers who work with ambient scents should be aware that these ambient scents may have perverse effects when their store is messy. In our study, correctly choosing a pleasant scent (pleasant + associated with neatness) compensates for the negative effects of a store becoming messy.

Chapter 8

Impact of scent on consumers' memory and assortment perceptions

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The objectives of this study were (1) to explore the effect of an ambient scent on respondents' memory and assortment evaluations of scent-congruent and scent-incongruent products and (2) to examine the moderating role of product category familiarity. Most consumer research on scent effects concentrates on the impact of scents on store and product evaluations, and recently, there has also been more scholarly attention paid to the impact of scents on memory. These studies found that scent can improve memory and that this effect is mediated by attention. However, in these previous studies, the respondents were exposed to only one product (with extra product information) or saw various brands one after each other. We focus on the impact of an ambient scent on recall and recognition of a large assortment of products in a particular category presented to the respondents all at the same time. Moreover, we argue that changes in attention and processing can also lead to changes in assortment evaluations and product choices. To our knowledge, no prior research has examined the effects of an ambient scent on assortment variety perceptions and assortment satisfaction. Our findings showed that an ambient scent has no influence on consumers' memory, assortment perceptions, or product choice when consumers are exposed to a large assortment in a product category at the same time. This result was found for both people familiar and unfamiliar with the scent-congruent product category.

8.1 Introduction

Most consumer research on scents concentrates on their effect on either memory or store and product evaluations. Research has found that pleasant ambient scents improve not only consumers' affective and cognitive reactions but also their approach behavior toward the products and the store (e.g., Bosmans, 2006; Doucé & Janssens, 2013; Morrin & Ratneshwar, 2000; Spangenberg et al., 1996; Ward et al., 2007). Nevertheless, it is also important that the scent fits the target object (e.g. product, store, or image; Bone & Jantrania, 1992; Bosmans, 2006; Doucé et al., 2013; Fiore et al., 2000; Mitchell et al., 1995; Spangenberg et al., 2006). Research also showed that when a product is scented, memory of associated information is enhanced (e.g., Krishna et al., 2010; Lwin et al., 2010). However, concerning the effect of ambient scent on memory, results are mixed (e.g., Krishna et al., 2010; Mitchell et al., 1995; Morrin & Ratneshwar, 2003). Additionally, whether or not the (ambient) scent should be congruent with the product is not yet clear (e.g., Mitchell et al., 1995; Morrin & Ratneshwar, 2003).

In previous studies examining the effect of scent on memory, respondents were exposed to only one product (with extra product information) or saw various brands one after each other. The objective of this study is to explore the effect of an ambient scent on consumers' recall and assortment evaluations for scent-congruent and incongruent products when exposed to a large assortment of a product category at the same time. Specifically, we use an assortment of a particular product category displayed on a shelf, variety perceptions of that product category, satisfaction with the assortment, and product choice.

First, we look at ambient scent effects on consumers' memory. The accessibility of a brand name from memory has a large positive impact on consumer choice (Hoyer & Brown, 1990; Nedungadi, 1990). Brand recall is also one of the major strategic objectives of marketers of branded products (e.g., Aaker, 1996; Keller, 1993, 1998; Morrin, 1999). So marketing managers should know what variables influence memory and what they can do to enhance brand memory. Second, we expect that changes in attention and processing lead to changes in assortment variety perceptions, assortment satisfaction, and product choices. Variety is an important aspect of the assortment offered by a store. Besides location and price, consumers base their store choice on assortment variety (e.g., Arnold, Oum, & Tigert, 1983; Hoch, Bradlow, & Wansink, 1999; Pan & Zinkhan, 2006), making variety and the variables that influence variety important to study. Marketing managers could use the results of our study to gain insight into whether or not environmental fragrancing helps a customer remember a product or a brand and whether this influences customers' variety perceptions and satisfaction with the assortment.

8.2 Literature review

8.2.1 Memory

Some experimental research has already studied the effects of scent on memory. These studies focus either on product scent or on ambient scent. Product scents are either intrinsic or added to an object. An ambient scent is one "not emanating from a particular object but is present in the environment" (Spangenberg et al., 1996, p. 67). In most studies, respondents view the brands or products one after the other and aren't exposed to all the products at once.

Before reviewing the literature on product and ambient scent effects on memory, we explain why scents can act as strong memory cues.

Transfer of olfactory information

Neuroscientific research suggests a strong connection between olfactory processing and memory (Gerber & Menzel, 2000; Sanchez-Andrade, James, & Kendrick, 2005). Scent-encoded information may be remembered for longer because the memory consolidation process associated with olfactory processing occurs in multiple stages. Immediately after exposure, scents are processed by the limbic system of the brain, which is highly involved in memory (Cahill, Babinsky, Markowitsch, & McGaugh, 1995; Eichenbaum, 1996; Krishna, 2012).

Product scent effects on memory

Krishna et al. (2010) showed that consumers remembered more about a scented product (i.e., a pencil with a pine scent) compared to an unscented one, even two weeks after product exposure. They also found this effect was mediated by the number of scent-related thoughts participants had at the time of information retrieval. Moreover, their research showed that ambient scent had no effect on consumer memory for a particular product, because an ambient scent cannot make the product perceptually distinctive within its environment, like a product scent can.

Other research showed that a scent attached to a direct mailer insert increased recall for the information on the insert, but only after a two-week delay and not after five minutes (Lwin et al., 2010). This is because information encoded via

smell is long-lasting. Memory for scents is more accurate over time than memory for any other sensory input. Additionally, the effect of scent was more than two times larger than the effect of adding an extra picture.

Ambient scent effects on memory

With respect to the effect of an ambient scent on memory, findings are mixed. Morrin and Ratneshwar (2000) found that people in a scented environment rated brands (especially unfamiliar brands) more favorably, paid more attention to unfamiliar brands and exhibited higher recall of them (five minutes after exposure) than those in an unscented environment. There was no difference in respondents' affective state (i.e., pleasure and arousal) in the scented and the unscented environment. Improved recall for the unfamiliar brands was mediated by attention, or the amount of time spent evaluating the brands. In another study, Morrin and Ratneshwar (2003) showed that an ambient scent, whether congruent (i.e., geranium) or incongruent (i.e., cloves) with the product category (i.e., personal care), increased participants' attention to pictures of the brands and improved recall and recognition of both familiar and unfamiliar brands (after 24 hours). The improvement in memory only occurred when the scent was present during encoding rather than when it was present during retrieval. Again, there was no difference in pleasure and arousal levels between the scented and unscented environment.

Unlike Morrin and Ratneswhar (2003), Mitchell et al. (1995) found that congruence of the scent with the target product class did matter. In their study, respondents were instructed to buy an assortment of chocolates or flowers out

of a choice set of four items. Every item was described in six attributes. When respondents were in a room where a scent congruent with the product category (i.e., chocolate scent or flower scent) was present, they spent more time processing the information, looked more evenly at all the attributes rather than screening for a few salient characteristics, made more statements about the choice set not mentioned in the descriptions, spread their choices more evenly over the four alternatives, and sought more variety than respondents in the incongruent scent conditions. The semantic match between the scent and the product may result in a stronger memory link, and therefore lead to enhanced recall. Lwin and Morrin (2012) confirmed that a congruent ambient scent can lead to enhanced product memory by showing that an appropriate ambient scent diffused into a simulated movie theater while seeing a product advertisement improved recall of information about the advertised product after both a short (five minutes) and long (two weeks) time delay.

The study of Seo et al. (2010) is, to our knowledge, one of the only studies that looked at the effect of scent when different stimuli were presented all at the same time. In their study, the participants looked at photographs of one scent-congruent and three scent-incongruent products. Via eye tracking, they revealed that in the scent condition participants looked more frequently and longer at the congruent product than in the no-scent condition. So scent can increase attention toward a congruent visual product.

Concerning the effect of an ambient scent on product memory when exposed to several products at the same time, we expect that, since an odor increases attention toward the congruent objects:

H1: The presence of an ambient scent increases memory of the products congruent with the scent compared to when no scent is present. This effect is not expected for products incongruent with the scent.

8.2.2 Assortment perceptions and product choice

As mentioned above, ambient scents can draw attention to congruent products (Seo et al., 2010). Changes in attention and processing can also lead to changes in assortment evaluations and product choices. Numerous factors can influence perceived variety of an assortment (Broniarczyk, Hoyer, & McAlister, 1998; Kahn & Wansink, 2004; Oppewal & Koelemeijer, 2005). *Actual* variety (i.e., number of products in the assortment) has a substantial effect on it, but also other factors such as the availability of a favorite brand and the organization and symmetry of an assortment can have an influence. In this study, we work with a large assortment of products congruent with the ambient scent (i.e., large actual variety). If the presence of the ambient scent results in more attention paid to the congruent products, it is more likely the consumer notices the assortment is large. Therefore, we expect that:

H2: The presence of an ambient scent increases the variety perceptions of the assortment of products congruent with the scent compared to when no scent is present. This effect is not expected for an assortment of products incongruent with the scent.

Earlier research showed that a high actual variety leads to higher assortment satisfaction (e.g., Oppewal & Koelemeijer, 2005). However, although consumers prefer large assortments, they can also be confused by too many products,

making them less confident with their product choices (Chernev, 2003; Huffman & Kahn, 1998). A large assortment demands more cognitive processing (Boyd & Bahn, 2009). Customers have more alternatives to compare and this might result in information overload (Messner & Wänke, 2011). This information overload can be decreased by the presence of the ambient scent. The presence of the scent can trigger a shopping goal and influence product choice. When consumers perceive a scent, an automatic knowledge activation process may unconsciously begin (i.e., odor priming; Mitchell et al., 1995; Schifferstein & Blok, 2002). A scent can prime certain concepts to consumers and once these constructs are activated, they often lead to corresponding behaviors (Dijksterhuis et al., 2005). Or as Schifferstein and Blok (2002, p. 539) put it:

"When consumers smell bread, it not only gives them a pleasant experience (this smells good!), but it also announces the presence of bread and it communicates that the bread is fresh and probably still warm. These signals and the corresponding inferences increase consumers' appetite for bread, increase their willingness to buy bread and makes them think about whether they need to buy any other bakery products. Thus the smell of freshly baked bread can have consequences for the evaluation of the buying situation in general, the purchase probability of the focal product (bread) and the purchase probability of related products."

So because a scent can activate a shopping goal, it can simplify the processing of a large assortment, leading to more satisfaction. The consumers now have a clear shopping goal (e.g., buy a product congruent with the scent) and they compare each option to the desired goal, reducing information overload

(Huffman & Kahn, 1998; Morales, Kahn, McAlister, & Broniarczyk, 2005). This leads to the following hypotheses:

H3: The presence of an ambient scent increases the satisfaction with the assortment of products congruent with the scent compared to when no scent is present. This effect is not expected for the assortment of products incongruent with the scent.

