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Impact of Olfactory Cues on Consumers' Purchase Behavior in Food Products

Kaisa Sandell

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ABSTRACT

Sensory marketing, affecting consumers' perception and behavior via our five senses, has gained a foothold in recent decades both in academia and among practitioners. If vision and audition dominated earlier research, more space is now given for olfaction (smell), gustation (taste), and touch. Despite the increasing research into olfaction and marketing, the link between a sensory stimulus (smell) and its impact on consumer behavior has remained unclear. This thesis seeks to fill this knowledge gap. *The purpose of this thesis is to investigate the impact of olfactory cues on consumer behavior.* Since research is limited in retailing, yet the potential use in practice is vast, the thesis is positioned in a retailing context. The study contributes to the sensory marketing research, utilizing the theory of consumer behavior. In contrast with earlier studies into atmospherics, this thesis focuses on fast-moving consumer goods (FMCG)—food products, in particular.

The thesis at hand consists of three scientific publications, each answering a specific research question. The first article studies the potential impact of olfactory cues on actual purchase behavior. It adopts a novel category management approach, addressing potential spill-over and cannibalization impacts on spatially-related product categories. This article sets the premises for subsequent articles by confirming that the presence of an olfactory cue has an impact on consumers' purchase behavior with no significant cannibalization effect. The findings also suggest that a tight congruence between a scent and targeted products fosters the sales impact, enabling the intra-category guidance of purchase decisions.

The findings from the first article provide a catalyst for studying in more detail what the optimal scope is for olfactory marketing. The second article investigates the impact when targeting a single product versus a product category, utilizing theories of selective attention and differentiation (single product), alongside attribute similarity and processing fluency (product category). The findings indicate that both single product and product-category sales can be boosted with a common category-congruent scent that is easy to process and identify.

While the first and second articles focus on scents and their targets, the third article of the thesis focuses on the consumer as a processor of scents. The article investigates whether all consumers are equally prone to the impact of olfactory cues. The article builds upon theories of consumer characteristics and their effects on

olfactory abilities. Characteristics include gender and age, and also psychological traits, which have received less attention in the sensory marketing literature. The operationalization of these traits was carried out with the consumer decision-making style (CDMS) literature. The results indicate that consumer characteristics moderate the effectiveness of olfactory cues on purchase behavior. Thus, the results help us to understand the somewhat contradictory results in the earlier scarce literature on olfactory cues and their behavioral impact.

The contribution of the three articles is complemented with a broad theoretical review in this compilation, with further emphasis on food-product marketing. The total contribution to the field of sensory marketing is presented as a theoretical framework of olfactory marketing on consumer behavior. In contrast to previous models that have described sensory marketing in general, the framework acknowledges the specifics of olfaction versus other senses and describes the path to actual behavior instead of mere attitudes and intentions. In a novel way, the framework is the first to address how consumers' individual characteristics partially dictate the impact on their behavior.

Methodologically, this thesis carries a novelty value, as all of the experiments were conducted in real shopping environments as opposed to laboratories, utilizing large datasets, and relying on a vast number of observations. Quantitative data and analysis is in the lead role, yet it has been complemented with qualitative support. From a managerial perspective, the thesis encourages retailers and marketers to implement scents as an effective sales promotion tool. Scents can be regarded as a powerful marketing tool thanks to the broad implementation possibilities, demonstrated in this thesis, in the world of retailing.

KEYWORDS: sensory marketing, olfactory cues, purchase behavior, FMCG, food products, retailing, in-store marketing

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TIIVISTELMÄ

Aistimarkkinointi – kuluttajiin vaikuttaminen viiden aistimme kautta – on kasvattanut viime vuosikymmeninä suosiotaan niin akateemisessa tutkimuksessa kuin käytännön markkinoinnissakin. Näkö- ja kuulohavaintoihin pohjaava markkinointi oli aiemmin valtavirtaa, mutta nyt haju- maku- ja tuntoaisti ovat nousseet kiinnostuksen keskiöön. Vaikka hajuaistiin ja markkinointiin liittyvää tutkimusta on kertynyt, linkki aistihavainnon (tuoksu) ja kuluttajan käytöksen välillä on puuttunut. Käsillä oleva tutkielma pyrkii tilkitsemään tämän tutkimusaukon. *Tutkielman tarkoitus on tutkia tuoksujen vaikutusta kuluttajakäytökseen*. Tutkimus sijoittuu vähittäiskaupan kontekstiin, josta aiempaa tuoksumarkkinoinnin tutkimusta on kertynyt niukasti, huolimatta laajoista soveltamismahdollisuuksista. Väitöskirja edistää ja laajentaa aistimarkkinoinnin tutkimuskenttää ammentaen kuluttaja-käytöksen teoriaa. Aiemmista tutkimuksista poiketen, tämä tutkielma keskittyy FMCG-tuotteisiin (fast-moving consumer goods), tarkemmin ottaen ruokatuotteisiin.

Käsillä oleva tutkielma koostuu kolmesta tieteellisestä julkaisusta, joista kukin vastaa spesifiin tutkimuskysymykseen. Ensimmäinen artikkeli käsittelee hajuaisti-ärsykkeiden (tuoksujen) mahdollista vaikutusta kuluttajien ostokäyttäytymiseen. Artikkeli hyödyntää tuoteryhmäjohtamisen (category management) teoriaa, huomioiden mahdollisen positiivisen (spill-over) ja negatiivisen (cannibalization) myyntivaikutuksen vierustuoteryhmiin. Tämä artikkeli luo pohjan seuraaville artikkeleille, sillä se vahvistaa tuoksuilla olevan selkeä vaikutus kuluttajien ostokäyttäytymiseen, ilman merkittävää negatiivista vaikutusta (cannibalization) muihin tuoteryhmiin. Lisäksi tutkimus osoittaa, että kongruenssi tuoksun ja kohteena olevien tuotteiden välillä vahvistaa positiivista myyntivaikutusta. Tämä mahdollistaa ostokäyttäytymisen ohjaamisen tuoteryhmän sisällä.

Ensimmäisen artikkelin löydökset toimivat katalyyttina seuraavalle artikkelille, kannustaen tutkimaan tarkemmin, mikä on optimaalinen tapa ja laajuus kohdentaa tuoksumarkkinointia. Toinen artikkeli selvittää tuoksumarkkinoinnin vaikutusta ostokäyttäytymiseen, kun kohteena on joko yksittäinen tuote tai kokonainen tuoteryhmä. Tutkimus hyödyntää valikoivan huomion ja differoinnin teorioita (yksittäinen tuote) sekä toisaalta ominaisuuden samankaltaisuutta ja prosessoinnin sujuvuutta kuvaavia teorioita (tuoteryhmä) tuoksua ja sen kohdetta valittaessa. Tulokset osoittavat, että oli myyntivaikutteisen tuoksumarkkinoinnin kohteena

yksittäinen tuote tai kokonainen tuoteryhmä, optimaalinen tuoksu on helposti tunnistettava, koko tuoteryhmää kuvaava tuoksu.

Kolmas artikkeli kääntää huomion tuoksuista ja niiden kohteista kuluttajiin tuoksujen käsittelijöinä ja tulkitsijoina. Artikkeli selvittää, ovatko kaikki kuluttajat yhtä alttiita tuoksumarkkinoinnin vaikutukselle. Teoriapohjanaan se hyödyntää kuluttajien yksilöllisten piirteiden yhteyttä hajuaistiin liittyviin kykyihin. Näihin piirteisiin kuuluvat fysiologiset tekijät ikä ja sukupuoli, mutta myös psykologiset piirteet, joita aiempi aistimarkkinoinnin tutkimus ei juurikaan ole käsitellyt. Psykologisten piirteiden mallintamisessa artikkeli käyttää kuluttajien päätöksentekokirjallisuutta (consumer decision-making styles, CDMSs). Tutkimustulosten perusteella kuluttajan fysiologiset ja psykologiset ominaisuudet yhdessä vaikuttavat siihen, miten herkästi kuluttaja reagoi tuoksumarkkinointiin ostokäyttäytymisellään. Näin ollen tulokset auttavat osaltaan ymmärtämään, miksi aiempi tutkimustieto tuoksumarkkinoinnin vaikutuksesta kuluttajakäyttäytymiseen on ollut ristiriitaista.

Kolmen artikkelin muodostama teoreettinen kokonaisuus täydentyy käsillä olevan kompilaation teoriakatsauksella, joka syventää mm. ruokatuotteiden markkinointia artikkeleita pidemmälle. Väitöskirjan tieteellinen kontribuutio esitetään kompilaatiossa viitekehyksenä, joka kuvaa tuoksujen vaikutusta kuluttajakäyttäytymiseen. Aiemmista aistimarkkinoinnin malleista poiketen, tämän väitöskirjan viitekehys on räätälöity tuoksumarkkinointia varten, huomioiden hajuaistin erityispiirteet ja kuvaillen vaikutusketjua varsinaiseen kuluttajakäyttäytymiseen saakka, pelkkien aikomusten ja asenteiden sijaan. Myös kuluttajan yksilöllisten piirteiden huomioiminen ostokäyttäytymistä selittävänä on uutta aistitutkimuksen kentässä.

Tutkimusmetodologisesti käsillä oleva väitöskirja poikkeaa aisti- ja laajemminkin markkinoinnin valtavirtatutkimuksesta, sillä koeasetelmat on toteutettu aidoissa kuluttajaympäristöissä laboratorioiden sijaan, runsasta dataa hyödyntäen. Analyysi on kvantitatiivispainotteinen, ja kvalitatiivista dataa sekä analyysia on käytetty tukiroolissa. Tutkielma kannustaa vähittäiskauppaa ja markkinoijia ottamaan tuoksut käyttöön tehokkaana myynninedistämiskeinona. Tuoksuja voikin pitää vaikuttavana markkinointitapana, sillä – kuten tämä tutkielma osoittaa – tuoksumarkkinoinnin käyttömahdollisuudet vähittäiskaupassa ovat laajat ja lupaavat.

ASIASANAT: aistimarkkinointi, tuoksut, ostokäyttäytyminen, FMCG, ruokatuotteet, vähittäiskauppa, kuluttajakäyttäytyminen

Acknowledgements

"*All our knowledge begins with the senses, proceeds then to the understanding, and ends with reason. There is nothing higher than reason*."

— Immanuel Kant, Critique of Pure Reason

Even Kant, a famous advocate of logic and reason, acknowledged that everything begins with the senses. Though he could not prove it then, he was right. Our senses and sensory experiences are the basis of all understanding and reasoning. To illustrate the process, let us think of how a baby learns. Babies have no memory, neither the capacity to understand what eating is nor what changing a diaper means. Yet a four-week-old baby knows what to expect when her parents take up a feeding bottle or start changing her clothes. Some would call it logic, others evolutionary instinct. Either way, the underlying mechanism is sensorial: The baby learns to connect certain sensory experiences with their consequences. Analogically, as adults, we learn through our senses, and only then can we form an understanding and reasoning regarding our surroundings. Therefore, it is fair to say that discovering the fascinating world of sensory marketing has revolutionized the way I think of science in general.

The discovery process did not happen on its own. Instead, I owe Dr Leila Hurmerinta, who did not laugh when her master's thesis student announced that she would write her thesis on sensory marketing—on olfactory marketing, to be precise. About what? No, not about perfumes. About olfactory marketing and consumer behavior. Okay, maybe at this point there was some laughter and jokes about smells in general, but Leila's eyes were lit up. Anyone who knows her, knows the mesmerizing way Leila gets inspired and creative. Leila encouraged me to dive into an almost uncharted theoretical territory. Upon graduation, I was humbled by the enthusiasm and curiosity that everyone showed toward olfactory marketing. Everyone was eager to hear more, just as I was eager to learn more. The master's thesis had only scratched the surface.

It was Leila who sparked the idea of continuing my research to the doctoral level. Boy did I hesitate—imagine being called the Smell Doctor—, but the idea of truly contributing to science in a subject that I was passionate about felt noble. I knew it

would not be easy, as I had a full-time job and wanted to create a career in fast-moving consumer goods (FMCG). Luckily, I was surrounded by supportive people all the way through. First and foremost, I consider myself privileged having had professors Harri Luomala and Mari Sandell as my pre-examiners. Professor Luomala masters logical argumentation and clear communication in a way very few people do – when he speaks, it resonates in everyone in the audience. I remember following the vivid dialogue between him and a doctoral candidate at a public defense and wondering whether it was our mutual roots in Ostrobothnia or something else that made me feel that are on the same wavelength. Whether this holds true, we shall see! Professor Sandell, in turn, I had met several years ago, when we discussed the fascinating world of scents. She has an outstanding knowledge of sensory perception, senses and food. It is humbling that someone has such a scientific and pedant approach to food – our mutual passion. Without professors Luomala and Sandell the thesis would be substantially less logical and interesting.

The whole Department of Marketing and International Business at Turku School of Economics showed a great deal of trust and flexibility to help a distance student, which I am forever grateful for. My second supervisor, Dr Rami Olkkonen, radiated admirable optimism and encouraged me in a stress-free manner in the late stages of the process. Moreover, my messy papers got valuable input from several faculty geniuses— Dr Elina Jaakkola, and Dr Harri Terho, among others. Thank you for the input and encouragement! I am also indebted to fellow doctoral candidates, many of whom have already attained their degrees. Especially Samuel Piha, thank you for your comments and witty humor.

Even though my home university is the best, I was privileged to complement the doctoral studies at Stockholm School of Economics and Hanken. The warm atmosphere and insightful long discussions that these universities provided are a great example of the academic community and the support it has given.

It is not only academics that I am grateful to—after all, an important contribution of this thesis stems from real-life field experiments. These experiments would not have been possible without several enthusiastic retailers. Both retail chains Kesko and SOK were of invaluable help. Janne Puikko, Niilo Latva-Pukkila and many more from the central management of Kesko; SOK's Jukka Lauren; and several retailers and store owners who shall remain a secret: Thank you for sharing my passion to further improve the in-store experience with scents; thank you for your love of good-quality data.

Financially, this thesis would not have been possible without the support from the Foundation for Economic Education and the Foundation of the University of Turku. I also owe a great deal to my employer Cloetta, who never questioned the beauty of pursuing a doctoral degree, but instead saw it as a means to elevate one's thinking and deepen one's expertise in FMCG and retailing. It is no accident that

most experiments have hedonic food products at their core. I must also confess that I have been supported by Cordina, Rondinella, Molinaro, and several other grape varieties. Those have kept the creative flow going, even during the most intensive writing phases.

Finally, I owe the greatest of respect to my family. My parents have encouraged me and my brother to always learn more and stay curious. I could not have hoped for better roots. Speaking of roots, I actually owe it to my mom's family genes for a delicate sense of smell, which got me interested in the topic in the first place! If others have had to put up with my messy papers or stupid questions, my husband Henry has put up with much more. The doctoral process has stolen our valuable time together, yet he has never complained. Henry, only you know how many times I would have given up without your support and encouragement. The thesis would not have been completed without you. Today, I cannot help smiling when I see how the passion for scents has caught you as well. Thanks to you, our little daughter has already smelled dozens of odors, from candy to freshly-cut grass.

The world is filled with beautiful scents. Yet no odor is as unique and touching as that of my dear baby. Holding her in my lap in the quiet night hours, secretly sniffing her baby hair—I think to myself: There is no better olfactory marketing than this.