H4: Diffusing an ambient scent increases the probability that a product congruent with the scent will be chosen and decrease the purchase probability of the incongruent product compared to the no-scent condition.

8.2.3 Moderating role of product category familiarity

The effect of an ambient scent on memory, assortment perceptions, and choice of a congruent product can also be influenced by the familiarity of the consumer with the congruent product category. Morrin and Ratneswhar (2000) already showed that the presence of an ambient scent enhanced recall of unfamiliar brands (but not of familiar brands) compared to the absence of an ambient scent. If a category is very familiar, consumers have extensive knowledge of the existing alternatives, encode information about new alternatives more efficiently, and pay more attention to relevant information while ignoring unimportant information (Johnson & Russo, 1984). These advantages lead to less information overload and an easier choice (Chernev, 2003; Mogilner, Rudnick, & Iyengar, 2008). Because such existing knowledge is well established in their memories, we expect that such a subtle cue as an ambient scent will

have little effect. Moreover, based on the proactive interference theory, a negative effect of an ambient scent on the memory of consumers highly familiar with the congruent product category is possible. Proactive interference occurs when previously learned information interferes with the recall of newly learned information (e.g., Jonides & Nee, 2006; May, Hasher, & Kane, 1999; Still, 1969). For example, respondents who were asked to learn multiple lists of items recalled fewer items of the last list learnt than respondents who only had to learn one list of items (Greenberg & Underwood, 1950). Research showed that proactive interference also leads to poorer list discrimination, meaning that respondents made more mistakes when asked whether an item was previously seen (Postman & Keppel, 1977). So people who are familiar with the mint candy assortment have more knowledge about mint candy and when this previously learned knowledge is activated through the presence of the mint scent, it can interfere with the memory of the recently shown candy assortment. On the other hand, consumers who are not familiar with a product category have limited knowledge about the product category, leading them to rely more on information in the choice environment (Bettman, Luce, & Payne, 1998).

Therefore, we expect:

H5: The presence of an ambient scent has only a positive effect on memory, assortment perceptions and product choice of the product congruent with the scent for people who are not familiar with the product category congruent with the scent.

To test these hypotheses, two experiments were conducted. In the first experiment, we work with a mint scent and mint candy is the congruent product category. In the second experiment, we work with two fruit scents (i.e., black cherry and lemon-tangerine). Candy remains the target product category. In both experiments, we chose to work with a large assortment.

8.3 Study 1

In Study 1, we assess the effect of an ambient mint scent on the memory for assortment perceptions of and product choice from a candy assortment containing both products congruent (i.e., mint candy) and incongruent with the ambient scent (i.e., fruit candy). Additionally, the moderating role of familiarity with mint candy is studied.

8.3.1 Design and independent variables

Ambient scent was a between-subjects factor with two levels: no ambient scent and mint scent. A pretest was conducted among 23 respondents to determine the fit between the mint scent and different product categories (i.e., potato chips, cookies, candy, chocolate cookies, fruit cookies, mint candy, and fruit candy). The mint scent was put on a cotton-tipped stick in a dark glass bottle. Respondents rated to what extent the scent fit the product categories on a 7-point scale ranging from 1 = not at all to 7 = totally. Results showed the mint scent only fit mint candy (M = 6.65, SD = .57), with a significant difference from the scale midpoint of 4 ($t(22) = 22.21$, $p < .001$).

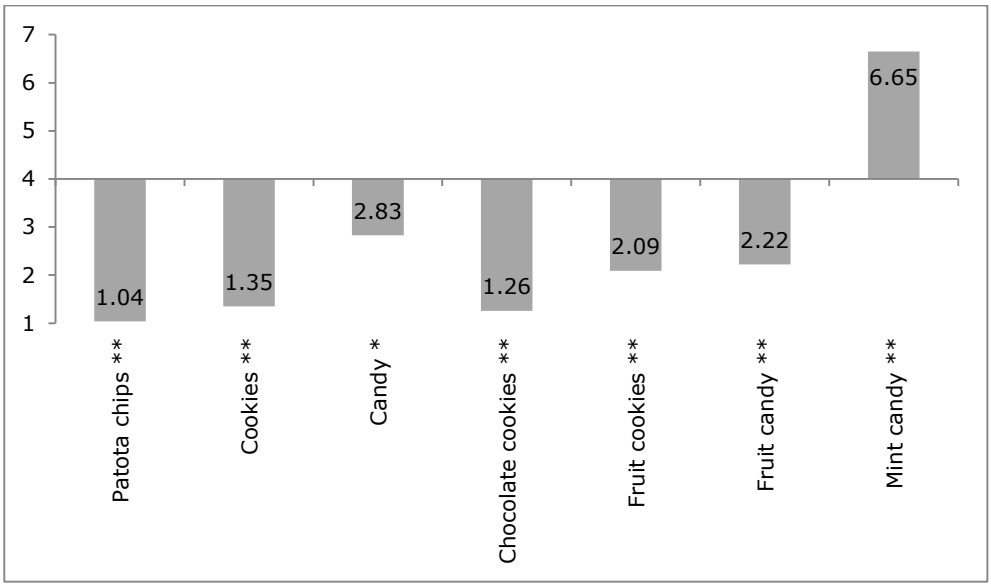

Figure 8.1. Pretest fit between mint scent and different product categories (7-point scale).

** Scent is significantly different from the scale midpoint of 4 at $p < .001$

* Scent is significantly different from the scale midpoint of 4 at $p = .01$

A second pretest attempted to determine the optimal intensity level of the scent. The ambient scent should not be too salient because if people think that the ambient scent is responsible for their responses, they may correct their behavior (Bosmans, 2006). Before the experiment, the mint scent was dispersed in a room similar to the one used in the main experiment. An Aerostreamer1000 fragrance appliance diffused it by heating the liquid scent on a metal plate and subsequently the evaporated scent is distributed by a fan. Fifteen respondents conducted a filler task in the room and when leaving the room they replied to two questions: "Did you notice something special in the room?" and "Now that we have mentioned the presence of a scent, do you detect the scent?" (Doucé &

Janssens, 2013). The intensity of the scent was lowered until respondents answered negatively to the first question and positively to the second. In the main study, the intensity of the fragrance appliance was set on the lowest level and the scent was diffused for 3 minutes and 30 seconds before respondents entered the room. The room was not ventilated until the end of the test.

The moderator product category familiarity was measured in three different ways, corresponding to the three components of the ABC model of attitudes: affect, behavior, and cognition (Solomon, Bamossy, Askegaard, & Hogg, 2006). The affective component was measured by the item "To what extent do you like mint candy?" on a 7-point scale, ranging from 1 = not at all to 7 = totally. The behavioral component was assessed by the item "How often do you buy mint candy?" on a 5-point scale, ranging from 1 = never to 5 = daily. The cognitive component was measured by the item "To what extent do you consider yourself knowledgeable about the assortment of mint candy?" on a 7-point scale, ranging from 1 = not at all to 7 = totally (Oliver & Bearden, 1985). The three items are used separately in further analysis.

8.3.2 Participants, procedure, and dependent variables

Participants were 68 students aged between 19 and 23 who participated in the study in exchange for course credit. Thirty-three students (15 men and 18 women) were randomly assigned to the room without an ambient scent and 34 students (17 men and 17 women) were randomly assigned to the room where the mint scent was present. The data of one participant were left out the

analyses because he did not fill in the questionnaire assessing the moderating variable.

Participants saw large assortments of three different product categories (i.e., candy, potato chips, and cookies). The target category was candy. The other two categories were used as filler stimuli. The candy assortment consisted of 46 items: 18 pieces of mint candy and 28 pieces of fruit candy. This ratio was based on the existing range of candy in the supermarket. Stimuli were presented in a booklet format. Each product category was shown on a shelf on a separate page and several attributes (i.e., brand name and flavor) were visible (see Figure 8.2 for the candy assortment). Participants were asked to choose one product from the candy assortment. Afterwards, we categorized their product choice as either mint or fruit candy. After choosing a product, perceived variety was measured for the mint candy assortment, the fruit candy assortment and the total candy assortment using two items (based on Mogilner et al., 2008): "How much variety do you think there is in the (total) assortment of (mint/fruit) candy?" (7-point scale ranging from 1 = very little variety to 7 = a lot of variety) and "How much choice do you feel you were offered in terms of (mint/fruit) candy?" (7-point scale ranging from 1 = very little choice to 7 = a lot of choice). Afterwards, a summated scale (mean of items; for mint candy: α = .73, for fruit candy: α = .70) was calculated and used in further analysis. Satisfaction with the mint candy assortment, the fruit candy assortment, and the total assortment was assessed with the item: "How satisfied are you with the assortment (mint/fruit) candy?" using a 7-point scale ranging from 1 = not at all tot 7 = totally (based on Hoch et al., 1999). Product choice, perceived variety

and assortment satisfaction were also measured for the filler stimuli to cover up the fact that candy was the target category of the study. Next, the participants were instructed to go to another room. This room had no added scent. There they were asked to recall as many products of the candy assortment as possible (about 15 minutes after exposure to the candy assortment). Recall was measured by the amount of mint or fruit candy (i.e., brand name and taste/description) correctly recalled. Then the participants conducted a recognition task. Participants were shown 57 pieces of candy, that is, 46 pieces they had seen in the candy assortment and 11 they had not seen before. Recognition was assessed by the number of correct recognitions (theoretical range of 0 to 23 for mint candy and 0 to 34 for fruit candy). After the recognition task, participants were given an A4 sheet representing an empty shelf and magnets of every piece of candy they had seen in the assortment. They were asked to put every piece of candy back at their original spot on the shelf. Participants' mental map of the shelf was measured both quantitatively and qualitatively. The quantitative measure consisted of the sum of the Euclidean distance of the position the respondent put every piece of candy from the actual position. The smaller the distance, the better the mental map of the shelf. With respect to the qualitative measure, three independent researchers indicated on a 10-point scale the extent to which they found the shelf to resemble the original. An interrater reliability analysis revealed an intraclass correlation coefficient of .87, indicating a very good agreement. The mean of the ratings of the three researchers was calculated and used in further analysis. Finally, participants filled in a survey containing the moderator product category familiarity and some basic demographics.

Figure 8.2. Assortment of candy, Study 1.

8.3.3 Results

Influence of ambient scent on memory, assortment perceptions, and choice

Independent sample t-tests were conducted to test hypotheses 1 to 3. The presence of an ambient mint scent had no influence on consumers' memory or assortment perceptions (all p > .10; see Table 8.1). Concerning product choice, a test of independence showed no association between the presence of the mint scent and product choice ($\chi^2(1) < .001$, $p = .98$). Only two respondents chose a mint candy: one in the control condition and one in the mint scent condition. These results do not support H1 to H4.

Table 8.1. Effect of ambient mint scent on memory and assortment perceptions

Dependent measures	*M(SD)*		*t*-value	*p*-value
	No scent (n=33)	Scent (n=34)		
Recall[1]				
Mint candy	1.36 (1.08)	1.60 (.91)	-.98	.33
Fruit candy	4.11 (1.35)	4.15 (1.56)	-.12	.91
Recognition[2]				
Mint candy	11.36 (2.77)	10.88 (3.10)	.67	.51
Fruit candy	21.33 (3.85)	21.15 (3.72)	.20	.84

[1] The amount of mint or fruit candy correctly recalled (range of 0 to 18 for mint candy and 0 to 28 for fruit candy).

[2] The number of correct recognitions (range of 0 to 23 for mint candy and 0 to 34 for fruit candy).

Table 8.1. Effect of ambient mint scent on memory and assortment perceptions (continued)

Dependent measures	*M(SD)*		*t-value*	*p-value*
	No scent (n=33)	Scent (n=34)		
Mental map of shelf (Quantitative)[3]				
Mint candy	159.11 (39.88)	149.82 (54.66)	.79	.43
Fruit candy	212.97 (50.77)	217.64 (70.80)	-.31	.76
Mental map of shelf (Qualitative)[4]				
Candy assortment	2.80 (2.10)	3.07 (2.10)	-.53	.60
Perceived variety[5]				
Mint candy	4.68 (1.10)	4.60 (.89)	.33	.75
Fruit candy	5.66 (.96)	5.71 (.68)	-.24	.81
Assortment satisfaction[6]				
Mint candy	5.27 (1.07)	5.09 (1.13)	.80	.43
Fruit candy	5.94 (.97)	6.09 (.83)	-.68	.50

[3] The sum of the Euclidean distance of the position the respondent put every piece of candy from the actual position (in centimeter). How smaller the distance, the better the mental map of the shelf.

[4] The extent in which the shelf resembles the original on a 10-point scale.

[5] Measured on a 7-point scale.

[6] Measured on a 7-point scale.

Moderating role of product category familiarity

The moderating role of product category familiarity was tested using a moderated regression analysis with mint scent (categorical variable, 0/1 coded), one of the measurements of familiarity with the assortment of mint candy (i.e.,

affective [like], cognitive [knowledge] or behavioral [buying frequency] measurement; all continuous variables, mean-corrected), and the interaction term of these two variables as independent variables (Cronbach, 1987; Irwin & McClelland, 2001; McClelland, 1997).

When liking mint candy was added to the analysis, we only found a significant simple effect of liking mint candy on recognition of mint candy (p = .001; see Table 8.2). When adding knowledge of the mint candy assortment to the analysis, a significant simple effect of knowledge of mint candy was found for recognition (p = .008) and perceived variety of mint candy assortment (p = .03; see Table 8.3). When buying frequency of mint candy was added to the analysis, a significant simple effect of buying frequency of mint candy was found for recall (p = .048), recognition (p = .03), and perceived variety of mint candy assortment (p = .01; see Table 8.4). We also found a marginally significant interaction effect for perceived variety of the mint candy assortment (p = .099).

Table 8.2. Summaries of moderated regression analyses (Liking mint candy)

Dependent variables	Model		Scent		Liking mint candy		Scent x liking mint candy	
	F(3, 63)	*p*	*t*	*p*	*t*	*p*	*t*	*p*
Recall mint candy	1.68	.18	.95	.35	1.56	.12	-.04	.97
Recognition mint candy	5.64	.002	-.83	.41	3.56	.001	-.84	.41
Mental map of mint candy shelf (Quantitative)	1.06	.37	-.76	.45	-1.35	.18	.22	.83
Perceived variety mint candy	.59	.63	-.35	.73	1.10	.28	-.20	.84
Assortment satisfaction mint candy	1.66	.18	-.86	.39	1.45	.15	.20	.84

Note Scent variable was coded as 0-1.

Table 8.3. Summaries of moderated regression analyses (Knowledge of mint candy assortment)

Dependent variables	Model		Scent		Knowledge mint candy		Scent x knowledge mint candy	
	F(3, 63)	*p*	*t*	*p*	*t*	*p*	*t*	*p*
Recall mint candy	1.87	.14	.98	.33	1.30	.19	.30	.77
Recognition mint candy	2.87	.04	-.72	.47	2.75	.008	-1.41	.16
Mental map of mint candy shelf (Quantitative)	.40	.76	-.78	.44	-.16	.88	-.42	.68
Perceived variety mint candy	1.95	.13	-.35	.73	2.24	.03	-.98	.33
Assortment satisfaction mint candy	2.08	.11	-.84	.40	1.53	.13	.20	.85

Note Scent variable was coded as 0-1.

Table 8.4. Summaries of moderated regression analyses (Buying frequency mint candy)

Dependent variables	Model		Scent		Buying mint candy		Scent x buying mint candy	
	F(3, 63)	*p*	*t*	*p*	*t*	*p*	*t*	*p*
Recall mint candy	2.55	.06	.86	.40	2.01	.048	-.40	.69
Recognition mint candy	2.44	.07	-.85	.40	2.29	.03	-.82	.41
Mental map of mint candy shelf (Quantitative)	.70	.56	-.72	.48	-1.12	.27	.51	.61
Perceived variety mint candy	2.32	.08	-.47	.64	2.59	.01	-1.68	.099
Assortment satisfaction mint candy	1.30	.28	-.91	.37	1.65	.11	-.71	.48

Note Scent variable was coded as 0-1.

In line with H5, we specifically want to know whether mint scent has an effect at a specific level of product familiarity. The standard interaction effect is not relevant to test this hypothesis. Therefore, the effect of an ambient mint scent was studied for both people who are not familiar with the mint candy assortment (i.e., one standard deviation below the mean) and familiar with the mint candy assortment (i.e., one standard deviation above the mean). However, the ambient mint scent had no effect on either group (all $p > .10$); hence, we found no support for H5. Results are shown in Tables 8.5 to 8.7.

Table 8.5. Moderating role of liking mint candy on the effect of ambient scent on memory and assortment perceptions

	Not liking mint candy (*one standard deviation below the mean*)				Liking mint candy (*one standard deviation above the mean*)			
	M		*t*-value	*p*-value	*M*		*t*-value	*p*-value
Dependent measures	No scent	Scent			No scent	Scent		
Recall mint candy	1.12	1.35	.69	.49	1.62	1.84	.64	.53
Recognition mint candy	9.87	9.87	.02	.98	12.93	11.84	1.18	.24
Mental map of mint candy shelf (Quantitative)	169.76	157.76	.69	.49	148.51	142.22	.38	.71
Perceived variety mint candy	4.51	4.47	.10	.92	4.86	4.72	.39	.70
Assortment satisfaction mint candy	5.03	4.74	.74	.46	5.53	5.35	.46	.65

Table 8.6. Moderating role of knowledge of mint candy assortment on the effect of ambient scent on memory and assortment perceptions

	Little knowledge of mint candy (*one standard deviation below the mean*)				A lot of knowledge of mint candy (*one standard deviation above the mean*)			
	M		*t*-value	*p*-value	*M*		*t*-value	*p*-value
Dependent measures	No scent	Scent			No scent	Scent		
Recall mint candy	1.14	1.31	.48	.63	1.59	1.89	.90	.37
Recognition mint candy	10.03	10.51	.49	.63	12.72	11.25	1.51	.14
Mental map of mint candy shelf (Quantitative)	160.43	156.15	.25	.80	157.77	143.60	.84	.40
Perceived variety mint candy	4.31	4.46	.44	.66	5.06	4.75	.94	.35
Assortment satisfaction mint candy	4.99	4.72	.73	.47	5.56	5.39	.45	.65

Table 8.7. Moderating role of buying frequency of mint candy on the effect of ambient scent on memory and assortment perceptions

Dependent measures	Seldom buying mint candy (*one standard deviation below the mean*)				Frequently buying mint candy (*one standard deviation above the mean*)			
	M		*t*-value	*p*-value	*M*		*t*-value	*p*-value
	No scent	Scent			No scent	Scent		
Recall mint candy	1.03	1.33	.89	.38	1.74	1.85	.32	.75
Recognition mint candy	10.25	10.24	.01	.99	12.62	11.45	1.18	.24
Mental map of mint candy shelf (Quantitative)	168.37	153.77	.87	.39	148.65	146.30	.14	.89
Perceived variety mint candy	4.26	4.54	.87	.39	5.16	4.65	1.52	.13
Assortment satisfaction mint candy	4.97	4.92	.14	.89	5.62	5.19	1.14	.26

8.3.4 Discussion

The ambient mint scent did not influence consumers' memory, assortment perceptions, or product choice. These results do not support H1 to H4. Moreover, there was no difference in the effect of ambient scent between consumers who were not familiar with the product category congruent with the scent and consumers who were. This result does not support H5. However, we noticed that consumers in general did not choose mint candy. Only two respondents (one in every scent condition) selected mint candy when asked to buy one piece of candy. This indicates that consumers prefer fruit candy over mint candy, which might explain why we found no effects of mint scent. Therefore, we examined the effect of two fruit scents on consumers' memory, assortment perceptions, and product choice in study 2.

8.4 Study 2

In study 2, we assessed the effect of the presence of an ambient red fruit scent (i.e., black cherry) and an ambient citrus fruit scent (i.e., lemon-tangerine) on the memory for assortment perceptions and product choice from a candy assortment containing both products congruent with the ambient scents (respectively red fruit candy or citrus fruit candy) and incongruent with the ambient scent (respectively citrus fruit candy or red fruit candy and mint candy). Again, the moderating role of familiarity with the candy assortment congruent with the scent is studied.

8.4.1 Design and independent variables

Ambient scent was a between-subjects factor with three levels: no ambient scent, red fruit scent (i.e., black cherry), and citrus fruit scent (i.e., lemon-tangerine). As in Study 1, a pretest determined the intensity level of each scent. About 10 respondents answered two questions: "Did you notice something special in the room?" and "Now that we have mentioned the presence of a scent, do you detect the scent?" (Doucé & Janssens, 2013). The intensity of the scents was lowered until the respondents answered negatively to the first question and positively to the second. In the main study, the intensity of the fragrance appliance was set on the lowest level and the red fruit scent was diffused for 2 minutes and the citrus fruit scent was diffused for 2 minutes and 45 seconds before the respondents entered the room. The rooms were not ventilated until the end of the test.