To all my teachers, of whom my family is the greatest of all.

Turku, filled with summer scents
12.6.2020
Kaisa Sandell

KAISA SANDELL

Kaisa Sandell is a passionate researcher in sensory marketing. She has a career in FMCG (fast-moving consumer goods), in the food products industry in particular. Currently, Kaisa holds the position of Global Brand Manager at Cloetta, one of Europe's biggest confectionery manufacturers.

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List of Original Publications

This thesis is based on the following original publications, which are referred to in the text by their Roman numerals:

I Sandell, K. Olfactory cues and consumers' purchase behavior in food products: a category management approach. *Economia Agro-Alimentare/ Food Economy*, 2019a; 21(1): 73-100.

II Kivioja, K. Impact of point-of-purchase olfactory cues on purchase behavior. *Journal of Consumer Marketing*, 2017; 34(2): 119-131.

III Sandell, K. Olfactory cues and purchase behavior: consumer characteristics as moderators. *European Journal of Marketing*, 2019b; 53(7): 1378-1399.

1 Aims of the Study

1.1 Research gap

The marketing paradigm has evolved since the discipline originated. More recently, the exchange-focused paradigm has expanded to a network level, and relational theories have become mainstream. Even though this change is still partially underway, there is a Kuhnian shift bubbling at the boundaries. The view of marketing is reaching new breadths and depths, as *consumer experiences and sensory systems* emerge as the last frontiers of marketing (Achrol & Kotler 2012).

In the heart of these sub-phenomena is the desire to remain connected to the consumer. In the digital era, consumers' attention is a scarcity that everyone is competing for. Since our visual sense has become over-bombarded, the marketing discipline has opened its eyes to the remaining four senses. The rising interest is seen in the number of academic publications as well. In 2008, a review suggested that over one third of sensory marketing studies had been published after 2003 (Peck & Childers 2008); over a decade later, the number of studies demonstrates an ever-growing interest (Roschk et al. 2017), and in 2019 alone, more than 20 high-quality academic articles in sensory marketing were published.

Sensory marketing can be defined as "marketing that engages the consumers' senses and affects their perception, judgment and behavior" (Krishna 2012, p. 332). As sensory marketing did not begin to surface until the 1980s, it was first reviewed through existing marketing models and frameworks. The early literature exploring sensory marketing was positioned in environmental psychology with a focus on atmospherics. For example, Gulas and Bloch (1995) applied the traditional model of stimulus–organism–response (S–O–R) (Mehrabian & Russell 1974; Donovan & Rossiter 1982) to review the processing of olfactory stimuli. The model addresses the process of a scent being perceived (followed by an affective response to it), but it does not include consumer behavior as the last step in the process. Instead, the model was more compatible with the atmospherics literature that was rooted in marketing after Kotler's (1974) famous article.

If we put aside vision that has dominated the academic research, then where does it leave us with the other senses? *Audition,* our sense of hearing, is nowadays quite extensively studied (see Meyers-Levy et al. 2010, for an excellent review). It has

received due attention thanks to the role of music in advertising and the ubiquity of our spoken and heard language. Today we know how audition affects our judgments and behavior when it comes to sound symbolism, voice, and ambient music. Research into *haptics*, our sense of touch, has also transformed itself since Harlow's monkey experiments (1958). Peck and Childers (2003a, 2003b, 2008) and Peck and Shu (2009) have devoted time and energy into shedding light on the understudied sense, providing consistent and logical findings. The importance of touch for humans has been recognized, and research has established tools and methods, such as the Need-for-Touch (NFT) Scale (Peck & Childers 2003a) for a more consistent research methodology. In lesser focus in the marketing context has been *gustation*, one's sense of taste. Gustation has only a thin, direct link to marketing theory or practice—mainly in terms of in-store sampling—, which may explain its sidekick role in sensory marketing research. It will most likely increase in relevance, however, as consumption and satiety receive more attention from a health perspective.

Last but not least, there is *olfaction*. Olfaction, a delicate sense that we cannot turn off, has recently inspired marketing academics and practitioners alike. Olfactory cues have the potential to affect consumers in several ways. For example, scents can improve consumers' quality perceptions (Bone & Jantrania 1992) and enhance brand recall and recognition (Morrin & Ratneshwar 2000, 2003). The presence of a scent even makes us remember a product better (e.g. Krishna, Lwin et al. 2010). Bone and Ellen (1999) were among the first to conduct a comprehensive review article about scents and their impact on various consumer responses. They reported versatile connections—for instance, a scent and product evaluations, or intentions to visit a store. However, there were very few studies about actual consumer behavior. Instead, they only reported ones that considered a choice when it was necessary to choose one product, or intentions to buy a product, or to visit a store.

Surprisingly, little has changed since Bone and Ellen's (1999) review article. The academic literature is taking its first steps in establishing the connection between olfactory cues and *actual consumer behavior,* going beyond perception and memories. The thin body of research shows that scent as a sales promotion tool can have a direct impact on purchase behavior (e.g. Gueguen & Petr 2006; Spangenberg et al. 2006). As traditional means of affecting actual purchase behavior (such as price promotions) have become diluted, olfactory cues increase in relevance. However, not all research points in the same direction. Recent studies suggest that the presence of a scent may not have any impact (Schifferstein et al. 2011; McGrath et al. 2016) and it can even produce a negative outcome (Knoblich et al. 2003; Lunardo 2012). The ambiguity of the research results is perplexing. As Rimkute et al. (2016) point out, the research on olfactory cues in consumer behavior lacks coherence.

What might be the underlying causes of such incoherent results? First, the research has been conducted in varying contexts. Some studies suggest that perhaps

olfactory cues only have an impact on behavior in certain types of environments (Teller & Dennis 2012). Indeed, those few studies that address consumer behavior have been undertaken in rather special environments—in restaurants (Gueguen & Petr 2006) and in clothing stores (Haberland 2010; Morrison et al. 2011; Bouzaabia 2014). What is left out of the picture is a common *retailing context*, such as a supermarket. The broad and special environments have been a logical choice when scents have been reviewed as part of atmospherics. But when it comes to affecting behavior, a supermarket or similar context might offer more everyday implications for theory and practice. This is particularly true for all food products. For instance, most packaging today—tightly sealed coffee packs, plastic-wrapped fruit—disables consumers from experiencing and evaluating food products from their natural scent, which has been the evolutionary status for millions of years and a natural habit for humans. Clearly, food products would offer a natural playground for studying olfactory cues.

Another issue contributing to the incoherence stems from methodological choices. Many experiments have been conducted under laboratory conditions (Mitchell et al. 1995; Bosmans 2006). Moreover, the field of research seems to suffer from a lack of actual behavior, as noted by Rimkute et al. (2016) in their review. The majority of studies rely on self-reports, intentions, and attitudes. Actual behavior has been less in the limelight. This is a growing concern in, for example, psychology research generally (c.f. Baumeister et al. 2007) and is definitely no less relevant for marketing research.

A third blind spot is consumers as the processors of scents. Interestingly, studies indicate that the behaviors elicited by olfactory cues are not equally effective among all consumers (Morrin & Chebat 2005; Chebat et al. 2009; Doucé & Janssens 2013). Could it be that the reason for this contradiction lies in the consumers themselves? A quick glance at olfaction research lends support to this idea. First, our age and gender affect our olfactory acuity and threshold for scents (Hummel et al. 2007). Second, and perhaps even more interestingly, our psychological characteristics—how we generally behave as consumers—affect how we perceive scents and react to them (c.f. Frasnelli & Hummel 2005; Olsson et al. 2006). Moreover, a recent study demonstrates that scents evoke emotions in humans, but in differing ways, depending on their olfactory capabilities (Lin et al. 2018). Marketing research has already unveiled how to leverage our other senses to affect our purchase behavior while accounting for consumer characteristics. For example, consumers who score high on the NFT Scale are more likely to buy a product when given a chance to touch it, while those scoring low on the Scale do not mind whether they get to touch the product or not (Peck & Childers 2003a, 2003b). Visually-driven consumers are best lured into buying when objects are aesthetically presented (e.g. Reimann et al. 2010), yet not everyone bases their purchase decision on an attractive package design. What

if, analogically, olfactory cues affect purchase behavior, but only in consumers with certain characteristics? Identifying those characteristics could partially settle the lack of clarity regarding the effectiveness of olfactory cues.

In sum, the extant academic research on olfactory cues and consumer behavior is scarce. Little is known regarding the impact on actual purchase behavior, especially in a natural setting. The close connection between food products and our sense of smell has not yet been utilized either. Furthermore, there is a gap in knowledge that would connect consumer characteristics and their potential in terms of them moderating the effectiveness of olfactory cues. All these issues contribute to the contradictory position within this area of research. In fact, the term "scent marketing" itself has not yet been established for common use. Clearly, there is an interesting blind spot to be filled: establishing scent marketing firmly within retailing, as a relevant part of sensory marketing.

1.2 Purpose and research questions

The fragmentation and scarcity of sensory marketing research that focuses on olfaction is problematic. Although the literature abounds with seemingly unconnected examples, there is no framework or model that would summarize and guide the use of olfactory cues. The existing general models for sensory marketing are not optimal for olfactory cues due to olfaction being processed in a different way than other sensory cues are (Krishna 2010), thus making the general models less fit for olfaction. It is striking that no such framework exists, given that as we speak, practitioners apply scents for marketing purposes without knowing (1) whether the presence of a scent affects purchase behavior or not, (2) what the optimal scope is for the targeting, or (3) if all consumers are equally affected by scents. Equally, there is no theoretical framework that would tie these factors together and integrate olfactory marketing as part of broader sensory marketing and retailing.

The purpose of this thesis is to investigate the impact of olfactory cues on consumer behavior. Thanks to the close connection between olfaction and food that has been neglected to date, we focus on food products in the retailing context. Specifically, the following questions will guide our work:

Q1: Does the presence of olfactory cues affect consumer behavior?

Q2: What is an optimal scope to target with scents?

Q3: How do individual characteristics moderate the effectiveness of olfactory cues?

These questions will help to fill in the most relevant research gaps, and together the answers will contribute to a more wholesome view of olfactory cues and consumer behavior.

1.3 Positioning

This thesis endeavors to contribute to the domain of *sensory marketing research*, focusing on olfactory cues. The thesis ties sensory marketing closer to consumer behavior, as we apply relevant theoretical concepts from the field of *consumer purchase behavior* to study the impact on consumer behavior. Contrasting with the early literature that reviewed olfactory cues as part of atmospherics, we focus on *FMCG and food-product marketing* by acknowledging the special nature of FMCG and food products and applying theoretical concepts from these domains to investigate our research questions. Building upon these two well-established research domains will ensure that the contribution to the newer research domain of sensory marketing will be solid. In addition, we deliberately restrict the investigation to a retailing context. This conscious choice ensures that the theoretical contribution is relevant and applicable to the specifics of retailing, in opposition to, for example, services that are characterized by different purchase behavior theories.

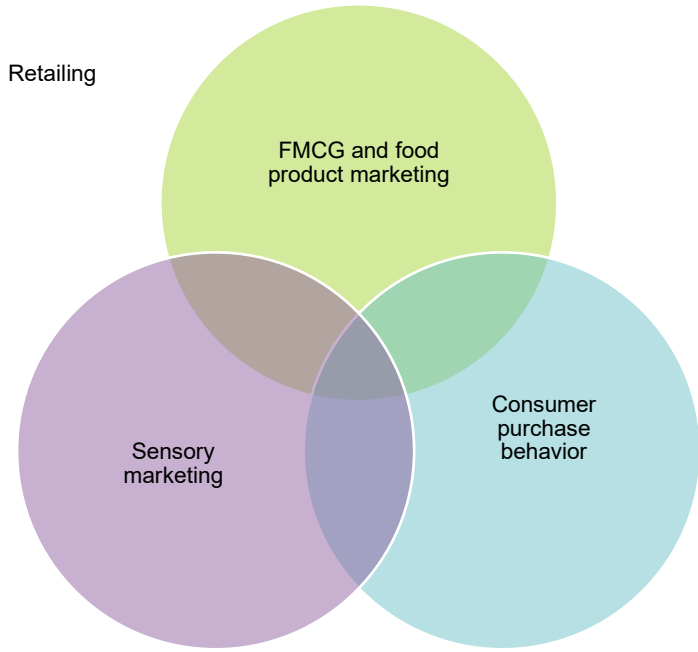

Figure 1. The positioning of the thesis.

The outline of the thesis is as follows. We begin by setting the theoretical and conceptual background in chapter 2. First, we present an overview of sensory marketing (section 2.1) and dive deeper into olfaction and scents specifically (section 2.2). Next, in section 2.3, we continue with the second major theoretical field;

namely, consumer purchase behavior. The third theoretical domain, FMCG and food-product marketing, is discussed in section 2.4, with an intentional focus on food products. This theoretical background leads us to a proposed framework and hypothesis, which are presented in section 2.5.

Next, we continue with the methodology in chapter 3. Chapter four presents the main findings of our studies, summarizing each of three scientific articles that constitute the backbone of this thesis. Each article investigates a topic outlined as research questions (RQs). Finally, we end with a discussion and the conclusions, revisiting the originally-proposed framework.

2 Theoretical Background

2.1 Sensory marketing

2.1.1 Toward a definition

Sensory marketing can be defined as "marketing that engages the consumers' senses and affects their perception, judgment and behavior" (Krishna 2012, p. 332). In this thesis, we adopt and refer to Krishna's definition. Even though the majority of sensory marketing research has spun off in the past two decades (Peck & Childers 2008; Roschk et al. 2017), research into our five senses in the context of consumer behavior has gradually accumulated over a longer period of time. In the earlier days, many researchers devoted themselves to only one sense and approached the topic from that particular angle. Research could dwell in the beautifully specific aspects of one specific sense and its implications—for instance, the effect of verbal and visual cues on ad processing (Houston et al. 1987). Research was subordinant to the mainstream research in each decade, such as advertising studies in the eighties. Sensory marketing as an umbrella concept did not exist until 2008, when the researchers examining different senses got together in search of common ground (Krishna 2010).

Then what is the essence, the common denominator of all senses that justifies the umbrella concept of sensory marketing? It is *the understanding of sensation and perception for the field of consumer behavior*, it is about emotions, attitudes, learning, and actual behavior (Krishna 2012). When we encounter an advertisement in a magazine, our eyes form *a sensation*. A sensation is created when a stimulus (the ad) impinges upon the receptor cells of a sensory organ (the eye). This stage of sensory processing is biochemical and neurological. It is not until the message from the stimulus is delivered to our brain for processing that it becomes *a perception*. Understanding the difference in these two stages and how they affect our response to the original sensory stimulus is paramount. Sensations are studied primarily by biochemical research; psychology is interested in perceptions and what follows from them. Sensory marketing, per se, can be seen as an application of the understanding of sensation and perception for the use of marketing purposes. We will look at the process in detail in section 2.1.2.