As in Study 1, the moderators familiarity with respectively red fruit candy and citrus fruit candy were assessed in three different ways, corresponding to the three components of the ABC model of attitudes (Solomon et al., 2006): affect (liking candy), behavior (buying frequency of candy) and cognition (knowledge of candy assortment). The same measures as in Study 1 were applied to red fruit candy and citrus fruit candy, expect for the cognitive component, which now was measured by four 7-point items ("To what extent do you consider yourself knowledgeable about the assortment of red fruit (citrus fruit) candy?"; "To what extent do you consider yourself to be an expert about the assortment of red fruit (citrus fruit) candy?"; "To what extent can you recall all existing brands of red fruit (citrus fruit) candy from memory?"; "To what extent can you

recognize all existing brands of red fruit (citrus fruit) candy?", based on the consumer expertise scale of Kleiser & Mantel, 1994). A summated scale (mean of the four items) was calculated for knowledge of the red fruit candy assortment and for knowledge of the citrus fruit candy assortment. These scales showed good reliability (i.e., red fruit candy: α = .83; citrus fruit candy: α = .82) and were used in further analysis.

8.4.2 Participants, procedure and dependent variables

Participants were 150 students aged between 18 and 22 years old who received course credit for participation. The data of six participants were discarded because they left most of the questions unanswered. There were 47 participants (26 men and 21 women) in the no-scent condition, 48 (28 men and 20 women) in the red fruit scent condition, and 49 (28 men and 21 women) in the citrus fruit scent condition.

The procedure was the same as in Study 1. Participants saw a large candy assortment of 46 items: 13 pieces of red fruit candy, 13 pieces of citrus fruit candy, 6 pieces of mixed candy, and 14 pieces of mint candy (see Figure 8.3). Participants were asked to choose five pieces of candy. After choosing the candy, we measured perceived variety and assortment satisfaction for the red fruit candy assortment, the citrus fruit candy assortment, the mint candy assortment and the total candy assortment with the same measures as in Study 1. Next, participants went to another room with no scent diffused. Here, they first conducted a filler task (a puzzle). Next, we measured recall and recognition as in Study 1. Participants were shown 72 pieces of candy (i.e., 46 they had

seen in the candy assortment and 26 they had not seen before). The amount of correct recognitions for the red fruit candy could range from 0 to 22, for citrus fruit candy from 0 to 16, and for the mint candy from 0 to 22. Participants' mental map of the shelf was not measured in Study 2 because no effects of ambient scent on this dependent variable were found in Study 1. Finally, participants filled in a survey concerning moderators of product category familiarity and basic demographics.

Figure 8.3. Assortment of candy, Study 2.

8.4.3 Results

Influence of ambient scent on memory, assortment perceptions, and choice

A series of one-way ANOVAs tested the influence of an ambient scent on memory and assortment perceptions (i.e., H1 to H3). Results are provided in Table 8.8. No significant effect was found on consumers' memory or assortment perceptions of congruent or incongruent products (all $p > .10$). Neither a red fruit scent nor a citrus fruit scent had an influence on consumers' memory or assortment perceptions (LSD post hoc tests for scent-product congruent comparisons and Bonferroni post hoc tests for scent-product incongruent comparisons: all $p > .10$). Hence, we found no support for H1 to H3.

Table 8.8. Effect of ambient scent on memory and assortment perceptions

Dependent measures	*F*	*p*	*M (SD)*		
			No scent (n=47)	Red fruit scent (n=48)	Citrus fruit scent (n = 49)
Recall[1]					
Red fruit candy	.15	.86	2.44 (1.52)	2.33 (1.39)	2.29 (1.54)
Citrus fruit candy	1.03	.36	1.99 (1.52)	1.96 (1.22)	1.62 (1.51)
Mint candy	.27	.76	1.74 (1.13)	1.70 (1.25)	1.86 (1.02)

Note LSD post hoc tests showed no significant effect of an ambient scent congruent with the product on memory and assortment perceptions. Bonferroni post hoc tests showed no significant effect of an ambient scent incongruent with the product on memory and assortment perceptions.

[1] The amount of candy correctly recalled (range of 0 to 13 for red fruit candy as well as for citrus fruit candy and 0 to 14 for mint candy).

Table 8.8. Effect of ambient scent on memory and assortment perceptions (continued)

Dependent measures	*F*	*p*	*M (SD)*		
			No scent (n=47)	Red fruit scent (n=48)	Citrus fruit scent (n = 49)
Recognition[2]					
Red fruit candy	.71	.49	17.13	17.54	17.00
			(2.56)	(2.22)	(2.21)
Citrus fruit candy	1.71	.18	10.53	11.40	10.84
			(2.58)	(2.17)	(2.16)
Mint candy	.07	.94	12.96	13.06	12.88
			(2.77)	(2.43)	(2.40)
Perceived variety[3]					
Red fruit candy	.64	.53	4.73	4.86	4.64
			(.94)	(.86)	(1.09)
Citrus fruit candy	.96	.39	3.97	4.29	4.13
			(1.03)	(1.25)	(1.12)
Mint candy	.01	.99	5.23	5.21	5.21
			(1.24)	(1.26)	(1.20)
Assortment satisfaction[4]					
Red fruit candy	1.93	.15	5.53	5.33	5.14
			(1.00)	(.93)	(.98)
Citrus fruit candy	2.25	.11	4.40	4.90	4.76
			(1.15)	(1.29)	(1.03)
Mint candy	1.58	.21	4.77	5.17	5.18
			(1.39)	(1.26)	(1.24)
Product choice[5]					
Red fruit candy	.10	.90	2.36	2.44	2.35
			(1.03)	(1.07)	(1.07)
Citrus fruit candy	.16	.85	.40	.48	.49
			(.71)	(.90)	(.79)

Note LSD post hoc tests showed no significant effect of an ambient scent congruent with the product on memory and assortment perceptions. Bonferroni post hoc tests showed no significant effect of an ambient scent incongruent with the product on memory and assortment perceptions.

[2] The number of correct recognitions (range of 0 to 22 for red fruit candy, 0 to 16 for the citrus fruit candy , and 0 to 22 for mint candy).

[3] Measured on a 7-point scale.

[4] Measured on a 7-point scale.

[5] The amount of chosen candy pieces (range of 0 to 5 for both red fruit and citrus fruit candy).

Concerning product choice, one-way ANOVAs showed no significant effect of ambient scent on the amount of chosen red fruit candy pieces ($F(2,141) = .10$, $p = .90$) and the amount of chosen citrus fruit candy pieces ($F(2,141) = .16$, $p = .85$). For the amount of chosen mint candy pieces, a Kruskal-Wallis test was conducted because Levene's test showed variances in the groups were significantly different ($p = .003$) and an exploration of the data made clear that many respondents chose either zero or one piece of mint candy and an extreme outlier chose four pieces of mint candy. The Kruskal-Wallis test showed a significant association between the presence of an ambient scent and the amount of chosen mint candy pieces ($H(2) = 6.08$, $p = .048$), with a mean rank of 78.74 for the no-scent condition, 74.08 for the red fruit scent condition, and 67.90 fort the citrus fruit condition. Mann-Whitney tests were used to follow up this finding. A Bonferroni correction was applied and all effects are reported at a .025 level of significance. Mint candy was chosen less when respondents were in a room with a citrus fruit scent (mean rank = 44.94) than in no-scent condition (mean rank = 52.21, $U = 977$, $p = .02$). Mint candy was also chosen less when respondents were in a room with a red fruit scent (Mean rank = 45.52) than no-scent condition (mean rank = 50.53), however, this difference did not reach significance, $U = 1009$, $p = .14$. These findings partially support H4: the purchase probability of a product decreased due to the presence of an incongruent ambient scent.

Moderating role of familiarity with the red fruit candy assortment

The moderating role of familiarity with the red fruit candy assortment on consumers' responses to the scent-congruent product was tested by a

moderated regression analysis with red and citrus fruit scent both dummy-coded (categorical variables, 0/1), one of the measurements of familiarity with the assortment of red fruit candy (i.e., affective [like], cognitive [knowledge] or behavioral [buying frequency] measurement; all continuous variables, mean-corrected), and the interaction terms of the two scent dummy variables with the measurement of familiarity with the red fruit candy assortment as independent variables (Cronbach, 1987; Irwin & McClelland, 2001; McClelland, 1997).

As outlined in Tables 8.9, 8.10, and 8.11, when one of the measurements of familiarity with the assortment of red fruit candy was added to the analysis, we found in most cases a significant simple effect of familiarity with the red fruit candy assortment. Additionally, there was no simple effect of the presence of a red fruit scent and only one marginally significant interaction effect between the presence of a red fruit scent and knowledge of the red fruit candy assortment on recognizing red fruit candy (p = .08).

Table 8.9. Summaries of moderated regression analyses (Liking red fruit candy)

Dependent variables	Model		Red fruit scent		Citrus fruit scent		Liking red fruit candy		Red fruit scent x liking red fruit candy		Citrus fruit scent x liking red fruit candy	
	F(5, 138)	*p*	*t*	*p*	*t*	*p*	*t*	*p*	*t*	*p*	*t*	*p*
Recall red fruit candy	1.71	.14	-1.02	.31	-.76	.45	1.78	.08	.75	.45	-.45	.65
Recognition red fruit candy	1.02	.41	.40	.69	-.43	.67	1.27	.21	.49	.63	-1.16	.25
Perceived variety red fruit candy	4.54	.001	.20	.85	-.74	.46	2.09	.04	-.23	.82	1.50	.14
Assortment satisfaction red fruit candy	5.52	< .001	-1.54	.13	-2.32	.02	1.95	.05	.01	.99	1.78	.08

Note Red and citrus fruit scent were both dummy coded (0/1).

Table 8.10. Summaries of moderated regression analyses (Knowledge of red fruit candy assortment)

Dependent variables	Model		Red fruit scent		Citrus fruit scent		Knowledge red fruit candy		Red fruit scent x knowledge red fruit candy		Citrus fruit scent x knowledge red fruit candy	
	F(5, 138)	*p*	*t*	*p*	*t*	*p*	*t*	*p*	*t*	*p*	*t*	*p*
Recall red fruit candy	2.75	.02	-.80	.43	-.91	.36	3.44	.001	-1.63	.11	-4.79	.08
Recognition red fruit candy	1.10	.36	.73	.47	-.46	.65	1.88	.06	-1.78	.08	-1.33	.19
Perceived variety red fruit candy	7.47	< .001	.19	.85	-.94	.35	3.06	.003	.24	.81	.74	.46
Assortment satisfaction red fruit candy	4.32	.001	-1.43	.16	-2.41	.02	2.82	.005	-.75	.45	-.14	.89

Note Red and citrus fruit scent were both dummy coded (0/1).

Table 8.11. Summaries of moderated regression analyses (Buying frequency red fruit candy)

Dependent variables	Model		Red fruit scent		Citrus fruit scent		Buying red fruit candy		Red fruit scent x buying red fruit candy		Citrus fruit scent x buying red fruit candy	
	F(5, 138)	*p*	*t*	*p*	*t*	*p*	*t*	*p*	*t*	*p*	*t*	*p*
Recall red fruit candy	3.92	.002	-.66	.51	-.39	.70	3.22	.002	-.78	.44	-.74	.46
Recognition red fruit candy	1.19	.32	.93	.35	-.13	.90	1.00	.32	-1.19	.24	.50	.62
Perceived variety red fruit candy	5.86	< .001	.31	.76	-.21	.83	2.12	.04	.97	.34	.93	.35
Assortment satisfaction red fruit candy	4.52	.001	-1.34	.18	-1.79	.08	1.33	.19	.88	.38	1.30	.20

Note Red and citrus fruit scent were both dummy coded (0/1).

As indicated by H5, we are specifically interested in whether there is a scent effect at a specific level of product familiarity. Therefore, the effect of an ambient red fruit scent was studied both for people who were not familiar with the red fruit candy assortment (i.e., one standard deviation below the mean) and for people who were (one standard deviation above the mean). Results can be found in Tables 8.12 to 8.14. Overall, the ambient red fruit scent had no effect on memory and assortment perceptions of either group (all $p > .10$, two exceptions). Two ambient scent effects were marginally significant. People with little knowledge of red fruit candy were better at recognizing red fruit candy they had seen before when there was a red fruit scent ($M = 17.85$) than when there was no scent ($M = 16.60$, $p = .08$). In contrast, people with a lot of knowledge of red fruit candy were better at recalling red fruit candy they had seen before when there was no scent ($M = 3.24$) than when there was a red fruit scent ($M = 2.50$, $p = .09$).

Overall, these findings do not support H5.

Table 8.12. Moderating role of liking red fruit candy on the effect of ambient red fruit scent on memory and assortment perceptions

	Not liking red fruit candy (*one standard deviation below the mean*)				Liking red fruit candy (*one standard deviation above the mean*)			
	M		*t*-value	*p*-value	*M*		*t*-value	*p*-value
Dependent measures	No scent	Red fruit scent			No scent	Red fruit scent		
Recall red fruit candy	2.18	1.61	1.18	.24	2.85	2.79	.12	.91
Recognition red fruit candy	16.83	16.75	.10	.92	17.58	18.05	.67	.51
Perceived variety red fruit candy	4.54	4.63	.29	.78	5.03	5.02	.05	.96
Assortment satisfaction red fruit candy	5.36	5.06	.98	.33	5.80	5.51	1.07	.29

Table 8.13. Moderating role of knowledge of red fruit candy assortment on the effect of ambient red fruit scent on memory and assortment perceptions

	Little knowledge of red fruit candy (*one standard deviation below the mean*)				A lot of knowledge of red fruit candy (*one standard deviation above the mean*)			
	M		*t*-value	*p*-value	*M*		*t*-value	*p*-value
Dependent measures	No scent	Red fruit scent			No scent	Red fruit scent		
Recall red fruit candy	1.85	2.12	.63	.53	3.24	2.50	1.73	.09
Recognition red fruit candy	16.60	17.85	1.79	.08	17.83	17.29	.77	.44
Perceived variety red fruit candy	4.41	4.40	.04	.97	5.16	5.25	.30	.76
Assortment satisfaction red fruit candy	5.22	5.10	.45	.66	5.95	5.53	1.53	.13

Table 8.14. Moderating role of buying frequency of red fruit candy on the effect of ambient red fruit scent on memory and assortment perceptions

	Seldom buying red fruit candy (*one standard deviation below the mean*)				Frequently buying red fruit candy (*one standard deviation above the mean*)			
	M		*t*-value	*p*-value	*M*		*t*-value	*p*-value
Dependent measures	No scent	Red fruit scent			No scent	Red fruit scent		
Recall red fruit candy	1.80	1.84	.09	.93	3.11	2.69	1.06	.29
Recognition red fruit candy	16.80	17.83	1.45	.15	17.47	17.33	.21	.84
Perceived variety red fruit candy	4.47	4.34	.46	.65	5.01	5.25	.94	.35
Assortment satisfaction red fruit candy	5.36	4.93	1.51	.13	5.71	5.63	.32	.75

Moderating role of familiarity with the citrus fruit candy assortment

The moderating role of familiarity with the citrus fruit candy assortment on consumers' responses toward the scent-congruent product was tested using a moderated regression analysis with red and citrus fruit scent both dummy coded (categorical variables, 0/1), one of the measurements of familiarity with the assortment of citrus fruit candy (i.e., affective [like], cognitive [knowledge] or behavioral [buying frequency] measurement; all continuous variables, mean-corrected), and the interaction terms of the two scent dummy variables with the measurement of familiarity with the scent fruit candy assortment as independent variables (Cronbach, 1987; Irwin & McClelland, 2001; McClelland, 1997).

As outlined in Tables 8.15, 8.16, and 8.17, when one of the measurements of familiarity with the assortment of citrus fruit candy was added to the analysis, we found no significant simple effect of the presence of a citrus fruit scent, only one significant simple effect of familiarity with the citrus fruit candy assortment (i.e., knowledge of citrus fruit candy assortment on recall of citrus fruit candy; $p = .03$), and two significant interaction effects between the presence of a citrus fruit scent and familiarity with the citrus fruit candy assortment (i.e., knowledge of citrus fruit candy assortment: $p = .08$; buying frequency of citrus fruit candy: $p = .04$) on perceived variety of the citrus fruit candy assortment.

Table 8.15. Summaries of moderated regression analyses (Liking citrus fruit candy)

Dependent variables	Model		Red fruit scent		Citrus fruit scent		Liking citrus fruit candy		Red fruit scent x liking citrus fruit candy		Citrus fruit scent x liking citrus fruit candy	
	F(5, 138)	*p*	*t*	*p*	*t*	*p*	*t*	*p*	*t*	*p*	*t*	*p*
Recall citrus fruit candy	3.38	.007	-.06	.95	-1.53	.13	.75	.45	.72	.48	1.57	.12
Recognition citrus fruit candy	2.88	.02	1.89	.06	.50	.62	1.65	.10	-.01	.99	.22	.83
Perceived variety citrus fruit candy	2.42	.04	1.45	.15	.57	.57	1.01	.31	.54	.59	.77	.44
Assortment satisfaction citrus fruit candy	2.02	.08	2.08	.04	1.36	.18	.93	.35	.01	.99	.54	.59

Note Red and citrus fruit scent were both dummy coded (0/1).

Table 8.16. Summaries of moderated regression analyses (Knowledge of citrus fruit candy assortment)

Dependent variables	Model		Red fruit scent		Citrus fruit scent		Knowledge citrus fruit candy		Red fruit scent x knowledge citrus fruit candy		Citrus fruit scent x knowledge citrus fruit candy	
	F(5, 138)	*p*	*t*	*p*	*t*	*p*	*t*	*p*	*t*	*p*	*t*	*p*
Recall citrus fruit candy	3.35	.007	-.29	.77	-1.62	.11	2.22	.03	-.75	.46	.04	.97
Recognition citrus fruit candy	1.55	.18	1.75	.08	.52	.61	.80	.42	.15	.88	.39	.69
Perceived variety citrus fruit candy	4.12	.002	1.39	.17	.61	.54	.04	.97	2.28	.02	1.77	.08
Assortment satisfaction citrus fruit candy	2.21	.06	2.02	.05	1.36	.18	.50	.62	.59	.55	.92	.36

Note Red and citrus fruit scent were both dummy coded (0/1).

Table 8.17. Summaries of moderated regression analyses (Buying frequency citrus fruit candy)

Dependent variables	Model		Red fruit scent		Citrus fruit scent		Buying citrus fruit candy		Red fruit scent x buying citrus fruit candy		Citrus fruit scent x buying citrus fruit candy	
	F(5, 138)	*p*	*t*	*p*	*t*	*p*	*t*	*p*	*t*	*p*	*t*	*p*
Recall citrus fruit candy	2.90	.02	-.29	.77	-1.39	.17	1.02	.31	.71	.48	.83	.41
Recognition citrus fruit candy	2.06	.07	1.68	.096	.56	.58	1.55	.12	-.31	.76	-.15	.89
Perceived variety citrus fruit candy	2.38	.04	1.36	.18	.80	.43	-1.19	.24	2.37	.02	2.12	.04
Assortment satisfaction citrus fruit candy	3.20	.009	1.96	.05	1.51	.13	.04	.97	1.79	.08	1.27	.21

Note Red and citrus fruit scent were both dummy coded (0/1).

In line with H5, we studied whether there was an effect of citrus fruit scent at a specific level of product familiarity (i.e., for people unfamiliar with the citrus fruit candy assortment [one standard deviation below the mean] and for people familiar with it [one standard deviation above the mean]). Summary statistics can be found in Tables 8.18 to 8.20. In general, the ambient citrus fruit scent had no effect on either group (all p > .10, three exceptions). Three ambient scent effects were (marginally) significant. People who did not like citrus fruit candy were worse at recognizing citrus fruit candy they had seen before when there was a citrus fruit scent present (M = .96) than when there was no scent present (M = 1.84, p = .03). People who frequently bough citrus fruit candy were more satisfied with the citrus fruit candy assortment ($M_{no\ scent}$ = 4.41, $M_{\text{citrus fruit scent}}$ = 5.06, p = .06) and perceived more variety in it ($M_{no\ scent}$ = 3.74, $M_{\text{citrus fruit scent}}$ = 4.40, p = .046) when there was a citrus scent present than when there was none.

These results are inconsistent with H5.