In addition to sensory processing, our five senses are also closely bound together by their *interaction* since our senses do not work in silos. Most often, the impact of one sensory stimulus depends on the presence and type of another. For instance, Christmas music in a store has a positive effect on the evaluation of merchandise, but only when paired with Christmas scent (Spangenberg et al. 2005). Even the earliest research into senses in the marketing context hypothesized that other senses might play a role, although this was not yet able to be proved. Laird (1932) pioneered and pondered how quality perception must be formed through multiple subconscious triggers. He tested soft silk stockings, scented with two different scents, found a difference between them, and compared this to the no-scent condition, but could not put a finger on the reason *why* one scent led to higher quality perceptions than another did.

Approximately at the same time as Laird's experiment, psychologist Köhler (1929) made his famous bouba–kiki experiment. Köhler, just like Laird, anticipated that the stimuli from different senses are interpreted together and that they affect each other. He tested the theory on verbal and visual cues. He drew two shapes, one very round and cloud-like, the other sharp and edgy. Respondents were asked to put two names, "kiki" and "bouba" (originally "takete" and "baluba") to the shapes. Kiki was associated with the more edgy shape; bouba was seen to fit with a round, soft shape. The results have been repeated and confirmed by several later studies (e.g. Ramachandran & Hubbard 2001). This so-called sound–shape symbolism is just one form of the symbolism that our senses create together. An extreme version of this symbolism has been christened as *synesthesia*.

More recently, the symbolic value that our brain knits together from different sensory inputs (Krishna 2010) has also been referred to as *ideasthesia*, introduced by Nikolić (2009). The name comes from Greek, meaning "sensing concepts" or "sensing ideas." Not only psychology, but also marketing academia acknowledges the close connection. The interplay has been studied through multiple combinations like music and scent (Mattila & Wirtz 2001; Lehrner et al. 2005), shape and color (Becker et al. 2011), and colors and flavor names (Miller & Kahn 2005).

The connection between sensory input and perception is undebatable, but there are two schools of thought in regard to sensations and *cognition and our body*. Traditionally, cognition has been considered as separate from perception: Our cognitive thinking is not affected by sensory perceptions. Recently, however, a growing body of research suggests otherwise—and the advocates of "grounded cognition" have increased (e.g. Williams & Bargh 2008; Labroo & Nielsen 2010). This school of thought suggests that our mental simulations, bodily states, and situated actions affect our cognitive activity (Barsalou 2008). Nobelist Daniel Kahneman (2011) has made this connection famous to the general public with easy-to-understand examples of it in his book *Thinking Fast and Slow*. One such example

is holding a pen with your lips while engaged in a cognitive task. If you hold it tight with your lips, one end in your mouth, your facial muscles are forced into a frown—and your brain decodes this as something negative, affecting your cognitive processing and judgment. If you hold the pen with your upper lip only, as a mustache, you activate the smile muscles—and your brain will make a more positive evaluation of a cartoon, as demonstrated originally by Strack, Martin, and Stepper (1988). Similarly, everything we *sense with our body* affects our cognition. There is nothing new in grounded cognition theory—already Darwin (1872/1965) hypothesized it—but current advancements in neuroscience have enabled proof of it.

Given the close connection between sensory cues to both our brain and body, sensory marketing just might be affecting consumer behavior more broadly than has been previously thought of. This type of research is valuable in helping sensory marketing establish its role and giving the umbrella concept the limelight that it deserves.

A third notion worth considering is that all sensory inputs, no matter which sense the focus is on, have a subtle and subconscious angle to them. Consumers are exposed to innumerous messages that marketers hope they have time to cognitively and actively process. In contrast, appealing to our very basic senses can be an efficient way to reach out to busy consumers. Sensory appeal gives consumers the space to make their own judgments, based on their personal perceptions. In other words, sensory triggers help in consumers' self-generation of perceptions, such as brand attributes, rather than those dictated by the marketer. Sengupta and Gorn (2002) suggest that such deductive engagement can be more persuasive than deliberate statements.

In essence, our five senses are present in everything we do. They are also part of nearly all marketing efforts: when seeing an advertisement, forming a perception and evaluation of a store or product, memorizing a brand, or, ultimately, buying a product. It is therefore beneficial to review sensory marketing as a concept in its own right, in addition to appreciating its earlier position as part of other marketing frameworks. Let us next review alternative frameworks for sensory marketing.

2.1.2 Sensory processing frameworks

The early literature on sensory marketing was positioned within environmental psychology and atmospherics. Kotler (1974) undertook pioneering work in drawing attention to atmospherics, defining it as "the effort to design buying environments to produce specific emotional effects in the buyer that enhance his purchase probability" (p. 50). He acknowledged the sensory qualities of a space surrounding a purchase object. In this framework, the steps of the process were as follows:

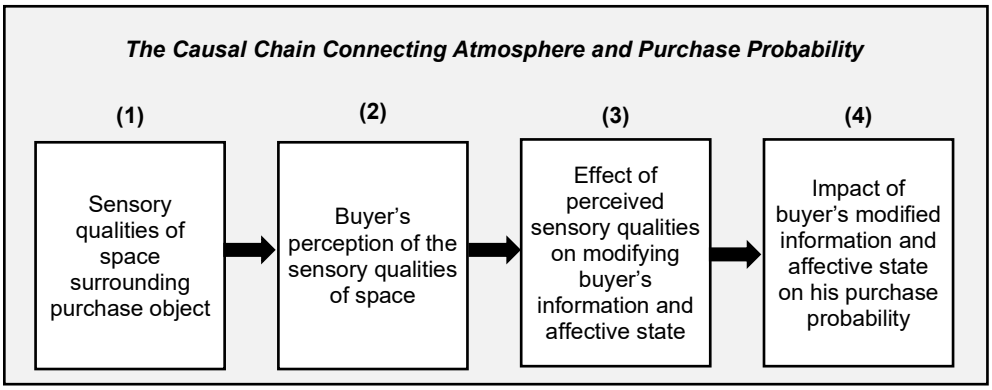

Figure 2. Kotler's framework of atmospherics and purchase probability (1974, p. 54).

In Kotler's model, space is the starting point; hence, sensory cues are also seen to primarily modify our perception of the surrounding *space*. Interestingly, Kotler already identified both the cognitive and the emotional dimension that sensory triggers have on consumers (stages 3 and 4). Moreover, Kotler put forward the idea that sensory cues not only affect our perception, but also have a positive impact on consumers' purchase probability (stage 4). He gave several examples of spaces where sensory input could be employed, such as in restaurants, retail environments, and new homes. The ideas are evergreen and have undoubtedly inspired later studies.

In the footsteps of Kotler, Mehrabian and Russell (1974) and Donovan and Rossiter (1982) spread the gospel of environmental psychology. Their traditional model of stimulus–organism–response (S–O–R) clarified the steps and roles of processing an environmental stimulus. In essence, the focus on environmental psychology and atmospherics in the 1980s gave the first proper frame for sensory marketing. Early research on sensory marketing applied this traditional model to review the processing of olfactory stimuli (Gulas & Bloch 1995) and sparked interest in service environments (Hirsch 1995). Albeit the S–O–R model is solid, it lacks elements paramount to sensory input: It does not recognize moderating variables, neither does it specify the response—for instance, is it only about forming a perception of the sensory input, or does it also include memory and emotions, perhaps even leading to behavior?

Following the interest in servicescapes in the 2000s, research on sensory aspects broadened to service environments, still holding onto an atmospheric focus. Roschk et al. (2017), in their extensive review article, list research from the 2000s that treats cues primarily as *atmospheric stimuli*—not emanating from a particular object, but as part of the environment. However, in the majority of those studies, the focus remained on the environment as opposed to on consumer behavior. In contrast, more recent frameworks of sensory processing, such as by Hultén (2015) and Krishna

(2012), put more emphasis on the outcome of consumer responses. While Hultén's (2015) framework is the best fit for analyzing bigger units such as whole companies or other bigger environments, Krishna's (2012) model is adaptable for a variety of purposes, as presented in figure 3 below. For this reason, we use Krishna's (2012) framework as a starting point.

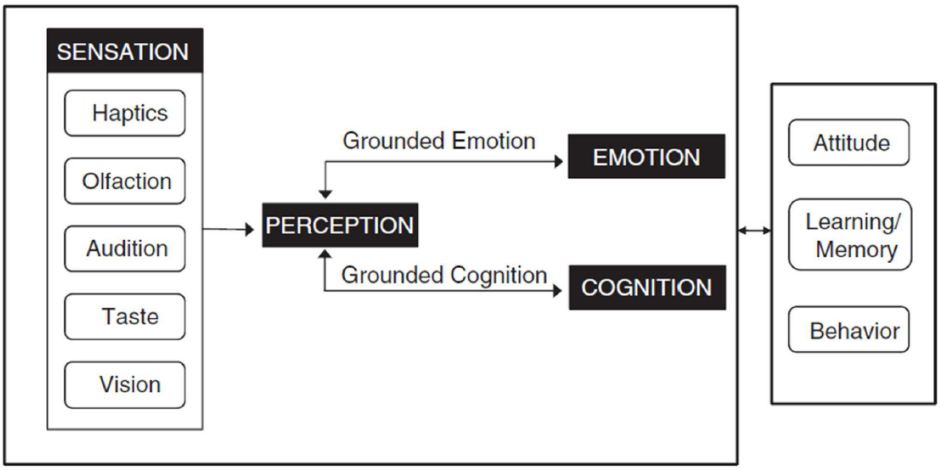

Figure 3. A conceptual framework of sensory marketing (Krishna, 2012, p. 335).

The model begins with sensation, the biochemical reaction when a stimulus reaches the receptor cells of a sensory organ. Perception, in turn, is the awareness or understanding of sensory information, formed in our brain. Importantly, this framework recognizes both pathways toward consumer reactions: emotion and cognition. As our body is involved tightly in the process, Krishna refers to *grounded* emotion and cognition. The process leads to various consumer responses, affecting our attitude, learning, and memory—and sometimes, ultimately, our behavior. The subsequent sections review key aspects of those senses that are primary dictated by our *cognition* and rationale; namely, vision, audition, gustation, and touch.

2.1.3 Highlights of vision, audition, touch, and gustation

Vision is a dominant sense—both in everyday life and in academic research. Studies into advertising have ensured that visual sensory input and the subsequent consumer responses have been extensively studied. In addition, visual illusions, or perception biases, have provided an intriguing research venue (Wansink & Van Ittersum 2003) and attracted attention outside academia as well (for excellent research examples

with broad publicity, see Kahneman 2011). Most of us are familiar with the illusion of two arrowed lines, one shorter and one longer, yet they share the same length, as originally presented by Müller-Lyer (1889) (figure 4 below).

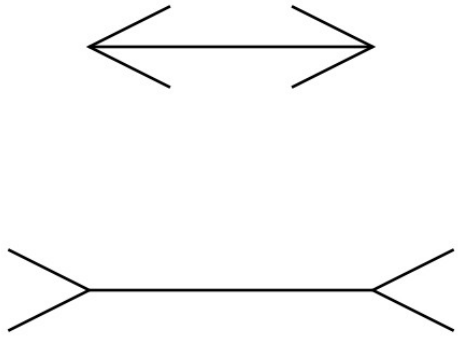

Figure 4. Example of a visual perception bias: so-called Müller-Lyer lines (Müller-Lyer 1889).

This visual perception bias has a substantive impact on consumer behavior. It affects our judgment of product sizes and actual consumption (Chandon & Wansink 2007). Visual sense often also dominates other sensory input. For instance, colors affect our perception of a product or environment. Warm colors like red and orange are more activating and hence connected to more arousing atmospherics, while cool colors, such as blue, are reported to result in a more relaxing and pleasant environment (Bellizzi & Hite 1992; Crowley 1993). In a product context, colors can interfere with flavor recognition and perceived flavor (Spence et al. 2010). For instance, a yellow-colored candy is more difficult to identify as cherry-flavored than a red one is. This food-specific visual bias will be explored further in conjunction with *taste.*

After vision, *audition* has also received rich attention in the academic research. And for a good reason: Much of marketing communication is auditory in nature. We hear advertisements in online videos and on the radio, including jingles and brand songs. Most public spaces have specific music as part of their ambience. Even our language affects how we perceive people, names, and brands. From a sensory marketing perspective, the topic of sound symbolism is particularly intriguing. Sound symbolism studies how the sound of a word affects our perception of the object. One of the best-known examples is from Yorkston and Menon (2004), who demonstrated that a fictious ice-cream named "Frosch" sounds creamier than "Frisch." In general, the letter "i" is connected to smaller or lighter objects, irrespective of one's first language (Nuckolls 1999). Consumers also evaluate brands more favorably if they perceive the sound symbolism of the brand name to be

congruent with expectations of that brand (Lowrey & Shrum 2007). Surely, if the real brand experience is different, consumers will correct their perceptions. Nevertheless, sound symbolism highlights the potential of new brand names, and even for some existing brands, the sound symbolism is apt for the brand. For instance, in chocolate bars, KitKat sounds short, crispy, and light, while Mars refers to a rounder, smoother, and heavier object. The original "kiki bouba" effect demonstrates the case well, as was briefly referred to in chapter 1. Figure 5 below presents the two shapes. Consumers universally associate "kiki" with the sharp, edgy object, and "bouba" with the rounder one.

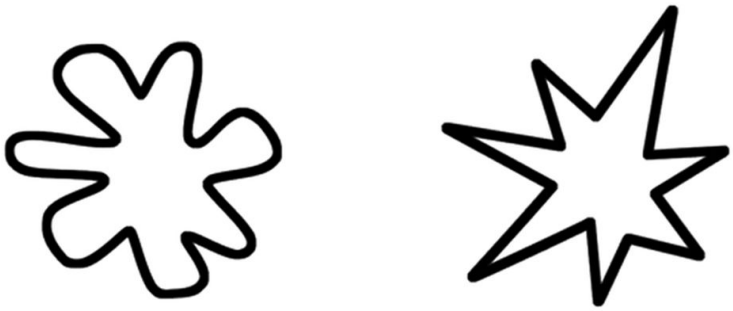

Figure 5. Bouba and kiki shapes (Chen et al. 2016).

Lowe and Haws (2017) demonstrated that sound symbolism applies not only to brand names per se, but to marketing communication as well: If a marketing message was communicated with a higher-pitched voice and sounds, it conveyed a vision of a smaller product size, while lower-pitched audio cues had the opposite effect.

Even though many aspects of sounds and sound symbolism are universal, our language also plays a role in how we interpret audio. English-speaking consumers tend to pay more attention to heard words, since the language system is sound-based. In contrast, Chinese consumers remember logos and visually presented brands better, as their language system is graphical (Meyers-Levy et al. 2010). Challenges may arise when marketing efforts go global. Ideally, auditory marketing should acknowledge different ways of processing auditory cues.

Music and jingles constitute another intriguing research stream within audio and marketing. Music offers a powerful stimulus to evoke cognitive, emotional, and behavioral responses in consumers. An everyday example is offered by gyms, where up-beat music cheers you on for better results, and another by the relaxing background music of a day spa. As for cognitive responses, classical music is matched with high quality and service (Baker et al. 1994; Areni 2003). Slow-tempo music in turn affects time perception, suggesting that slower music makes people spend more time in a store than intended (e.g. Yalch & Spangenberg 1993; 2000).

Similarly, music can enhance our mood, feelings, and emotions (c.f. Rajnish & Bagdare 2011). Moreover, the impact of music carries over to actual behavior as well. A rich body of research has demonstrated how slower or softer music increases time spent in a store—and even actual spending. However, determining what the optimal music should be like is not always easy, as research findings are versatile: Classical music (e.g. Areni & Kim 1993), unfamiliar music (Yalch & Spangenberg 2000), slow music (Caldwell & Hibbert 1999), and happy music (Brökemier et al. 2008) have all been reported to increase sales. It should be noted that, as with any sensory cue, less is usually more. Music can be powerful in environments and advertisements alike, but especially in advertisements, it can derail attention from the core message if the listener is not involved (Meyers-Levy et al. 2010).

Our sense of *touch,* or *haptics*, is perhaps less studied than vision and audio, but haptics has increased in interest in recent decades. The importance of touch has been established since ancient times—Aristotle even thought that touch mediated all other senses (Peck 2010)! Compared to vision and audio, touch is a direct sense, as consumers only feel what is in their immediate proximity. Therefore, there is no "ambient touch," as with visual, audio, or olfactory cues. In the marketing context, haptics is mostly studied through touching with the hands.

Touch can be reviewed as either instrumental or hedonic (Peck 2010). Instrumental touch provides a means to an end, such as by giving information on an object before purchasing it. At its simplest level, consumers use instrumental touch to put a package in their shopping cart, relying on autopilot and paying little or no attention to the haptic information. Touch can also provide other sensory information, such as holding a package to see the nutritional table on the back of the pack or holding a loaf of bread closer to your nose to assess the scent. In these cases, the role of touch is minimal and almost non-intentional.

However, instrumental touch can also be a primary source of information. Everyone who likes avocados can relate to the shopping mission of finding the perfect avocado. They look the same, do not make any sound, and they have no scent either. Therefore, the only way to evaluate the goodness of the produce is to touch it, feeling its softness or hardness and potential unevenness. As usual, the visual sense comes first and provides a rough estimate, based on previous encounters, but in many cases, touch is required to make a finer evaluation (Klatzky et al. 1993). Instrumental touch can sometimes be overlooked by marketers, even though it offers ways to differentiate a product and brand. For instance, natural snack packaging can enhance its naturality with packaging material that feels suitably "rough" and down-to-earth, while a smoothing concealer is likely more at home in packaging that communicates softness and evenness. Many consumers have an aesthetics-elicited touch; that is, they enjoy the feel of certain materials and shapes, but the determinants vary between consumers (Peck & Childers 2003a; Klatzky 2010). Therefore,

marketers should consider haptic cues from the total brand perspective. In addition to instrumental touch, some touch can be purely hedonic in nature: Touch is the end goal, usually to attain a positive, pleasurable, tactile experience. This kind of hedonic aspect, even without any link to a product, can be value-adding to a product (Peck & Wiggins 2006). It should be noted, though, that some consumers have a higher NFT than others do (Peck & Childers 2003b). When touching is not possible (e.g. in e-commerce), marketers can cover a lack of touch with proper verbal descriptions.

Interestingly, touching an item increases the feeling of ownership of it (Peck & Childers 2006; Peck & Shu 2009). Maybe, therefore, in e-commerce it is easier to add products to the cart but leave them there than in regular stores? Finally, touch can also have a negative consequence in marketing and consumer behavior. Dictated by disgust, consumers avoid products that they have seen others already touch (e.g. Argo et al. 2006).

Last but not least, our fourth sense to be reviewed in this chapter is *taste*, or *gustation*. Taste is surprisingly understudied in the consumer behavior and marketing context, even though it plays a pivotal role, especially in food-product marketing. As this thesis focuses on food products in a retailing context, this underrated sense deserves a healthy dose of attention. Taste is a peculiar sense as it is so often mixed with or influenced by other senses. Taste per se consists of five tastes: sweet, salty, sour, bitter, and umami. These basic tastes are sensed with our tongue, where—against common belief—the buds sensing different tastes are rather universally distributed (Huang et al. 2006). Humans are rather poor in distinguishing the basic flavors and their levels alone because we experience them almost always with other sensory inputs: aromas, colors, texture, fattiness, temperature, and so forth. Indeed, without other sensory cues, apples and potatoes are hard to tell apart from one another (Herz 2007).

Academic research has largely focused on the interlink between taste and vision. For instance, color has a well-established impact on perceived taste. In a study by DuBose, Cardello, and Maller from 1980, the identification rate of fruit-flavored drinks was as low as 20% when participants tested them blind but jumped to 100% with colors. Further, when a cherry-flavored drink was colored orange, a staggering 40% identified the flavor as orange. Color intensity is correlated with perceived taste intensity (DuBose et al. 1980). Next to the color–flavor interlink, visual cues heavily influence the perceived volume and consumption of food (see Wadhera & Capaldi-Phillips 2014 for a comprehensive review). For instance, a tall glass is estimated to have greater volume than a less tall glass. Logically, when a food product is packaged so that it is visible, more salient, or hedonic, it will be consumed in larger quantities (e.g. Chandon & Wansink 2002). Visual cues also affect taste and consumption volume through colors. In a study, researchers colored every 7th or 14th potato chip

red, which led participants to eat less than without these "interrupters" (Geier et al. 2012).

Smell has a close connection to taste and the two sensory experiences and perceptions often get intermingled. Smell is the most important driver of taste perception (Small & Prescott 2005). This is logical, as taste is usually preceded by a scent (orthonasal) and, again, when eating the food (retronasal). An appealing smell can encourage consumers to taste—such as a sampling activity in a supermarket. However, smell can also have a negative connotation, as is sometimes the case with cheeses or boiled cabbage or beetroot. With less inviting smells, consumers learn to appreciate them after once eating the food, as will be explored in section 2.2.

In addition to visual and olfactory cues, taste is largely impacted by audio. Imagine eating a potato chip that does not make a cracking sound; this would be interpreted as lower quality or as out-of-date. The effect has been confirmed by academic research as well (e.g. Zampini & Spence 2004). In advertising, ads that convey multisensory cues of the product improve perceived taste. To summarize, even though gustation is a less studied sense, our taste can be affected by numerous marketing means. In this chapter, the four senses of vision, audio, touch, and gustation have been briefly reviewed from a marketing angle. Following on in section 2.2, olfaction and scents are discussed in detail.

2.2 Olfaction and scents

2.2.1 Olfaction–emotion-wired sense

Olfactory sense, or *olfaction*, is the most primitive sense. Our noses are able to detect over one trillion olfactory stimuli (Bushid et al. 2014). Olfaction has guided us to survive—to detect an impending fire early enough, to avoid bad food, and to create a permanent bond between a newborn baby and its mother. Even today olfaction has a great impact on our lives. Without the smell, Coca-Cola and Sprite would taste the same (Herz 2007). Olfaction is also different from the other senses in that it is always present. As Harald Vogt, founder of the Scent Marketing Institute puts it (Vlahos 2007, p. 71): "Fragrance is the only thing left. You cannot turn off your nose. You have to breathe."

Generally, the term "odor" is used interchangeably with olfactory stimuli; that is, a stimulus consisting of olfactory components that our olfactory receptors react to (Bushid et al. 2014). Thus, an odor can be either positive or negative. Almost as a synonym, the term "smell" can also be either positive or negative, referring to the attribute that our nose detects. Scent is most often used in the context of atmospherics (e.g. Kotler 1974; Herz 2010), often with a positive connotation. In this thesis, we refer to odors and smells as general olfactory stimuli—scents as pleasant ambient

odors. The perfume industry additionally uses the term "fragrance" (e.g. Schilling et al. 2010), while aroma refers to food and the food industry (e.g. Yin et al. 2017).

Olfaction is our slowest sense. It takes almost half a second for the brain to register a sniff. After registering, it takes naturally even more time to process the information. Smells also linger for a long time. Whereas a sound is typically quickly experienced and over, a smell lingers for a varying time, depending on air flows and temperature. Odors' molecules are hydrophobic—in other words, odors are sticky (Herz 2010). Once you get that mouth-watering scent of freshly baked cinnamon rolls, your self-discipline must last longer than just a few minutes. However, our brain does try to protect us from an overdose of smells. Exposure to an odor produces the physiological process of *adaptation*. Adaptation occurs when odor receptors become internalized into their cell bodies so that they are no longer available to respond to an aroma (Firestein 2001). After a period of no exposure, receptors respond to the aroma's "normal" levels again (*disadaptation*). According to some studies (e.g. Moore 1994; Zufall & Leinders-Zufall 2000), short-term adaptation and disadaptation take less than a minute, whereas long-term adaptation can take several minutes (Zufall & Leinders-Zufall 2000), even 15–20 minutes (Herz 2010). A short exposure to an indulgent scent (less than 30 seconds) evokes a desire for the object, while a longer exposure (more than 2 minutes) tends to have a reverse effect (Biswas & Szocs 2019). Thus, a whiff of chocolate is tempting, but an eight-hour shift at a chocolate factory will likely obliterate any cravings for chocolate.

A majority of consumers have a normally functioning olfactory sense. Yet, it is estimated that roughly 5% of the population suffer from *anosmia*, a lack of functioning olfaction, accounting for over 3 million people (Philpott & Boak 2014). In elderly people, the percentage is significantly higher, closer to 20% (Murphy et al. 2002). Typical causes of anosmia are sinonasal diseases or viral infections (Damm et al. 2004), but also head injuries can cause loss or impairment of olfaction. On top of anosmia, 15–20% of the population suffer from an opposite condition, *hyposmia*, an oversensitive sense of olfaction (Mullol et al. 2012). Both anosmia and hyposmia negatively affect quality of life, especially if severe (Neuland et al. 2011). Anosmic individuals are more often in danger since they may not detect smoke or spoiled food, but on the other hand, hyposmic individuals are "hostages" to their environments that are so full of odors. Severely hyposmic individuals experience both physical pain and mental health issues (Neuland et al. 2011). It is not only hyposmic consumers, but also a more mainstream segment of the population who would prefer less-scented environments (e.g. Meng et al. 2018), which poses a challenge for olfactory marketing. The use of irritating substances in fragrances and other scents is restricted by legal entities (European Commission, Directive 76/768/EEC; Directive 67/548/EEC; Regulation 1223/2009; Regulation 648/2004),

and an international organization, the International Fragrance Association, gives additional recommendations for the safe and pleasant use of scents.

Olfaction is often described as the most emotional sense. While a universal definition of emotion hardly exists in the research, emotions refer to the affective processes that we experience (e.g. joy, anger, fear, happiness, pleasure) and that produce a bodily state (e.g. arousal) (Mulligan & Scherer 2012).

The close connection between emotions and olfaction has been neuroanatomically and psycho-physically proved. The olfactory nerve is very close to the *amygdala* (only two synapses away) (Herz 2010). The amygdala is the essential structure for the expression and experience of emotions (Aggleton & Mishkin 1986) and emotional memory (Cahill et al. 1995). The amygdala is needed in social learning based on rewards and punishments, too (Rolls 1986). The olfactory nerve is only three synapses away from the *hippocampus*—the part of our brain that is involved in memory and information selection (Herz 2010). The amygdala and hippocampus, partly together with the thalamus, comprise a complex that has been responsible for less cognitive, more emotional, and instinctive processes through evolution (Hansen et al. 2004).

What makes olfaction so special is how the sensory information is processed in our brains. Information from all the other senses is mediated through the thalamus—the rational part our brain—before reaching the amygdala and other parts of the brain. On the contrary, olfactory bulbs forward the information directly to those parts of the brain that are responsible for emotions and memories. In other words, smell is not influenced by reason on the way to the brain. Ellen, a Georgia State university marketing professor, concludes (Vlahos 2007): "All of the other senses, you think before you respond, but with scent, your brain responds before you think." Another apt description is offered by Hultén, Browenius, and Van Dijk (2009, p. 43): "It's hard to distort a smell experience, because it influences without the possibility of correction or transformation." Indeed, 75% of emotions are generated by smell (e.g. Bell & Bell 2007). Although research speaks for the emotionality of olfaction, Bone and Jantrania (1992) argue that it could be cognitions, rather than hedonics, that drive the olfactory effects in a marketing setting (Herz 2010). Either way, the end result is the same: We respond to a smell emotionally.

Pleasant smells typically induce positive emotions and attract us (Hummel & Nordin 2005). For instance, many fragrances are perceived as pleasant and therefore elicit positive emotions (Warrenburg 2005). Positive emotions can be, for instance, happiness and wellbeing, nostalgia, peacefulness, or intellectual stimulation (Ferdenzi et al. 2013). Analogically, unpleasant smells elicit negative emotions and act as warning signals (Hummel & Nordin 2005). A well-known example is chemicals with sulfate that generally disgust consumers, signaling their poisonous nature (Oaten et al. 2009). Unpleasant, aversive odors seem to be deep-rooted as a

warning mechanism: Research demonstrates that even if the aversiveness of an odor is counteracted with a pleasant auditory stimuli (music), olfactory processing still dominates in eliciting emotions (Berthold-Losleben et al. 2018).

Culture and gender can influence the affective reaction to odors. For instance, in Asian cultures, odors are more prominent and therefore the same dose of an odor may not be sufficient to induce an emotional response compared to European cultures (Ferdenzi et al. 2013). Women express more negative emotional reactions to "humanly" odors, such as body odors or leather, and also food odors (cheese, onion), and smoky odors. In contrast, men express their aversion more toward floral and vegetal odors (cucumber, magnolia) (Ferdenzi et al. 2013). However, the topic would require more research, as the identification of the odors used also has an influence on expressed emotions. Given the importance of odors in experiencing emotions, it is hardly surprising that olfactory dysfunction is connected to bipolar disorders (Henry et al. 2020), autism spectrum disorder (Tonacci et al. 2017), and other neurological conditions.

Even though the connection between olfaction and emotions is regarded as solid, a recent review of studies into olfaction and emotions revealed inconsistent findings and encouraged Lin, Cross, and Childers (2018) to address individual differences in consumers. Interestingly, a passive olfactory task (detecting a smell) ignites an automatic emotional process in individuals. When given a more challenging task, a smell seems to ignite a more cognitive process. Moreover, those individuals who are sensitive to smell tend to automatically suppress the emotional reactions to scents (Lin et al. 2018). This mechanism is hypothesized to be of a protective nature. It is also worth noting that studying olfaction and emotions is challenging as many studies use self-report questionnaires or pleasure–arousal–dominance (PAD) scales, yet emotions are quickly experienced and automatic and would therefore require physiological indicators, such as event-related potential (ERP) or other neuroscience methods (Morrin & Ratneshwar 2003; Lin et al. 2018).

Thanks to olfaction's direct connection to emotion processing, our smell-triggered *memories* are much greater than sight- and sound-triggered ones (e.g. Engen 1982; Herz 1998; Vlahos 2007). Odors are equivalent to other stimuli in their ability to elicit accurate recall (Herz 1998) but are proved to be much more emotional and more evocative; through scents, people feel more brought back to the original time and place (Herz et al. 2003; Herz 2004; Willander & Larsson 2006. Herz et al. (2003) went further and proved that personally important scents result in significantly greater activation in the amygdala than any other memory cues.

There are numerous notions in the literature about the special resonance of odor-evoked memories. The most famous one is undoubtedly described by Marcel Proust.