Table 8.18. Moderating role of liking citrus fruit candy on the effect of ambient citrus fruit scent on memory and assortment perceptions

Dependent measures	Not liking citrus fruit candy (*one standard deviation below the mean*)				Liking citrus fruit candy (*one standard deviation above the mean*)			
	M		*t*-value	*p*-value	*M*		*t*-value	*p*-value
	No scent	Citrus fruit scent			No scent	Citrus fruit scent		
Recall citrus fruit candy	1.84	.96	2.17	.03	2.16	2.18	.05	.96
Recognition citrus fruit candy	9.97	10.10	.19	.85	11.13	11.47	.51	.61
Perceived variety citrus fruit candy	3.80	3.75	.14	.89	4.15	4.46	.95	.34
Assortment satisfaction citrus fruit candy	4.24	4.43	.57	.57	4.58	5.03	1.35	.18

Table 8.19. Moderating role of knowledge of citrus fruit candy assortment on the effect of ambient citrus fruit scent on memory and assortment perceptions

Dependent measures	Little knowledge of citrus fruit candy (*one standard deviation below the mean*)				A lot of knowledge of citrus fruit candy (*one standard deviation above the mean*)			
	M		*t*-value	*p*-value	*M*		*t*-value	*p*-value
	No scent	Citrus fruit scent			No scent	Citrus fruit scent		
Recall citrus fruit candy	1.56	1.09	1.21	.23	2.52	2.07	1.12	.26
Recognition citrus fruit candy	10.27	10.34	.10	.92	10.85	11.27	.63	.53
Perceived variety citrus fruit candy	3.96	3.72	.81	.42	3.98	4.49	1.65	.10
Assortment satisfaction citrus fruit candy	4.32	4.43	.34	.73	4.50	5.03	1.59	.11

Table 8.20. Moderating role of buying frequency of citrus fruit candy on the effect of ambient citrus fruit scent on memory and assortment perceptions

Dependent measures	Seldom buying citrus fruit candy (*one standard deviation below the mean*)				Frequently buying citrus fruit candy (*one standard deviation above the mean*)			
	M		*t*-value	*p*-value	*M*		*t*-value	*p*-value
	No scent	Citrus fruit scent			No scent	Citrus fruit scent		
Recall citrus fruit candy	1.78	1.16	1.61	.11	2.23	2.08	.38	.70
Recognition citrus fruit candy	10.01	10.34	.51	.61	11.15	11.34	.28	.78
Perceived variety citrus fruit candy	4.16	3.86	.96	.34	3.74	4.40	2.02	.046
Assortment satisfaction citrus fruit candy	4.40	4.45	.18	.86	4.41	5.06	1.92	.06

8.4.4 Discussion

Neither the red fruit scent nor the citrus fruit scent influenced consumers' memory or assortment perceptions. Concerning product choice, results showed that the presence of a fruit scent (especially a citrus fruit scent) decreased the purchase probability of a product incongruent with the scent (i.e., mint candy). However, neither the presence of red fruit scent nor the presence of a citrus fruit scent increased the purchase probability of a product congruent with the scent. As in Study 1, overall, there was no difference in the effect of ambient scent between consumers who were not familiar with the product category congruent with the scent and consumers who were. Our findings do not support H1 to H5.

8.5. General discussion

The aims of this study were (1) to explore the effect of ambient scent on respondents' memory and assortment evaluations of scent-congruent and scent-incongruent products when exposed to a large assortment at the same time and (2) to examine the moderating role of product category familiarity. Previous research on the effect of ambient scent on memory showed mixed results (e.g., Krishna et al., 2010; Morrin & Ratneswahr, 2003). Whether or not the ambient scent should fit with the product under investigation was also not clear (e.g., Mitchell et al., 1995; Morrin & Ratneswahr, 2003). Furthermore, to our knowledge, no prior research looked at the effects of an ambient scent on assortment variety perceptions and assortment satisfaction. However, both memory and assortment perceptions play a crucial role in brand and store choice.

Results showed that no ambient scent (neither a mint scent nor a red fruit scent nor a citrus fruit scent) influenced consumers' memory, assortment perceptions or product choice, nor did it affect memory and assortment perceptions of sub-populations familiar and unfamiliar with the scent-congruent product category. These findings are not in line with Lwin and Morrin (2012) or Morrin and Ratneshwar (2000; 2003), who showed that in a scented environment people rated brands more positively and were better at recalling brand names and brand information than people in an unscented room, whether after a short or a long time delay. However, it should be noted that other research examining the effect of an scent added to a direct mailer only found a positive effect of scent on consumers' memory after a delay of two weeks and not after a delay of five minutes, and this because information encoded via the sense of smell results in a deeper and longer-lasting memory, making it particularly effective for improving memory in the long term (Lwin et al., 2010). In this study, we only worked with a time delay of approximately 15 minutes. Moreover, previous research showed a positive effect of scent on memory when the scent was present either at the time of encoding (Lwin et al., 2010; Morrin & Ratneswhar, 2003) or both at the time of encoding and at the time of retrieval (Lwin et al., 2010; Morrin & Ratneswhar, 2000). In these previous studies, the respondents were also exposed to only one product (with extra product information) or saw various brands one after each other. In our study, the scent was only present at the time of the encoding and the respondents were exposed to 46 pieces of candy at the same time. A possible explanation for the fact that we did not find any effect of an ambient scent might be that respondents also need a scent cue at the time of retrieval to trigger their memory of such a large assortment.

Furthermore, our assortment consisted of well-known brands, for which consumers usually have pre-stored information. This pre-stored information might have influenced the effect of scent on memory and assortment perceptions. Finally, we worked with an assortment that was well organized by flavor and brand. An ambient scent effect is more likely to be found when the assortment is disorganized and flavors and brands are mixed together, because this makes the task more difficult, leading the consumer to rely more on subtle environmental cues. Future research might explore whether ambient scent can enhance the memory of a large assortment (of unfamiliar brands) when the scent is also present at the retrieval time, after a long time delay, and/or when the large assortment is disorganized.

Our results cannot support the notion that an ambient scent can be used by marketing managers to improve consumers' memory of a product or a brand and their assortment perceptions when they are exposed to a lot of products at the same time. No ambient scent effects were found whether or not consumers were familiar with the scent-congruent product category. It appears that consumers who are not familiar with a product category are not more influenced by atmospheric cues such as scent. Moreover, for those familiar with the product category, we cannot confirm that a congruent ambient scent can lead to proactive interference, causing negative effects on memory and assortment perceptions.

Chapter 9

Conclusion

This final chapter summarizes the findings of this doctoral dissertation and its managerial implications. The cost of scent marketing and a few ethical reflections of diffusing scents in a retail environment are discussed. To conclude, some interesting opportunities for future research are suggested.

9.1 Conclusion of our findings

Pleasant ambient scents can have a positive influence on consumer behavior. However, not everyone reacts the same to every scent in every environment. Starting from the theoretical model of ambient scent effects (Gulas & Bloch, 1995), we examined the moderating role of individual differences and product congruency, the interaction effect of scent with other atmospheric cues and the impact of scent on memory and assortment perceptions in more detail. Figure 9.1 shows the theoretical implications of our findings incorporated in the model of Gulas & Bloch (1995). We extended the model by (1) demonstrating that besides their indirect effect through acuity or scent preference, individual differences can also directly influence the relationship between a perceived ambient scent and consumer reactions, (2) showing that in certain cases scent-product incongruity might lead to more positive consumer reactions than scent-product congruity, (3) indicating that the scent-product congruity effect might also depend on individual differences, and (4) demonstrating that pleasant ambient scent cannot overcome an unpleasant layout.

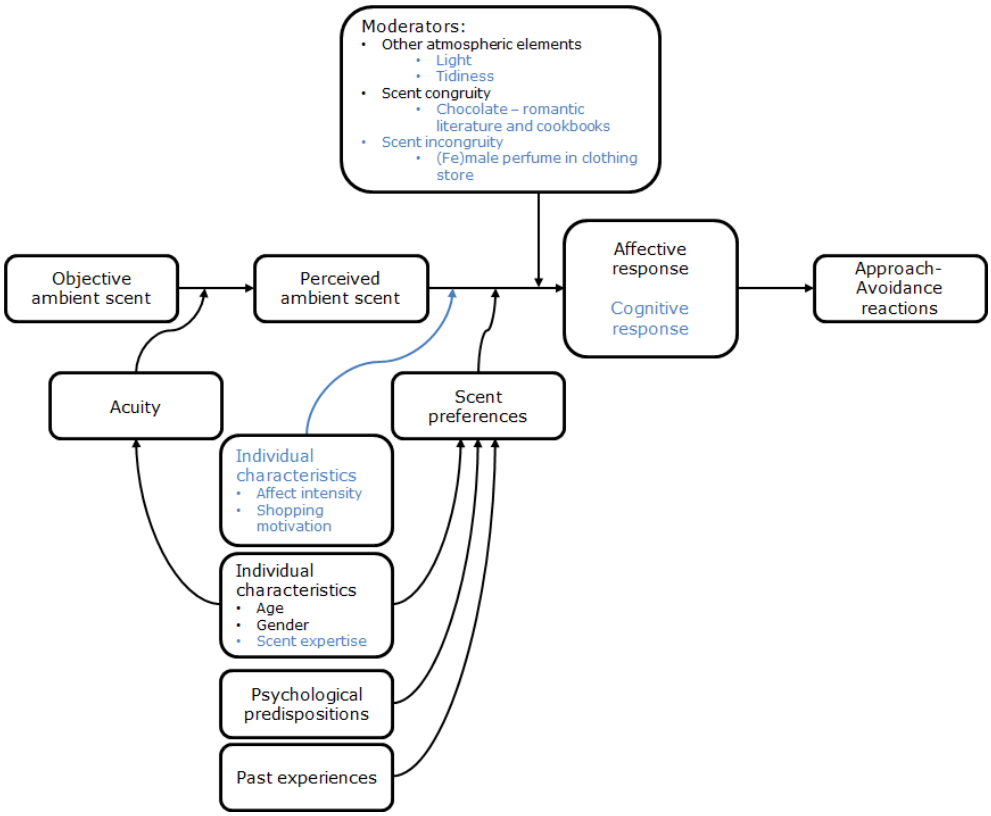

Figure 9.1. Overview of the theoretical implications of our findings incorporated in the model of Gulas and Bloch (1995).

Concepts and arrows in blue were added based on the results of the doctoral researches.

9.1.1 Moderating role of individual differences and product congruency

The ambient scent effect model of Gulas and Bloch (1995) proposes that ambient scent perceptions of consumers depend on individual characteristics of the consumer. In chapter 2, we argue that individual differences can also affect the relationship between ambient scent perceptions and consumer reactions.

Specifically, we examined the moderating role of affect intensity and shopping motivation. Consumers who score high on affect intensity experience emotions more intensely and respond more strongly to emotional stimuli than consumers who score low on affect intensity. Because a pleasant ambient scent in a shopping environment is also an emotional stimulus, consumers who score high on affect intensity are more positively influenced by the presence of a pleasant ambient scent in the shopping environment. A field experiment conducted in a prestige fashion store showed that a pleasant ambient scent enhanced positive affect, evaluations, and approach behavior only for high affect intensity consumers and not for low affect intensity consumers. We expected that consumers who score high on hedonic shopping motivation would be more influenced by a pleasant ambient scent than consumers who score low, because a scent is diffused in a store to create a pleasant environment that produces sensorial and emotional experiences and consumers with a high hedonic shopping motivation gain value from these shopping experiences. However, no such effect was found, perhaps because the experiment took place in a clothing store already filled with hedonic elements. In fact, high hedonic shoppers already rated the store and the products very positively in the control condition (6 or more on 7-point scale), which may have provided too little room for improvement by scent (ceiling effect). On the other hand, an unexpected positive scent effect for consumers with a low hedonic shopping motivation was found, perhaps because even when scents are unconsciously perceived, they can alter consumer reactions, also for consumers who do not actively search for hedonic experiences.

Chapter 3 examined the moderating role of scent expertise. Gulas and Bloch (1995) stipulated in their model that the effect of an ambient scent on consumer responses can be moderated by its congruity with the store's offerings. Several studies confirmed this proposition by showing that a diffused scent only has a positive effect when congruent with the product under evaluation (e.g., Bosmans, 2006). However, this congruency effect may depend on how well consumers can recognize a scent. Earlier research found, for example, that women are better at recognizing fragrances than men (Doty et al., 1985). We investigated whether scent experts (i.e., novice experts and experts; wine tasters) evaluate products that are (in)congruent (i.e., a banana, an apple, and a tomato) with an ambient scent (i.e., banana scent) differently than laymen and whether this effect is mediated by a higher awareness of scents in the environment and an improved ability to identify different scents. Results showed that scent experts evaluate a product incongruent with the scent less positively, are better at scent identification, and are more aware of scents in their environment than laymen. However, the differences in the evaluation of the incongruent product between the scent expert groups cannot be fully explained by differences in their levels of scent identification or scent awareness.

As mentioned above, more positive effects of the presence of a pleasant ambient scent are expected when the scent is congruent with the store's offerings. This moderation was already confirmed for products with inherent scents (e.g., fruit in Bosmans, 2006). In chapter 4, the effect of thematic congruency between an ambient scent and products without direct scent properties was studied. Specifically, the effect of a pleasant ambient chocolate scent on approach and

buying behavior toward thematically congruent (i.e., cookbooks and romantic literature) and incongruent books (i.e., crime and history books) was examined. Thematically congruent scent effects can be explained by odor priming. A scent which is congruent with the product primes concepts associated with the product, making it conceptually fluent and easier to process. Because the product is more accessible in the consumer's mind, the consumer is more likely to approach it (e.g., Dijksterhuis et al., 2005; Lee, 2002; Nedungadi, 1990). A field experiment in a bookstore showed that a pleasant ambient scent has a positive effect on approach and buying behavior toward thematically congruent books and a negative effect on approach and buying behavior toward incongruent books.

However, Chapter 5 suggests that incongruity does not always have a negative influence on consumer evaluations. In certain well-defined cases, product-scent incongruity can have a positive effect on them. In this chapter, the effects of a gender-(in)congruent ambient perfume diffused in a men's and women's clothing store on customer value were studied. We argued that a gender-incongruent scent (e.g., a feminine perfume in a men's clothing store) might function as a mating cue, possibly triggering a mating goal in the target audience (e.g., men). This mating goal may then result in an improved evaluation of products that help them signal their mating value to the opposite sex (e.g. clothes). Results showed that a pleasant congruent ambient scent only has a positive effect on the aesthetic dimension of customer value compared to the absence of a scent. In contrast, a pleasant incongruent ambient scent has a positive influence on five (of the seven) dimensions of customer value as

compared to the absence of a scent. Moreover, an incongruent scent also leads to a more positive evaluation of the play, product excellence, and social dimension of customer value compared to a congruent scent. These three dimensions are particularly important for mate attraction. A gender-incongruent scent results in more pleasure, more feeling that the store helps them to make a good impression, and more esteem for the products in the store than a gender-congruent scent.

The findings in chapter 2 to 5 showed that neither all consumers nor all their reactions toward the target stimulus (e.g., store, products, brands) will be influenced in the same way by a pleasant ambient scent. First, some (e.g., high affect intensity) consumers are more likely to be influenced by a pleasant ambient scent. Second, the congruency of the scent with the target stimulus plays an important role. Except for certain well-defined cases (such as the cited mating cue), a congruent scent leads to better results than in incongruent scent. Third, this congruency effect can also be influenced by individual differences like the level of scent expertise of the consumer.

9.1.2 Interaction effects with other atmospheric cues

Besides the moderating role of non-atmospheric elements (e.g., individual differences and scent congruity), other atmospheric elements in the environment can also influence the effect of a pleasant ambient scent on consumer reactions. A few studies already examined the interaction effects of ambient scent and other atmospheric elements and found that a store environment with congruent atmospheric elements draws better consumer

reactions toward itself and its products than one with incongruent atmospheric elements (e.g., scent and music; Mattila & Wirtz, 2001). People prefer congruency and processing fluency. Therefore, they experience a positive affective state, which can be transferred to the store and its products. Congruency between atmospheric cues can be achieved in different ways (e.g., based on valence, arousal, or semantic associations; Mattila & Wirtz, 2001; Krishna et al., 2010). In chapter 6, the interaction effect between ambient scent and overall light was studied. Ambient scent and overall light were (mis)matched with each other based on semantic associations (i.e., warm/cold and dim/bright). Findings showed that matching scent and light leads to more positive consumer reactions than mismatching these atmospheric cues.

Chapter 7 examined whether retailers can overcome negative elements like store messiness by diffusing pleasant scents. Specifically, the effect of pleasant scents (not) associated with neatness on consumer evaluations of a tidy versus a messy store was studied. A scent can have both affective and cognitive priming effects on consumer reactions. A pleasant ambient scent can trigger an overall positive affective reaction which might reduce the intensity of environmental annoyances (Herz, 2007). However, this is not in line with research on valence matching effects and processing fluency which indicated that in the presence of a pleasant contextual cue (e.g., pleasant ambient scent) consumers will only respond more positively to a target stimulus (e.g., store environment) when the valences of the contextual and the target stimulus match (Brakus et al., 2008; De Bock et al., 2013). An ambient scent can also make certain concepts more accessible in the consumer's mind. A scent can be

associated with semantic and episodic knowledge (Degel et al., 2001) and when these semantic associations are activated, they guide consumers' evaluations of and behavior toward the store and products (Holland et al., 2005). Results showed that a pleasant ambient scent not associated with neatness negatively influences product evaluation when diffused in a messy store because the valence of the pleasant scent was mismatched with the valence of the unpleasant messy lay-out. Moreover, the products in a messy store are only evaluated more negatively than the products in a tidy store when a pleasant scent not associated with neatness is present. When a pleasant scent associated with the negative element the retailer is trying to overcome is present, this negative effect of a pleasant ambient scent in a messy store on product evaluation disappears. The cognitive association of the pleasant scent associated with neatness appears to give consumers in the messy store the impression that the store is not so messy.

The findings in chapter 6 and 7 indicate it is important to study the effects of store atmospherics from a holistic point of view. A shopping experience is a holistic experience which exposes consumers to several atmospheric elements at once and the way they react to one depends on the presence of others (Spence et al., 2014). Chapter 6 showed a positive multisensory semantic congruency effect between scent and light, whereas chapter 7 demonstrated that a pleasant ambient scent cannot overcome an unpleasant messy layout. When diffused in a messy store environment, the pleasant ambient scent even has a negative effect on product evaluation, unless it is associated with the negative element the retailer is trying to overcome.

9.1.3 Impact of scent on memory and assortment perceptions

Chapters 2 to 7 focused on the impact of ambient scent on store and product evaluations. However, previous research also revealed a strong link between olfactory processing and memory because scents are directly processed in the limbic system of the brain (e.g., Gerber & Menzel, 2000; Krishna, 2012; Morrin & Ratneswhar, 2003). Positive memory effects of scent were already found when respondents were exposed to only one product (with extra product information) or they saw various brands one after each other. Chapter 8 explored the influence of an ambient scent on respondents' memory and assortment evaluations of scent-congruent and scent-incongruent products when exposed to a large assortment at the same time. It also examined the moderating role of product category familiarity. However, results indicated that an ambient scent cannot be used to improve consumers' memory and their assortment perceptions when they are exposed to a lot of products at the same time. Familiarity with the scent-congruent product category made no difference to these results.

9.2 Managerial implications

These findings suggest several managerial implications. As retailers are continuously looking for strategies to differentiate themselves, investing in an appealing store environment which can trigger a pleasant customer experience seems valuable.

Using pleasant ambient scents to improve the customer experience in a shopping environment can create promising opportunities. An ambient scent can

be added or altered relatively easily, changing the atmospheric sensation of a shopping trip and setting the retailer apart from competitors. However, retailers must not forget that not all consumers will be influenced in the same way by a pleasant ambient scent and the decision to diffuse a scent should be first of all based on the target audience. For example, people who score high on affect intensity are more influenced by the presence of an ambient scent than people who score low on affect intensity. Moreover, women score higher on affect intensity than men (Moore, 2004), suggesting that scent marketing is particularly interesting for stores with a female target audience. Additionally, stores targeting scent experts (e.g., wine experts, master chefs, professional gardeners) should also be aware that these customers react differently to the presence of a scent than laymen.

After deciding to diffuse an ambient scent in the store environment, it is also important to choice the most appropriate one. It should be pleasant. Personal experiences and cultural differences can make different scents pleasant to different customers; however, some scents are nearly consistently viewed as pleasant (e.g., floral scents) or unpleasant (e.g., spoiled food).

Second, the ambient scent should fit the store's offerings. This fit can be obvious for retailers who sell products with an inherent scent, such as chocolatiers. But it is also important for retailers who offer products without inherent scent. A match can be found making use of the associations triggered by the scent. For example, a chocolate scent can also be associated with desserts and romance, suiting cookbooks and romance literature in a book store. To make sure the desired associations are activated in the consumer's mind, retailers should make

use of scents that are a good example of a well-known scent category (e.g., floral scent) and/or strongly associated with universally pleasant occasions (e.g., coconut, associated with sunny vacations). Moreover, they should combine the scent with other-modality stimuli that have similar associations, making it more likely that the right concepts are activated (Smeets & Dijksterhuis, 2014). Retailers offering more than one product type should be aware of the possible negative effects of a pleasant ambient scent that does not fit with part of the store offerings. However, in certain well-defined cases, such as when the scent might function as a mating cue (i.e., a gender-incongruent perfume), a pleasant incongruent scent can have a positive influence on consumer evaluations. Therefore, retailers selling products that help individuals signal their physical attractiveness (e.g., clothing, jewelry, and lingerie stores) can make use of pleasant gender-incongruent perfumes to create an appealing store environment.

Third, the ambient scent should also fit the other atmospheric cues in the store environment. Atmospheric cues are never perceived in isolation and retailers should match their cues not only by valence but also by semantic associations to obtain optimal results. In this context, it should also be noted that a pleasant ambient scent is not always an efficient instrument to overcome negative elements of a shopping experience (such as an unpleasant, messy layout).

An example decision diagram to help retailers choose an appropriate scent is given in Figure 9.2. Typically, 'A' represents the ideal scent choice: the scent is perceived as pleasant, congruent with the products sold in the store, and congruent with the other atmospheric cues. This does not imply that the other

sections of the diagram can never be relevant. For example, 'B' represents a situation where the scent is perceived as pleasant and congruent with the other atmospheric cues, but incongruent with the products. A product-incongruent scent might sometimes be the most appropriate scent to choose, as illustrated by the study of a gender-incongruent scent in a clothing store.