In his opus *À la recherche du temps perdu*[1] (1913–1927), he narrates his own experience of scents' power: Dipping a madeléine cookie into linden tea triggers in him a long-forgotten memory from his childhood, lively and powerful as if it had happened yesterday. Thanks to this well-known story, special, emotional smell-evoked memories are nowadays commonly referred to as the "Proust phenomenon" (e.g. Shattuck 2000). Later, for example, Hirsch (1992) investigated odors' role in nostalgia and lively memories, providing support to the phenomenon that Proust experienced. In the same way, having a whiff of coffee at the grocery store may bring back memories of morning coffee enjoyed at home and thus remind a consumer to buy a package. Before exploring our perception of scents, figure 6 clarifies the processing of olfactory versus other sensory cues in our brain.

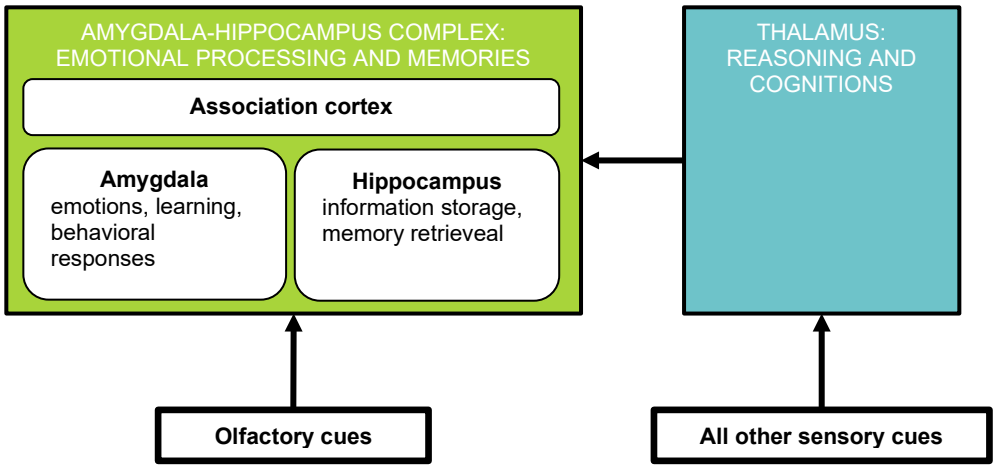

Figure 6. Processing of sensory cues in the brain: Olfactory vs. other sensory cues (adapted from Hansen et al. 2004, p. 8 and Herz 2010, p. 103).

As can be seen from figure 6 above, all other sensory stimuli are first processed in the thalamus, followed by the more emotional part of the brain. In contrast, olfactory stimuli are directly connected to the complex that handles emotions and memories and connects these two. The complex consists of the amygdala, the hippocampus, and a cortex that facilitates the information flow between the two parts. The distinction in how scents versus other sensory cues are processed is striking, given that extant sensory processing frameworks treat all sensory cues equally. For instance, the originally presented conceptual framework of Krishna (section 2.1.2) is precisely as the name implies—conceptual. It presents cognition and emotion as following from a perception of a sensory stimulus but equalizes the different senses,

[1] Proust, M. (1919). *A la recherché du temps perdu* (11th ed.). Paris: Gallimard.

giving only illustrative examples of the process. Such an approach easily ignores or downplays the more emotional role of olfaction that is already determined by our bio-chemistry.

2.2.2 Perception of scents

"Truth is subjective," philosopher Kierkegaard famously wrote. Once an olfactory stimulus has reached our brain, we start to form a perception of it and interpret it subjectively—just like any other sensory stimuli. These perceptions and interpretations are very individual. Hence the *perceived scent* may vary a lot between people. Processing an olfactory stimulus depends on (a) physiological factors that are either individual or equal across populations and (b) psychological factors that affect us on an individual level. In general, these factors affect our *olfactory performance*; that is, how easily and accurately we are able to detect a smell (olfactory threshold) and recognize what the smell represents (olfactory identification). Following the purpose of this thesis, the focus is on factors that are easy to measure and detect (age, gender) and psychological characteristics that can be relevant from a marketing perspective. Together, these qualities only scratch the surface of research into the versatile connection between olfaction and our characteristics. For instance, the impact of socioeconomic status (Fornazieri et al. 2019) is ignored.

Age is the single most significant physiological factor (Larsson et al. 2000; Hawkes & Doty 2009; Doty & Kamath 2014) affecting the perception of odors. In general, adults (between 20 and 60 years) are better at identifying smells compared to elderly people and children (Sorokowska et al. 2015. However, once adulthood is reached, olfactory performance impairs with age. This age-related impairment is two-fold: Older adults are less sensitive to odors (e.g. Cain & Gent 1991) and exhibit a poorer ability to name and identify olfactory information (Schemper et al. 1981; Doty et al. 1984). According to Larsson et al. (2000), the deterioration of olfaction with age is not general, but rather smell-specific. In other words, 50-year-old individuals may detect and identify some smells equally, but there may be inter-individual variances with other smells. Sensitivity to odors declines rather quickly as we age, whereas impairment in odor identification is less dramatic (Stafford 2012).

Children, in turn, improve their olfactory performance as they grow older. This progress, however, is not attributable to age per se, but rather to accumulating experience with odors and linguistic development (Monnery-Patris et al. 2009), and memory and cognitive development (Frank et al. 2011; Goswami 2011). In summary, there is a general negative relationship between age and olfactory performance.

Gender is another significant factor affecting our perception of scents. Traditionally, women were found to outperform men at all ages in olfactory abilities (e.g. Doty et al. 1984; Dorries 1992). This is not surprising, as women are also more sensitive to chemosensations and memory tasks involving odors and odor identification (Öberg et al. 2002; Olofsson & Nordin 2004). However, some research results indicate that there is no significant difference between men's and women's olfactory performance (e.g. Larsson et al. 2000). A recent meta-analysis suggests that the contradictory results may be due to the interaction between gender and age, so that women outperform men, but only in middle-age groups, and not in their childhood, teenage years, or when they reach a senior age (Wang et al. 2019). Therefore, it is advisable to review consumers as a whole when assessing olfactory performance. Whether women's actual olfactory capabilities are better or not, olfaction and smells play a bigger role in women's everyday lives. Namely, women rely on olfaction in everyday decision-making, social communication, and even when making product purchases more so than men do (Seo et al. 2013).

In short, demographic factors affect our sensitivity to and identification of odors. In light of the extant research, demographic factors are also of importance in olfactory marketing contexts (Chebat et al. 2009), not only in olfaction research per se.

In addition to physical factors, there are *psychological traits* that affect our olfactory perceptions. Personality traits have been defined as "an individual's characteristic pattern of thought, emotion and behavior, together with the psychological mechanisms—hidden or not—behind those patterns" (Funder 1997, pp. 1–2). Personality traits affect our olfactory performance in numerous ways: they influence odor sensitivity (Koelega 1970, 1994; Filsinger et al. 1987; Pause et al. 1998; Larsson et al. 2000; Havlíček et al. 2012), perceived odor intensity (Chen & Dalton 2005), odor discrimination (Havlíček et al. 2012), odor identification (Larsson et al. 2000), and even our reaction time to odors (Chen & Dalton 2005; La Buissonnière-Ariza et al. 2013). Some of the connections between personality traits and olfactory performance are hypothesized to be mediated through emotions—and as described in section 2.2.1, smells can generate a myriad of emotions.

There is some—yet limited—knowledge of which specific characteristics drive the differences in olfactory performance. For instance, *neuroticism and anxiety* are connected to both better detection of smells (Pause et al. 1998; Chen & Dalton 2005; Havlíček et al. 2012; La Buissonnière-Ariza et al. 2013) and discriminating and identifying smells (Larsson et al. 2000; Havlíček et al. 2012). Moreover, *socially agreeable* people tend to be more sensitive to odors in general (Croy et al. 2011). Interestingly, those individuals who are more constrained by social desirability (e.g. faking good) rely on olfactory cues in their everyday decision-making more than average (Seo et al. 2013). To sum up, some specific characteristics clearly alter our

olfactory performance, although research is scattered in terms of which characteristics have been studied and found relevant.

In a marketing context, psychological traits have received limited attention. Consumers who are *affect intense* (the degree to which an individual experiences emotions, Moore et al. 1995) experience more enjoyment when exposed to a pleasant smell compared to low affect-intense consumers (Moore & Homer 2000). These affect-intense consumers also produced more positive evaluations in a high-involvement environment when the environment was infused with a pleasant scent (Doucé & Janssens 2013). Another rather isolated characteristic that has been studied in a marketing context is the *impulsiveness vs. compulsiveness* trait. Less impulsive consumers seem to be more prone to the impact of scent when measured in terms of purchase behavior (Morrin & Chebat 2005).

Studying the potential moderating impact of our psychological basic characteristics—instead of the few separate ones studied so far in relation to olfaction—could help us understand what truly makes some consumers better "smellers" than others. Potentially, these differences have an important implication in terms of how we react to scents.

2.2.3 Evaluation and interpretation of scents

Once we have perceived a scent (partly dictated by our demographics and personality), we start evaluating and interpreting the olfactory information. Our innate response to a smell is not analytical, but hedonic, following the special connection between olfaction and the amygdala–hippocampus complex. In other words, our first reaction is not to ask what a smell is, but whether we like it or not (Herz 2010). Scent pleasantness is interrelated with scent familiarity: Smells that are already known to us appeal to us more than completely new smells do (Moskowitz et al. 1976). This implies that introducing a completely new scent might not work as well as expected due to its newness and unfamiliarity. Familiar scents are also more effective in the sense that they are more likely to elicit memories and thus affect people more emotionally.

Scent pleasantness is also moderated by its intensity. *Optimal arousal theory* suggests that all stimuli have an optimal level that produces the most preferred level of arousal (Berlyne 1971). When a stimulus is very weak, strengthening it results in a higher level of arousal, affecting humans positively. After a certain point, the stimulus in question becomes too distinctive, even annoying, thus beginning to affect perception negatively. The result is an inverted U-shape curve, generally known as a Wundt curve. Everyday examples include a gym session with background music that, when optimally intense but not too intense, gives an extra boost. The same music, however, turns quickly annoying and disturbing if adjusted to be too loud.

According to a study by Spangenberg et al. (1996), small changes in scent intensity do not affect results in a sensory marketing setting, as long as the intensity stays within a reasonable range so as not to become aversive. Also, the Wundt curve is not the same for all scents. Instead, a pleasantly evaluated scent is tolerated and preferred in higher intensities, whereas a more neutral (yet not unpleasant) scent only needs a low intensity to reach the optimum level. The scent's intensity is related to how we perceive the odor. An interesting finding made by Bosmans (2006) is that if the scent is congruent with the product, the scent continues to affect people's behavior—regardless of its way of affecting us. In other words, the scent works for the product (a) if it is subtle enough to affect people unconsciously or (b) even if we are aware of the scent's presence. Here, the scent's intensity naturally determines, to a great degree, whether we can become aware of it or not.

Another important factor affecting our evaluation and interpretation of a scent is its *processing fluency*. Processing fluency can be defined as the perceived or experienced ease of processing a stimulus (Schwarz 2004). Research suggests that scents that are easy to process lead to higher ease in terms of cognitive processing, while complex scents have no such effect (Herrmann et al. 2013). Therefore, simple scents (e.g. orange instead of orange—basil—green tea, Herrmann et al. 2013) elicit different consumer responses, such as increased spending (Haberland 2010; Herrmann et al. 2013).

The evaluation of a smell also depends on our culture because some smells are perceived differently in different cultures. Culture can be described as "the set of distinctive spiritual, material, intellectual and emotional features of society or a social group, and that it encompasses, in addition to art and literature, lifestyles, ways of living together, value systems, traditions and beliefs" (UNESCO 2002). Culture functions as a set of norms and a way to live but it also helps us make sense of everything that our five senses can recognize by giving meaning to them. It is widely known that culture affects the way we perceive and interpret visual cues (e.g. Frith & Tsao 1998). Although (or perhaps exactly since) olfaction produces a much more emotional, direct response, it is strongly affected by culture, too. This has been noticed in relation to "Sniffin' Sticks." Sniffin' Sticks is an odor-identification task to assess olfactory function and hyposmia. The test was developed in Europe and is commonly used in European countries. However, odor identification was noted to be strongly dependent on familiarity with the odors tested. Thus, the test results in Asia and America have been skewed. Cultural differences have forced researchers to discover ways to adapt the sniff tests to achieve valid results in other cultures, too (e.g. Shu et al. 2007; Konstantinidis et al. 2008).

The fact that some scents are so culture-specific is mostly due to odor-associative learning processes (see section 2.2.4). As explained earlier, many of our olfactory preferences are based on emotional associations (Fox 2008). How one feels when

first encountering the scent determines one's perception of the scent later. Thus, our response to an olfactory stimulus is cultivated by experiences—which differ from one culture to another (Lwin & Wijaya 2010).

When marketing with scents spread to Europe, cultural differences became obvious. Marketers quickly noticed that ambient scents used in the USA did not appeal to European consumers in the same way. An exotic coconut smell that was popular among American travel agencies was perceived as too sweet by a travel agency operating in Finland (Österberg 2008). This would seem to apply to other scents too, such as sweet vanilla and cinnamon (Achté 2009).

Lwin and Wijaya (2010) conducted a study where they explored the cultural associations of scents in low and high emotive contexts. It emerged that people from different cultural backgrounds associated partly very different smells with the same situations. Culture played an important role in shaping scent perceptions, especially in highly emotive contexts. For example, participants from Germany, the UK, and France mentioned scents of candles, beer, and Christmas (spices, mint) when asked what scents they associated with a happy celebration. Pakistanis and Indians, in turn, mentioned curry, spices, oil lamps, and incense. For European sensory marketers, it might perhaps be difficult to understand that the Chinese associate the smell of porridge, burned paper, and joss sticks with funerals. On the other hand, in low emotive contexts, people's scent associations seem to be somewhat uniform (e.g. the smell of a lemon is universally associated with a clean place).

In an earlier study, researchers tried to find common everyday odors and offensive smells that would be universal—and found it impossible (Schleidt et al. 1981). Also, the US army failed to create a "stink bomb" that would be unanimously considered unpleasant across various ethnic groups (Dilks et al. 1999). Considering how much the US army may have invested in the project it is no wonder that marketers find it hard to create appealing scents to suit every culture.

In addition to—and in interaction with—culture, *the scent itself* can influence its evaluation and interpretation. Natural smells, such as coffee, freshly-cut grass, or the sea, are often challenging to imitate with artificial scents. In fact, several studies into sensory marketing have pre-tested scents but only asked about their pleasantness or perceived congruence, but not about their correct identification (e.g. Spangenberg et al. 1996, 2006; Schifferstein & Blok 2002; Orth & Bourrain 2005; Morrison et al. 2011; Bouzaabia 2014), or have led respondents by asking directly about the fit (such as "When I smell this scent, I think about Christmas and the holidays," Spangenberg et al. 2005). The perfume industry has been wrestling with the same issue, trying to imitate delicate and often volatile odors such as floral scents (Schilling et al. 2010). Often artificial versions of less complex odors such as menthol or curry are more representative and thus are identified more correctly (e.g. Okutani et al. 2013). These odors are somatosensory stimuli (perceived also in the mouth), which can facilitate

identification. Correct identification does matter since it makes evaluation of the scent more positive (Ferdenzi et al. 2013). Creating artificial scents that are easily identifiable remains a challenging task for scent producers.

2.2.4 Odor-associative learning

The reason why the perceived smell can differ significantly from the original, objective smell, or why culture plays such an important role, is because humans *learn* to use sensory information as cues from the environment and interpret it accordingly (e.g. Engen 1991; Herz et al. 2004). There has been a long debate on whether odor preferences are learned or innate. Several experiments support the theory of hedonic responses to smells that are mostly learned through emotional associations (Herz et al. 2004; Herz 2005). Current understanding holds that we possess aversions or likings to a few smells and tastes that serve the purpose of protecting us—such as preferring sweeter flavors and smells that resemble one's mother's milk or disliking sour flavors and smells that can hint at spoiled (poisonous) food (Yeomans 2006). These preferences are already visible in fetuses: When mothers consume sweet drinks or food, unborn babies swallow more water in the womb; a reverse effect follows the mother's consumption of bitter or sour items (Huttu & Heikkinen 2017). Apart from these evolutionary-psychological mechanisms, most odor preferences are learned by acquiring pleasant or unpleasant experiences with those odors (Bartoshuk 1991; Engen 1991).

In general, *associative learning* has been defined as a process by which "one event or item comes to be linked to another because of an individual's past experiences" (Wasserman & Miller 1997, p. 574). A significant part of human cognition and behavior is based on associative learning (Wasserman & Miller 1997). There are three different theoretical approaches to how scents act as environmental cues, and how congruency can be created (e.g. Schifferstein & Blok 2002). It is worth noting, however, that the classification is not mutually exclusive but is rather illustrative.

First, in *paired-associate learning*, consumers experience an odor either simultaneously or consecutively with other sensory signals of an object. When the sensory signal corresponds with a particular object, it becomes congruent with that object (Herz 2005). An example might be a consumer visiting his or her usual bakery full of cinnamon scent; the consumer is served cinnamon rolls, and the cinnamon scent becomes a cue for the rolls. Exaggerated by generalization, paired-associate learning resembles classical conditioning. Research suggests that a visual–scent pair is affected by presentation order, so that when a visual cue is seen first, the learning process is facilitated (Bowers et al. 1994). If a scent is first presented alone, then is followed by a visual cue (color), the paired learning effect is less substantial. This

finding highlights the ecological nature of scents: Humans are poor at identifying scents as such, but instead need something to "anchor" them to.

Second, scents can also function as *contextual cues* (e.g. Tulving & Thomson 1973). Inhaling the smell of cinnamon rolls in a foreign city catches the consumer's attention because the odor is reminiscent of his or her usual bakery. The scent helps the consumer to seek the source of this smell in his or her environment; there must be a nearby bakery. In the case of contextual cues, the scent simply gives the consumer new or further information on the scent's source and draws attention to that source. Contrary to paired-associate learning, here the cue does not usually relate to an exact target (e.g. cinnamon rolls). Instead, the scent evokes broader contexts that are important to the individual, such as childhood memories experienced simultaneously with the scent, or simply a mood associated with the scent, or, in this case, the bakery back home.

Third, odors can create *thematic associations* (Schifferstein & Blok 2002). In forming thematic associations, a scent has not been previously presented with an object. Instead, the scent acts as a cue that consciously or subconsciously activates stored knowledge relating to the original object. The scent, the associations it produces, and the final target object must be congruent with each other for cueing to occur. For example, a consumer is looking for a new home and is shown an empty apartment that is full of cinnamon scent diffused by the realtor. Empty homes do not usually smell of cinnamon; that is, they are incongruent with each other. However, together with other environmental cues, the cinnamon scent can make the consumer think more positively of the home thanks to the warm feelings that the consumer has learned to associate with cinnamon scent.

2.2.5 Cue congruence and cross-modality

As described in the above sections, smells are part of the environment, and we learn to associate smells with certain events, places, or other parts of our surroundings. Our brain tries to find a *congruence,* or a fit, between the perceived scent and other parts of the environment. This is an example of the *holistic view*, according to which people respond to their environment holistically. In other words, it is not the individual stimuli, but rather the total configuration of stimuli together that dictate people's response to the environment (Holahan 1982). Interestingly, this theory, that has developed in environmental psychology, has its equivalents in consumer research as well (Bell et al. 1991), termed as an *aesthetic complementary*, and in art philosophy, it is called *the principle of unity-in-variety* (Beardsley 1981). Congruence can be regarded as one of the leading factors in the perception of sensory cues.

Cue congruence can be defined as "the degree of fit among characteristics of a stimulus" (Krishna et al. 2010, p. 410). Bone and Jantrania (1992) were among the first to apply the concept to the context of olfaction and scents but used it to characterize the consistency between elements of a certain product: the smell of the product and all other elements of it.

The literature on olfactory cues and marketing advocates the use of congruent scents, regarding congruence as almost a mandatory aspect to produce a desired consumer effect compared to an incongruent or no-scent condition (e.g. Schifferstein & Blok 2002; Spangenberg et al. 2005). Since our brain responds positively to congruence, congruent scents are often more fluent to process (Haberland 2010).

The extant research has demonstrated that congruence can be created between the scent and a range of different targets. First, cue congruence can be approached from an atmospheric perspective—fitting a scent to a broader environment such as a store or mall. This often results in a thematic fit—such as pairing a Christmas scent with Christmas music (Morrin & Chebat 2005), or a lady-like (gender-congruent) rose scent with ladies' clothing, and, respectively, a more masculine rose maroc scent with men's clothing (Spangenberg et al. 2006). Other sensory cues, especially music, have also been successfully matched in an atmospheric or thematic match. Examples include atmospheric congruence between background music and flooring in a retail environment (Imschloss & Kühnl 2017) and adding jazz music to fit an upper-scale retail store experience (Helmefalk & Hultén 2017). This type of atmospheric or thematic congruence is successful in practice, proof of which is provided by many lifestyle or clothing brands such as Abercrombie & Fitch, Hollister, and Tommy Bahama (Kozinets et al. 2002).

Secondly, congruence can mean a tighter fit between a scent and a pre-determined object. Targeting a single product enables the creation of a distinctive fit, such as a coconut scent with sunscreen (Bone & Jantrania, 1992) or an orange scent with oranges (Seo et al. 2010). A tighter congruence enhances *selective attention*, drawing consumers' attention to that specific object (Seo et al. 2010). Such selective attention is beneficial if the aim is to distinguish one product from other products (e.g. oranges from other food objects, Seo et al. 2010; soccer magazines from other magazines, Schifferstein & Blok 2002). In general, a tightly congruent scent ensures that the object becomes *differentiated* from its environment.

Congruence can also be created between a scent and a group of objects, such as a product category. The literature investigating this scope of targeting is very limited; Mitchell et al. (1995) found that a general chocolate scent made consumers exhibit more variety seeking between the available chocolate options. When the target is broader than one product, a scent can highlight the *attribute or feature similarity* of the objects. The human brain is hard-wired to seek similarities and patterns in the environment, and a high level of similar features among objects is easier for the brain

to process (Eysenck & Keane 2005). For instance, launching a new line extension is successful when it shares enough attributes with the rest of the portfolio (Park et al. 1991). This type of feature similarity is broadly studied in visual cues (e.g. Jolion 2001), but less studied in olfactory cues. In the case of Mitchell et al. (1995), a chocolate scent facilitated consumers' information processing as they were more holistic in processing the information about available options and spent more time on choosing a product. Intriguingly, the chocolate scent that shared the common feature of all chocolates also made participants exhibit more variety seeking.

When it comes to incongruence, research is more limited. A study by Haberland (2010) suggests that a moderately incongruent scent can facilitate a consumer response (increase in spending), leaning on the theory of elaboration likelihood: An incongruent scent can provide new, additional information instead of (congruent scent) repeating information already found in the environment. The same study found, though, that if the scent becomes too incongruent, the effect defaults.

In a sensory context, congruence is often triggered by *cross-modality*; that is, the interplay of our senses. Cross-modality can be regarded as part of humans' innate tendency to seek consistency and logic. But because scents are processed less analytically than other senses are, we become particularly reliant on our other senses. A classic example is the smell of parmesan cheese. Although the smell may not be pleasant as such, it is congruent with delicious cheese, and is hence regarded as a fit with the cheese. When participants were asked to smell the same scent, labeled as "vomit," the smell was evaluated as revolting (Herz & von Clef 2001). When people walk past a pizzeria, they interpret the scent of garlic as the scent of pizza itself, because the smell of garlic is so congruent with pizza (Herz 2010). Thus, the cross-modality of a sensory input can alter the perceived pleasantness of a scent dramatically.

Analogically, the perfumery business utilizes colors, words, and aspirational atmospheres to convey the desired interpretation of an eau-de-toilette. A generic citrus notion quickly turns into a hint of lemon meringue or a Sicilian breeze in your brain, depending on the description in the advertisement. Similarly, colors can help consumers detect and interpret scents. When a color is matched with an odor so that they form a clear association (for instance, a red color with cherries), consumers' response is quicker and more accurate than if the color and odor have a weaker association fit (such as red with citrus fruit) (Zellner et al. 1991; Dematte et al. 2006).

Moreover, colors that people choose to fit a fine fragrance are influenced by the perceived masculinity/femininity of those fragrances (Zellner et al. 2008)—yet other proof that cross-modality does not take place only between two senses but is a broader creation instead.

Cross-modality can be used the other way around as well. In atmospheric planning, a space can be infused with a scent that matches a certain color or a desired

impact—for instance, a calming scent to reinforce a peaceful, relaxing atmosphere of a day spa. Similarly, the smell of freshly-cut grass helps evoke thoughts of spring at a gardening store already in the earliest days of spring.

An interesting recent advancement in cross-modality research has been on sensory compensation effects (Biswas & Szocs 2019). When participants in a supermarket and a school cafeteria were exposed to an indulgent scent (pizza scent; cookie scent) for a longer period (2 minutes), they purchased less unhealthy foods, compared to a no-scent or a non-indulgent food-related scent condition. According to the authors, the effect is induced by *compensation*, whereby a stimulus in one sensory modality (olfactory) already satisfied the desire related to another sensory modality (gustatory). Key to this compensation effect seems to be a prolonged exposure to a sensory stimulus. Fascinatingly, when participants were exposed to the indulgent scent only for a brief moment (less than 30 seconds), the effect was reversed: They bought more unhealthy, indulgent foods. These results can be explained by adaptation and disadaptation: After a longer exposure to a scent, our brain becomes used to the stimulus and ignores it (section 2.2.1).

Cross-modality does not only occur between the usual suspects like smell and taste or smell and labeling, as mentioned above. Our language is shaped so that it also affects perceived smells (and vice versa) in more indirect, discrete ways. For instance, a fishy smell increases suspicion toward other people (Lee & Schwarz 2012). In the well-known reasoning task called Moses illusion, people are asked how many animals of each species Moses took on the Ark. Many people intuitively answer two, although Moses had nothing to do with the Ark; it was Noah who guided the animals. Interestingly, when the task is performed under a faint fishy smell, people detect the fraud significantly more often—because they become more suspicious. In fact, dubious or suspicious action is described with words related to fishy smells in 18 languages (Lee & Schwarz 2012). A firm engages in "fishy business" if a person does not pass the "smell test." Previously, such metaphors were thought to be a mere sign of rich language, but recent research has demonstrated that abstract concepts are grounded in a more concrete sensory experience in the physical domain (Schwarz & Lee 2018).

To summarize, scents are never processed in isolation. The perceived fit (a) among different sensory cues and (b) between the scent and its target dictate the lion's share of how positively we respond to it. Depending on the overall configuration, a scent can affect our *behavior*. Let us next review literature on consumers' *purchase behavior* theory and how sensory marketing can participate in the different stages of the purchase path.

2.3 Purchase behavior in fast-moving consumer goods

2.3.1 Path to purchase: antecedent factors

FMCG live up to their name: items that rotate quickly off the shelves, typically sold in regular retail channels (definitions vary; see a good overview in Solomon et al. 2006). FMCG have provided a limitless playground for consumer research. In this chapter, we focus on FMCG and purchase behavior, understanding what drives our decisions and consumption of FMCG, and relating it to the previous chapters of sensory marketing and olfaction.

While FMCG is an umbrella concept that covers packaged food, beverages, and personal hygiene products alike, there are certain commonalities that theories use to explain consumer behavior in that context. First, researchers agree that a full problem-solving model is unnecessary as the buying behavior is mostly characterized by habitual, routine behavior or limited problem-solving. Figure 7 below clarifies the limitations.

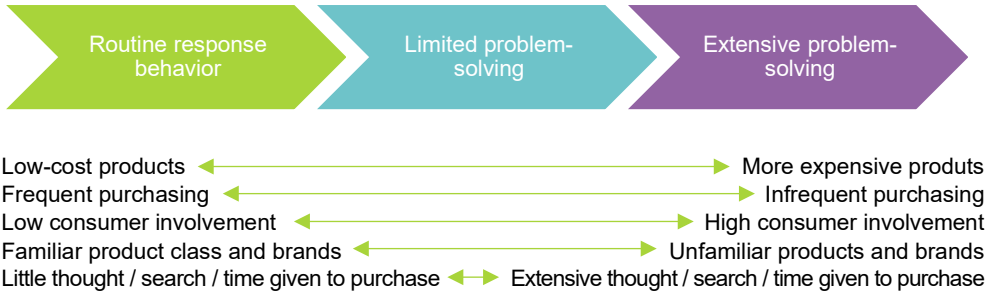

Figure 7. A continuum of purchase decision behavior (adapted from Solomon et al. 2006, p. 261).

Our focus is on products that are typically *low-cost and bought frequently, with rather low involvement*. This does not mean that all pre-purchase action would be equal across consumers. Instead, those purchases have traditionally been clustered to planned versus unplanned purchases. To generalize the classification from a few classic papers, shoppers can be categorized as planners, partial planners, and impulse purchasers (e.g. Cobb & Hoyer 1986; Iyer & Ahlawat 1987). Planners usually know in advance which product—and even which brands—they will buy before entering the store; partial planners tend to leave brand decisions until at the shelf; impulse purchasers most often skip planning altogether.

Nowadays, the marketing research community acknowledges that the dichotomy is not black and white, but closer to fifty shades of gray. The *theory of planned*

behavior (TPB), widely used in psychology, has taken a foothold in marketing research recently. TPB posits that the behavioral intention underlying an actual behavior depends on several situational factors (Ajzen 1991)—attitudes toward the behavior, subjective norms, and perceived behavioral control—and that these three factors influence our intentions and hence explain most variance in actual behavior.

In an FMCG context, TPB has been reviewed in several food categories (see e.g. Mullan et al. 2013; Al-Swidi et al. 2014), exemplifying the factors of TPB in the purchase planning phase extremely well. One surprisingly well-studied category in the TPB is organic food. Organic food has a healthy and sustainable image, and many consumers claim that they want to buy it. However, the number of actual buyers remains low, even in those markets where it has become "mainstream," such as in Finland (Tarkiainen & Sundqvist 2005). This dilemma has encouraged a rich body of research into the topic. Studies have demonstrated that especially *subjective norms* have a substantial impact on buying intentions. In essence, subjective norms shed light on how consumers *believe* to be seen by their reference groups if they have carried out a certain behavior. Put another way, it is about perceived social influences and pressures to indulge or not to indulge in a given behavior (Ajzen 1991; O'Neal 2007). In the FMCG context, a useful imaginative question could be: "What would my friends say if they saw this shampoo in my bathroom?", or, in the case of organic food specifically: "Should I buy these organic broccolinis for our barbeque night? What will others think of that?" Subjective norms affect purchase intentions both directly (Chen 2007; Voon et al. 2011; Al-Swidi et al. 2014) and indirectly via *attitudes* (Al-Swidi et al. 2014). Lastly, *perceived behavioral control* reflects an individual's perceived ease or difficulty in performing that actual behavior.