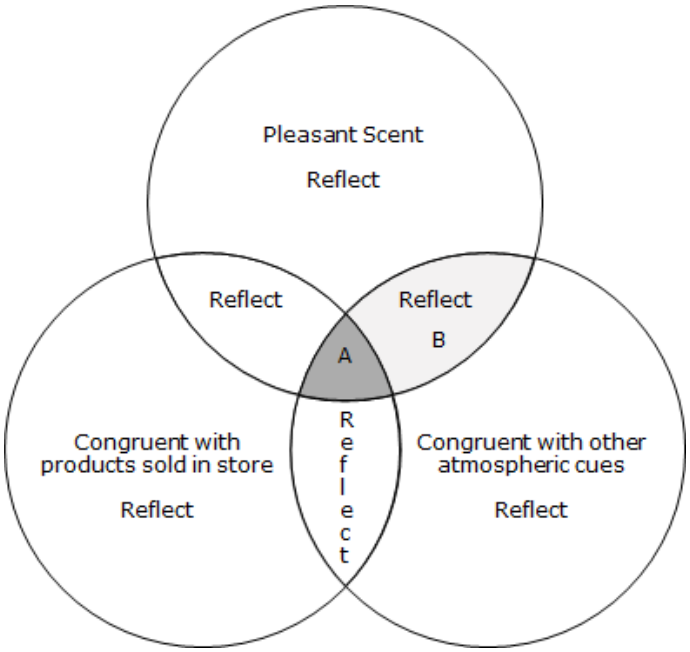

Figure 9.2. An example decision diagram for choosing an appropriate scent.

Concerning memory and assortment perceptions, it appears that marketing managers cannot use ambient scent to improve brand recall and recognition when consumers are exposed to a lot of products at the same time. Other instruments such as point-of-purchase displays and price promotions which generate brand purchase and brand experience can be more efficient to increase brand awareness (Huang & Sarigöllü, 2012).

9.3 Cost of implementing scent marketing

Before deciding to diffuse an ambient scent in the store environment, retailers should also weigh the benefits against the costs. The cost of dispersing an ambient scent depends amongst others on the size of the store, how the scent is diffused (e.g. via separate scent appliance or via the air conditioning system), whether the appliance is bought or rented, the intensity level of the scent, and the scent itself. To gain some insight into this cost, two scent providers in Belgium were contacted and were asked about the scent marketing costs in different situations. In Table 9.1, an indication of the cost of scent marketing is given using several scenarios.

Table 9.1. Estimation of the price of diffusing an ambient scent in a store for one year

	Size of the store		
	200 m²		1000 m²
	via separate scent appliance	via air conditioning	via air conditioning
Scent provider 1: Buying the appliance (according to product sheet)	€1335	€1624	€2370
Scent provider 2: Renting the appliance (+ service) (according to sales person)	€1000	€1500	/

Note Prices include buying or renting (for one year) the scent appliance, the installation of the appliance and the scent cartridges necessary to diffuse the scent in the store for one year.

The prices in Table 9.1 demonstrate that scent marketing costs the retailer approximately 3 à 7 euros a day. Buying the appliance implies a larger investment at the beginning but is more economical in the long run. For

example, for a separate scent appliance in a store of 200 m² the investment of the first year is 3.66 euros a day. The second year onwards, only the scent cartridges need to be purchased and the investment lowers to 1.60 euro a day. However, buying an appliance also implicates that the retailer has to maintain the appliance himself. In contrast, renting the appliance includes service and maintenance of the appliance.

9.4 Ethical reflections of diffusing scents in a retail environment

Diffusing pleasant ambient scents in the store environment can be an attractive tool for retailers to stage a pleasant customer experience. However, we should also reflect on some ethical issues of scent marketing (Bradford & Desrochers, 2009).

We can question whether it is acceptable that retailers try to influence consumers without them knowing they are exposed to a persuasion attempt and without them being able to defend themselves against the attempt. Even if consumers are aware of the scent, they might not see it as a persuasion attempt and might not respond accordingly. On the other side, one can argue that scent marketing is a legal marketing technique and consumers are aware that retailers try to sway them to buy their products. In fact, retailers try to design all store elements (e.g., colors, light, music) in such a way that the purchase probability of the customers increases. We argue that scent marketing can be beneficial for both retailers and customers. Retailers can use ambient scents in the store environment to differentiate themselves from the competition and create a

relationship with the customers, whereas consumers can enjoy a pleasant in-store experience thanks to the presence of a scent in the store.

In this doctoral research, synthetic scents were used. Retailers who decide to add a scent in the store environment (possibly as an alternative to a 'real' scent (e.g., the smell of baked bread in a bakery)), can chose to use essential oils or synthetic scents, although there is not always a one-on-one alternative. Synthetic scents are manufactured making use of fabricated chemicals, whereas an essential oil comes from specific natural plant parts (e.g., obtained by distillation) and can have antibacterial properties. In practice, synthetic scents are commonly used because obtaining essential oils from natural raw plant materials is a labor-intensive process and synthetic scents are often cheaper than essential oils (Turin, 2007). However, we should be careful with diffusing scents because some fragrance chemicals (present in both essential oils and synthetic scents) are toxic and can be harmful for our wellbeing (for an overview, see Bridges, 2002; De Vader & Paxson, 2009). The scents used in these doctoral studies are conform the International Fragrance Association (IFRA) standards. The IFRA is an association founded by the fragrance industry and tests whether a fragrance ingredient is safe to use (http://www.ifraorg.org/). The IFRA standards are regularly adjusted based on new information on the safety of fragrance ingredients. Nevertheless, IFRA standards are set for single fragrance ingredients and do not test the safety of a combination of fragrance ingredients. Moreover, not all fragrance ingredients are examined by IFRA and the IFRA does not monitor their members to make sure

that their standards are followed (Bridges, 2002). Additional follow-up and research is desirable in the process of further regulation development.

9.5 Opportunities for future research

At the end of each chapter, a few directions for future research are discussed. In addition, this paragraph suggests some general opportunities for further scent marketing research.

9.5.1 Olfactory imagery

Recently, researchers found evidence of the existence of olfactory imagery (e.g., Bensafi et al., 2003), the ability "to experience the sensation of smell when an appropriate stimulus is absent" (Stevenson & Case, 2005, p. 244). Olfactory imagery can be important for marketing managers because it may enhance the experience of products, making them more appealing for purchase, without actually having to diffuse a scent. Future research can examine whether merely imaging a scent has an effect on consumer reactions. One research already found that when consumers were asked to imagine the smell of a cookie, they responded more positively to the cookie, but only when they saw a visual representation of it (Krishna, Morrin, & Sayin, 2014). An actual scent improved consumer reactions regardless of whether there was a visual representation present. Apparently, olfactory imagery requires a visual aid to elicit a vivid mental image of the product. However, additional research is needed to explore olfactory imagery's effects on consumer behavior.

9.5.2 Signature scent

Future research could also investigate the effect of signature scents. Besides diffusing general ambient scents, retailers or brands can also create their own unique scent to increase their differentiating ability (Spence et al., 2014). General ambient scents can lead customers to transfer pleasant emotions associated with the scent to the store. In addition, an ambient signature scent can also trigger a unique set of emotions and memories related to the store because the scent is exclusively associated with it (Davies et al., 2003; Goldkuhl & Styvén, 2007). Therefore, it is important that the scent is distinctive and unique. Some retailers (Victoria's Secret, Singapore Airlines, and the Westin Hotel chain, for example) have already developed their own signature scents. Using a signature scent might solve the problem of general ambient scents becoming less distinctive as retailers make increasing use of them. Investigating the potential added value of a signature scent is interesting opportunity for future research.

9.5.3 Scent in the online store environment

In chapter 1, we mentioned that online store environments usually lack atmospheric elements such as tactical and olfactory cues that fully immerse consumers into the atmosphere (Petermans, 2012; Turley & Chebat, 2002). However, as technology advances, the online store environment could rely increasingly on atmospheric cues to create a pleasant online shopping experience. A few years ago, an AromaUSB which diffuses a pleasant scent when plugged into a computer has been developed (http://www.aromausb.com/). Further development of this technology, such as

linking the scent USB with browsing behavior, might lead to more research into the effects of adding scents to an online shopping experience.

9.5.4 Scents in non-profit organizations

Ambient scents can also create pleasant experiences in other domains than the typical retail setting. For example, having to go through medical procedures can be very stressful for patients. The waiting rooms in hospitals and dentist's offices especially induce anxiety. These waiting rooms often have a typical scent associated with unpleasant memories of previous experiences there. Diffusing a pleasant ambient scent might reduce anxiety in patients by masking the typical unpleasant scent and triggering pleasanter associations based on previous encounters (Toet, Smeets, van Dijk, Dijkstra, & van den Reijen, 2010). Some initial research found that orange or lavender scent diffused in the waiting room of a dental office or hospital can decrease anxiety, increase calmness, and improve patients' moods (Lehrner, Eckersberger, Walla, Pötsch, &, Deecke, 2000; Lehrner, Marwinski, Lehr, Johren, & Deecke, 2005). However, this effect could not be confirmed by Toet et al. (2010). Whether or not scents can be applied for nonprofit purposes like this merits further research.

9.5.5 Multisensory research

As mentioned before, consumers perceive the store atmosphere with all their senses at once. Therefore, research should not only focus on the effect of one atmospheric cue on consumer behavior, but account for multisensory environmental interventions (e.g., Spence et al., 2014). Predicting multisensory perceptions based on reactions toward the senses individually is impossible. This

dissertation has studied the multisensory congruency effects between scent and light as well as scent and layout. However, besides congruency, other multisensory aspects such as sensory dominance and sensory overload deserve more empirical attention.

For example, research on sensory dominance and the relative importance of different atmospheric cues in a retail context is lacking. Our brain does not give equal weight to information gathered from different senses (Hecht & Reiner, 2009). Most research showed visual dominance over the other senses (Krishna, 2012). For example, the color of wine or juice can drive scent or taste perceptions instead of the real scent or taste (e.g., Hoegg & Alba, 2007; Morrot, Brochet, & Dubourdieu, 2001). Morrot et al. (2001) found that a white wine colored with a scentless red dye was identified as a red wine despite its typical white wine scent. However, visual dominance seems to disappear when the visual cue is presented with not one but two other sensory cues (Hecht & Reiner, 2009). Additional research is needed to investigate how and in which circumstances the relative importance of different atmospheric cues influence consumer behavior.

Additionally, little research has examined sensory overload (Krishna, 2012; Spence et al., 2014). Sensory overload happens when consumers are overstimulated in the store environment; the risk of it increases as more sensory cues are introduced or intensified in the store. Future research could, for example, explore whether adding extra atmospheric cues to the store environment further improves customer reactions or results in more negative reactions because of sensory overload.

Overall, this dissertation fills some important gaps in the literature with respect to the use of ambient scent in the store environment to enhance consumer responses. However, scent marketing, especially in the context of multisensory effects, still merits further research.

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