This example of TPB highlights the complexity of the first steps on the path to purchasing. No matter how "objectively relevant" an item was, the subjective beliefs of the consumer interfere with the process. Consequently, the dichotomy of planned versus impulse purchases is also not entirely waterproof. In fact, the free will of a consumer can be questioned already at these early stages of the process. Even if a shampoo was on the shopping list, it might not turn into a real purchase intention—not to mention the final purchase decision.

For a marketer, especially for a sensory marketer*, the means to influence consumers during these early steps on the purchase path are arduous*. A marketer can try to influence the subjective norms mainly by making the brand and product socially acceptable to the target group, which requires a deep understanding of the underlying reference groups and values. For branded goods, this exercise calls for a spot-on position, and this is where sensory marketing comes into play. Research has well established that (multi-)sensory marketing makes a brand more salient (Krishna 2013). A congruent scent improves brand recall and leads to a more favorable evaluation of the brand, at least if the brand is unfamiliar to begin with (Morrin &

Rathneshwar 2000). Olfactory cues also assist in advertising: Advertisements for an orange juice brand were evaluated more positively when a scent was present (Bosmans 2006), and scents improve verbal recall from pictures (Lwin et al. 2010). A scented ad (versus a non-scented ad) increases the perceived proximity of the product, which in turn leads to higher product appeal (Ruzeviciute et al. 2020). However, the effect only applies to products that are expected to smell (e.g. a scented candle but not a drinking glass). Additionally, marketers can use olfactory cues to activate positive autobiographical memories connected with the brand, since scent-triggered memories are more permanent and easily retrieved than other (visual, audio) cues are (Chu & Downes 2002; Willander & Larsson 2006).

Other sensory cues have similar positive effects. In terms of audio, marketers can ensure that a brand name is optimally sound-symbolized: A brand name that sounds congruent with expectations is evaluated more positively (Lowrey & Shrum 2007). Research has studied many fictitious brands, such as the ice-cream brand "Frosch" that was perceived as creamier than "Frisch" (Yorkston & Menon 2004), but prime examples can also be found from real life. For instance, the car brand "Mini" has capitalized the letter "i" in its brand name, being strongly correlated with smallness (e.g. Spence 2012). There are numerous local brands in each market that have—perhaps unconsciously—benefited from sound symbolism. Let us mention a Finnish benchmark called "Tupla," a hefty chocolate bar full of energy and flavor. Music also helps brands by making the advertisements more persuasive (Park & Young 1986) and engaging (MacInnis & Park 1991; see Meyers-Levy et al. 2010, for an excellent overview of audio impacts).

To summarize, it is surely possible to influence consumers' purchase behavior in the early steps of the process, even with the aid of sensory marketing. Nevertheless, this strategy of long-term efforts does not seem to suffice in FMCG contexts, as the majority of purchase decisions are estimated to be made in the store (Nielsen 2016). Therefore, situational factors that affect consumers while they are *in* the store are often more important.

2.3.2 Path to purchase: in the store

The second half of the purchase decision process takes place in the store. In the FMCG context, this should actually be described as 70%, as the majority of purchase decisions are either partially planned, unplanned, or pure impulse buying. While the figure can seem more of a marketing legend than an actual number, studies suggest that this percentage, originally launched in 1965, is still quite valid: POPAI (Point-of-purchase Advertising International) has repeated their measurements in numerous markets, and so have giants of the branch such as Nielsen (2016), all landing between 65% and 80%. Somewhat misleadingly, many papers and most public discussions

only refer to impulse buying as a synonym for in-store purchase decisions. The definition of *impulse buying* has varied; from the early 1950 definitions by Clover to later addressing variations in product categories and shoppers' individual traits. (For a full chronological summary of its definitions from the 1950s to the 2010s see Muruganantham & Bhakat 2013.) The early definitions focused solely on the products, while more recent research, triggered by Piron (1991), acknowledges that impulse buying is strongly correlated to consumer traits. In this section, *we focus on in-store buying in general*, and deep-dive into hedonic versus utilitarian differences in categories and consumers in the subsequent section 2.3.4.

In the store, consumers are influenced by a myriad of situational factors. In the FMCG context, such established and well-studied factors are presented below in figure 8.

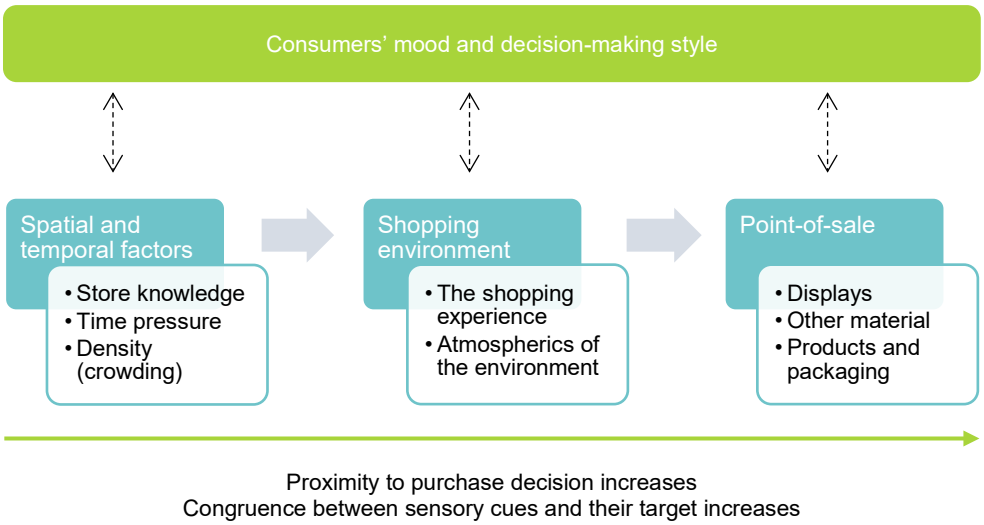

Figure 8 In-store situational factors affecting purchase behavior.

Consumer's mood

A consumer is an active agent and the consumer's own mood constitutes a pivotal factor of in-store behavior (e.g. Sherman et al. 1997; Solomon et al. 2006). Some literature positions this antecedent state as occurring before entering the store, while others review mood as part of in-store factors. This research reviews it as part of in-store behavior, since mood is a cornerstone in classical approach–avoidance behavior theory (Mehrabian & Russell 1974), acting as a filter between environmental cues and evaluations and behavior.

Researchers have offered heterogenous *definitions* for a mood. A mood can be regarded as a subconscious affective state, without an explicit stimulus or target (the

so-called backdrop view, as introduced by Luomala & Laaksonen 2000). According to this view, moods are pervasive or rather ubiquitous, although not as intense as emotions. Alternatively, moods can be reviewed from a motivational viewpoint (Luomala & Laaksonen 2000). This view emphasizes the "why" question, highlighting that moods are conscious, and while their target may be unspecific, this viewpoint defines moods as stimulus-specific. They are not as transient as the backdrop view proposes. All in all, both schools of thought recognize moods as broad affective states, in comparison to emotions (Gardner 1985; Rusting 1999). In general, a mood state, let it be positive or negative, biases judgments of the environment and the direction of the judgment (Andrade 2005). Consequently, it also influences actual purchases (see the review by Gardner 1985; Dawson et al. 1990). For instance, a positive mood results in a higher perceived price value benefit in price promotions, and analogically a negative mood diminishes the perceived value of the price promotion (Hsu & Liu 1998). It is worth noting that consumers' purchase behavior can also be influenced by consumers' *emotions*, as indicated in section 2.2.1. Emotions have equally varying definitions as mood, but in general, emotions are described as relatively short-lasting, as compared to moods, and focus on concrete objects (Mulligan & Scherer 2012). Since emotions are more fluctuating, a consumer can experience innumerous, often competing emotions while being in the store. Therefore, it can be argued that it is riskier and more challenging to try to influence a consumer's *emotions* than to influence their more prevalent, static *mood*. Therefore, the focus here is on mood rather than on emotions.

Sensory marketing can help in improving the consumer's mood in general. Most studies into olfactory cues and consumer mood support a relationship, which is presented briefly in table 1 below. Regrettably, many studies to date have focused on mood itself and not on a real behavioral outcome in a retail setting. Those studies that have included real-life experiments demonstrate that the moderator effect of mood works: Customer *spending* has also increased as an outcome of a more positive mood induced by olfactory cues. Of the other sensory cues, music has established a similar positive impact on mood (Bruner 1990; North & Hargreaves 1999). Colors, too, can influence the consumer's mood, as briefly discussed in section 2.1.3.

Table 1. Olfactory cues and their impact on the consumer's mood and affective state.

Authors	Environment	Scent's impact on mood and affective state	Impact on purchase behavior
Ehrlichman & Halpern (1988)	Laboratory experiment	Odor can influence mood, which may mediate congruent memories	N/A (not studied)
Bone & Ellen (1999)	Laboratory experiment	Review of older research: contradictory results on mood, support for affective responses	N/A (not studied)
Fiore Et Al. (2000)	Laboratory experiment	Scent had an effect on the affective state that partly mediated the effect on attitudes toward products and approach behaviors	N/A (not studied)
Haberland (2010)	Home decoration store	Easy-to-process scent influenced consumers' mood and other affective responses toward the store	Increased spending
Chebat & Michon (2003)	Shopping mall	Increased arousal and spending, resulting from positive perception of the shopping environment and better mood	Increased spending
Ebster & Jandrisits (2003)	Retail store	A congruent scent at the point-of-sale improved consumers' mood (irrespective of whether mood was negative or positive to start with)	N/A (not studied)
Teller & Dennis (2012)	Shopping mall	*Relationship with mood or affective state not supported*	No impact on spending
Doucé & Janssens (2013)	Fashion store	Positive influence on affective reactions	Increased spending but only among affect-intense consumers
Morrison Et Al. (2011)	Fashion store	Under scent and music condition: arousal and pleasure, which triggered behavioral responses	Increased spending, among young consumers
Helmefalk & Hultén (2017)	Retail store	Multisensory congruent cues (scent and music) influenced shoppers' emotions, through valence	Increased spending

It is worth noting that mood is an underlying factor of in-store behavior that, as described above, can have an impact on behavioral outcomes as such. In addition, mood can moderate the responses that are shaped by other situational factors, which will be discussed in the remainder of the chapter.

Consumer's decision-making style

Another factor that underlies all in-store decision-making is the consumers' decision-making style (CDMS). CDMS theory postulates that consumers possess different patterns or ways of making purchase decisions, and that these patterns or styles are constant; consumers rely on these behavioral patterns as opposed to developing new decision-making strategies each time they face a (purchase) decision moment. Originally, CDMS was defined as "a patterned, mental, cognitive

orientation toward shopping and purchasing, which constantly dominates the consumer's choices" (Sproles 1985, p. 79). Importantly, this orientation shapes consumers' choices in a constant manner (Sproles 1985).

The original version classified consumers into eight groups, known as the Consumer Styles Inventory (CSI; Sproles & Kendall 1986). Despite later criticism toward the concept and its validity (c.f. Mishra 2015), the CSI provided a pioneering tool for retailers and marketers to classify their consumers in a meaningful way, helping in targeting the right type of consumers. From the original model over 30 years ago, some characteristics are particularly fit for retailing, while others are more tailormade for clothing or other higher-involvement products. For instance, the original model includes "Price Consciousness" to describe how some consumers are more eager to hunt for value packs than others are. Another example is "Recreational/Hedonistic Consumers," which aptly catches the hedonic orientation of some consumers (a more in-depth discussion will follow in section 2.3.4). A third class, "Quality Conscious," also called perfectionists, describes those consumers who are always searching for the high-quality options of items available. The CDMS was later advanced and refined, ranging from a category-dependent model (Bauer et al. 2006), to a version for food products (Anić et al. 2014), health-oriented organic food buying (Prakash et al. 2018), and even for wines (Neeley et al. 2010). Interestingly, in all these recent studies, the three above-mentioned classes (Price-Value Conscious, Recreational/Hedonistic Consumers, Quality Conscious/Perfectionists) have proven valid, and those are present with slightly varying labels or descriptions in other recent studies as well (e.g. Makgosa & Sangodoyin 2018).

CDMS has not only received attention from academia, but even more so from retailers in the form of loyalty card programs. Consumers' emotions or moods may be elusive, but certain decision-making patterns and habits are seen as more constant and therefore worth consumer classification. Retailers established loyalty card programs mostly in the 1990s to collect such consumer knowledge (Mauri 2003). Loyalty card programs, in essence, reward consumers for shopping at a certain retailer, while helping the retailer to build a picture of shoppers' patterns (Mauri 2003; Liu 2007). Academic research into real retailer databases has confirmed that different consumer segments—with regard to purchase behavior specifically—exist within a loyalty card system, and that those segments should be targeted with different marketing strategies for maximum behavioral responses (Allaway et al. 2006). Sensory marketing research has already demonstrated how consumers from various CDMS segments react differently to a sensory stimulus, but regrettably, research that integrates *loyalty card data* and sensory marketing is still missing.

Spatial and temporal factors

Of all the situational factors, spatial and temporal factors interfere as soon as the consumer enters the store. Store knowledge, time pressure, and crowding all influence purchase behavior. In a classic study by Park, Iyer, and Smith (1989), *knowledge of a store's layout* facilitated finding one's favorite brand—hypothesized to result from more cognitive capacity to engage in the actual shopping rather than focusing on finding one's way in a store. It is commonly acknowledged that the store layout has an influence on in-store shopping behavior and increases impulse purchases (Zentes et al. 2011). *Time pressure*, in turn, made it more difficult to stick to the intended purchases (Park et al. 1989). Generally, retailers wish consumers to spend more time in the store, as this has been linked to higher purchase value (e.g. Grewal et al. 2018). This is especially relevant today, as consumers are increasingly time-pressured and try to minimize time spent on grocery shopping. *Retail density* is a third interrelated situational factor that describes how many shoppers are in the store simultaneously (i.e. crowdedness). Research has established an inverted U-shaped curve between crowding and shopping satisfaction (e.g. Eroglu, Machleit & Barr 2005), demonstrating that under medium crowding, the environment is perceived as more distressing and most consumers try to exit the store as quickly as possible—and end up spending less on the "wrong" items. The consumer's mood is an underlying factor that tends to fortify the impact of spatial and temporal factors: for instance, when already in a negative mood, a crowded supermarket can appear even more crowded than it actually is (Pons et al. 2014).

Sensory marketing has proved a powerful tool in facilitating and improving these spatial and temporal factors. First, sensory cues can assist in store navigation. For instance, digital signage is more effective if it uses sensory-affective content (little functional information) (Dennis et al. 2013). From an attention theory perspective, sensory-rich information is often easier to process than mere textual information is. For instance, a signage with pictures of cheese is faster to process than a sign with the word "cheese." In addition to scents and music, the literature is rich in studying the positive impact that lighting and colors can have on the shopping environment. However, since these factors focus more on general store atmospherics than purchase behavior, we settle on this by providing references to comprehensive reviews, such as those by Roschk et al. (2017) and Turley and Milliman (2000).

Second, especially olfactory cues influence perceived time pressure. Ambient scents, when infused in a retail store, make grocery shoppers lose track of time, spend more time in store, and make more unplanned purchases (Spangenberg et al. 1996; Leenders et al. 2019). Moreover, ambient scent is particularly effective for time-pressured shoppers: Even a lower intensity scent is enough to relax hurried customers (Leenders et al. 2019). Music has similar desired effects as scents do, as established by several studies. In a supermarket environment, pleasant background

music increases time spent in the store (and hence consumption) (Milliman 1982; Smith & Curnow 1966; Sullivan 2002). Music, just like scent, can effectively offset the annoying impact of crowding (Eroglu, Machleit & Chebat 2005). However, unlike scents, music seems to trigger more varying responses from different target groups, such as older versus younger adults (Yalch & Spangenberg 1993) and women versus men (Andersson et al. 2012), which can make it difficult to find an all-pleasing music and prompt positive responses across the clientele base. In this aspect, scents seem a more universal means of influencing the situational factors in store.

Third, Michon, Chebat, and Turley (2005) further demonstrated that olfactory cues can even change the perceived crowding. Under medium retail density—regarded as the most annoying level of crowding—, an ambient odor positively influenced shoppers' responses. To summarize, sensory marketing facilitates the creation of positive temporal and spatial factors. However, since our focus is on clearly definable targets and the thesis aims to confirm a direct link between olfactory cues and purchase decisions, spatial and temporal factors are less important for this thesis.

Shopping environment

Next to spatial and temporal factors, the experience of a shopping environment is also connected to purchase behavior. *A pleasant shopping environment and shopping experience* are positively linked to purchase value and volume (e.g. Kotler 1974; Herrington 1991; Mattila & Wirtz 2001). Kotler already defined atmospherics in relation to purchase behavior: "[Atmospherics are] the conscious designing of space to create certain effects in buyers. More specifically, atmospherics is the effort to design buying environments to produce specific emotional effects in the buyer that enhance his purchase probability" (1974, p. 50). In other words, it was already recognized in the 1970s that a pleasant shopping environment not only has a face value but can and should increase the chances of a purchase decision. In FMCG, there is less interaction with sales personnel, which gives store atmosphere the lead role of facilitating purchase decisions. However, due to the habitual, low-involvement nature of FMCG, atmospherics are considered less important overall than in service businesses or with high-involvement products.

As with spatial and temporal factors, the consumer's mood is also interrelated with the shopping experience and environment. A pleasant shopping environment and experience can enhance the consumer's positive mood through pleasure and arousal (e.g. Sherman et al. 1997), and similarly, a positive mood facilitates the perception of a pleasant environment (e.g. Sherman et al. 1997; Babin & Attaway 2000; Solomon et al. 2006).

Sensory cues are extensively studied in creating a pleasant shopping atmosphere. Ambient scents make consumers evaluate the atmosphere and/or experience more favorably (e.g. Chebat & Michon 2003; Spangenberg et al. 2006; Teller & Dennis 2012). Notably, most of these studies have been conducted in either a mall (Teller & Dennis 2012) or a specialty store (Chebat & Michon 2003), emphasizing an indirect connection to the ultimate purchase behavior. Helmefalk and Hultén (2017) broadened the approach to include a supermarket and found a positive correlation with sales, but there was no mention of which categories or products benefited from the experiment. Instead, what is common to atmospheric sensory marketing is the use of generally pleasing cues to *indirectly* affect consumers' behavior. Findings across different sensory cues (scents, music, colors, lighting) suggest that sensory cues can have a positive (or negative) impact, but that (a) it can be hard to please every shopper and that (b) some results could also be explained by other factors, such as consumers' individual traits (Ramlee & Said 2014). Since our focus is on purchase behavior, and most FMCG purchases are made habitually and impulsively, *general atmospherics* are of less interest in this thesis.

Point-of-sale

When a consumer strolls the aisles of a regular grocery store, they are exposed to an information overload. Limited by our cognition and attention, consumers tend to rely on an autopilot mode (Martin 2008), also referred to as inattentional blindness (Burke & Leykin 2014) or quick system one thinking (Kahneman 2011). As a result, only a fraction of visual information is processed. Therefore, point-of-sale stimuli are often necessary for an FMCG product or product category to stand out from the clutter. When a shopper devotes some of his or her limited attention to point-of-sale stimuli, let it be a display or an end-cap constellation, purchases increase (Ailawadi et al. 2009; Burke & Leykin 2014). The growth comes especially from unplanned purchases (Inman et al. 2009; Nordfält 2011). No wonder, then, that in the USA alone, FMCG companies spend more than $13 billion annually on point-of purchase stimuli (Solomon et al. 2006).

Even though consumers' mood is still present as an underlying factor, academic research has shown less interest in studying the complex relationship between *point-of-sale* and mood per se. In contrast, most research is focused on moods or emotions in shopping environments in general, not directly at the point-of-sale (e.g. Sherman et al. 1997; Babin & Attaway 2000; Solomon et al. 2006). In addition, behavioral responses triggered by point-of-sale stimuli are sometimes explained by using a mood (or at least components of it, such as pleasure or arousal) as the mediating pathway (see table 1). Since point-of-sale stimuli are so close to the actual purchase decision, research is more devoted to attention than mood (e.g. Grewal et al. 2018).

Nevertheless, mood is known to influence product evaluations (Sar et al. 2011) and product choice and risk taking (Chuang & Chang 2007).

Sensory stimuli have a leading role in point-of-sale presence. As Underhill (1999) aptly formulates: "Almost all unplanned buying is a result of touching, hearing, smelling or tasting something on the premises of the store" (p. 158). In terms of the *tactile dimension*, a point-of-sale can be designed to encourage consumers to touch the product ("feel the freshness"). Once touched, there is an increased purchase rate on those items (Peck & Childers 2006). Research in *olfaction* has studied point-of-sale settings limitedly, and for a long period, research settled with studying intentions instead of actual purchases (Mitchell et al. 1995; Spangenberg et al. 1996; Fiore et al. 2000) and using laboratories as environments (e.g. Spangenberg et al. 1996). The scarcity of research is surprising, given that sensory cues are most traceable to their objects when presented at the point-of-purchase. On the other hand, it highlights the fact that many sensory marketing studies have not studied actual behavior, only antecedent mental states, or behavioral intentions. For instance, a scent improves product memory (Lwin et al. 2010)—even though in their experiment, the scent was not presented again to jog the participants' memory when taking the actual memory task. Point-of-sale scents could certainly guide product choice since scents are already proven to enhance attention toward their congruent objects (Seo et al. 2010).

Following the aim of this thesis, point-of-sale olfactory stimuli constitute the most important in-store situational factor for this research. Using a scent at the point-of-sale also enables the use of straight-forward congruence between a scent and its object, which—as discussed in section 2.2—is an important driver of consumer responses. A stimulus that is presented at the point-of-sale, as opposed to delivering it to a whole store environment, presents an intriguing and more easily traceable research setting.

2.3.3 Category management to support decision-making

Category management (CM) has become an important tool in the FMCG industry to drive efficient consumer responses (Kotzab 1999). In practice, CM helps the end customers to find their desired brands and products easily in one outlet during each shopping trip (Dupre & Gruen 2004). Therefore, CM is an important support tool for guiding the consumer's decision-making. In food products, CM can be used to guide purchase behavior *within a category*. For example, variety seeking within a category can often be a desired outcome, as it can encourage consumers to try new brands or line extensions, and to spread positive word-of-mouth recommendations (Van Trijp et al. 1996; Woratschek & Horbel 2006). Sensory marketing has proved its power in facilitating intra-category behavior. Mitchell et al. (1995) conducted laboratory

experiments and found that a category-congruent scent made the participants exhibit more variety seeking and spread their choices more evenly among the alternatives. A natural and intriguing step in the research on olfactory cues would be to test a similar approach in a real store environment: Could the presence of a scent guide consumers' behavior within a category? At least research based on a student sample and mere advertisements instead of real products have pointed in this direction: A scent can make people choose a more premium option, so that a warm scent induced a preference for power-related brand advertisements, while a cool scent increased a preference for more functional-driven advertisements of brands (Madzharov et al. 2015). Similarly, a gender-congruent scent has been demonstrated to increase approach behavior toward a matching product category within the same store (a feminine scent increased the approach to women's clothes; a masculine scent to men's clothes). Music, too, can assist intra-category guidance: German (French) background music made consumers choose German (French) wines (North et al. 1999).

Another, more emerging and growing purpose of CM in FMCG is to guide behavior *across categories*, with the aim of maximizing total sales. Although the stream of research is still limited, the importance of cross-category effects has been recognized. Studies show that actions taken in one category impact other categories that are spatially-related—irrespective of whether they are complementary or substitutable (Bezawada et al. 2009) or are seemingly unrelated (Hong et al. 2016). Retailers and industry desire a positive spill-over effect between categories, so that an action in one category would encourage consumers to spend extra on another category. However, quite often the end result is a negative cannibalization impact, resulting in a zero-sum game or even fewer value sales.

The potential of sensory marketing has not yet been studied from this inter-category perspective. Instead, those studies that have analyzed purchase behavior have remained at a general level, asking consumers the number of total purchases that they made (furnishing store, Helmefalk & Hultén 2017) or they have only looked at one targeted product category and ignored what happened to total sales or at least to the spatially-related categories (glassware in an IKEA store, Hultén 2012). Clearly, this CM approach provides an intriguing research opportunity for sensory marketing. One aspect that should then be addressed is whether the measured consumption has a hedonic or utilitarian nature. The subsequent section discusses this continuum and its importance for purchase behavior in depth.

2.3.4 Hedonic and utilitarian consumption: wants and musts

Next to the antecedent stages of the purchase path and in-store actions, FMCG purchase behavior depends on the *nature of consumption*. Consumers' behavior can

be described through a hedonic or utilitarian orientation. A hedonic orientation has been defined as "those facets of consumer behavior that relate to the multisensory, fantasy and emotive aspects of product usage experience" (Hirschman & Holbrook 1982, p. 92). Consumers who have a hedonic orientation enjoy shopping; it brings them pleasure. A hedonic orientation has been connected to more spontaneous purchases (e.g. Babin et al. 1994; Hausmann 2000). Therefore, many in-store cues and activations are more pleasant and effective for hedonically-oriented consumers. In contrast, utilitarian consumption refers to the instrumental value of goods and consumption and is related to planned purchases (Babin et al. 1994). The identification of the hedonic vs. utilitarian approach is important for marketers and retailers to target their efforts correctly and efficiently.

There are two ways to approach and address the dichotomy. First, certain *product categories* are substantially more hedonic than utilitarian in nature (Batra & Ahtola 1991). Hedonic products often provide immediate satisfaction and tend to be unhealthy—such as candies or potato chips (e.g. Dhar & Wertenbroch 2000; Baltas et al. 2017). Marketers of candies therefore know that investments in in-store communication are usually worth the trouble. In contrast, consumers choose utilitarian products with a "should" preference (Dhar & Wertenbroch 2000). These "should" products have long-term benefits for the consumer (Bazerman et al. 1998) and they include foods known to be good for the consumer's health (Wertenbroch 1998). Interestingly, hedonic product categories are closely connected to sensory marketing. Namely, hedonic goods are characterized by an affective, multisensory emotional experience, where tastes, aromas, sounds, textures, and visuals play a major role (Hirschman & Holbrook 1982). No wonder, then, that extant studies on olfactory cues that have demonstrated significant impacts on consumer behavior have often investigated rather hedonic products (chocolates and flowers, Mitchell et al. 1995; gifts, Mattila & Wirtz 2001 home decoration, Haberland 2010; flowers, Jacob et al. 2014). Currently, there is no clear evidence of whether the impact of sensory cues is greater for hedonic than for utilitarian goods, as this has not yet been studied. From a theoretical point of view, this assumption is reasonable given the close connection between olfaction and emotions, as discussed in section 2.2. Certainly, the role of hedonic vs. utilitarian products would provide a relevant research topic for future studies in olfactory cues and consumer behavior.

An alternative way to approach hedonic and utilitarian orientations is to classify *consumers* as hedonic or utilitarian, since our individual, psychological traits affect our attitude toward shopping and our purchase patterns. Many retailer chains use such a method to target the right kinds of actions for their shoppers. For instance, hedonically-oriented shoppers can be enticed with limited editions and exciting selections, while the more rational ones appreciate price offers. This hedonic orientation has recently been recognized as an essential aspect of the food-product

context (e.g. Anić et al. 2014) and sensory preference context (Neeley et al. 2010) in the literature on consumer decision-making (e.g. Sproles & Kendall 1986). Interestingly, Bouzaabia (2014) found that hedonic consumers respond best to olfactory cues (i.e. responses measured in terms of sales at a Nike store). This finding is novel yet logical, as olfaction is the most emotional sense and could hence have an especially relevant role for those consumers who are more driven by hedonic and emotive aims—after all, hedonists are often considered as seeking more experiences and indulging in their senses (c.f. Alba & Williams 2013).

In sum, the extant research suggests that hedonism is a driver that intensifies the impact of sensory marketing on the consumer's purchase behavior, yet the same connection has not yet been established in a food-product context despite the theoretically good fit. The subsequent section will discuss in more detail the special characteristics of food products in relation to purchase behavior and sensory marketing.

2.4 Food-product marketing: special notions

2.4.1 Sensuality of food products

While our senses participate in everything we do, there are hardly any occasions where sensory input would be more profound than in food and eating. We evaluate food not only by its looks (color, shape, and size), but also by how it smells, tastes, what kind of texture it has, and how it sounds. Food is not only about fulfilling our physiological needs. In addition, it has a paramount psychological impact. Snicker's famous tagline "You're not you when you're hungry" for its gap-fill chocolate bar relies on heavy evidence. Having a meal alters your mood, often leading to a positive affect, higher rates of calmness, and less irritation (e.g. Gibson 2006). People have been shown to reach agreement in negotiations faster and easier if they are sharing the same food while negotiating—because food increases trust among people (Woolley & Fishbach 2017). Moreover, sharing food is associated with increased attachment (Gregersen & Gillath 2020). No wonder that Jesus used to "break the bread" among his disciples (Luke 22:19; Matthew 26:27).

Picky sensory evaluation was a prerequisite of survival, and evolution did its best in protecting us. For instance, the color blue was not connected with food products, and even today, food products use blue tones sparingly compared to other colors. Acknowledging the strong influence of senses helps in developing successful marketing for food products.

Not surprisingly, smell is the most important driver of taste perception, and together with taste, it creates the concept of flavor (Small & Prescott 2005). Olfaction and taste get easily confused with one another (Rozin 1982). For instance, without the

smell, coffee and wine taste the same (Herz 2010). Approximately 90% of perceived "flavor" is actually smell, while the rest is made up of the five basic tastes—sweet, acid, bitter, salty, and umami. Across a range of categories, smell predicts taste, and if you like the smell, you will most likely like the taste as well. This holds true for 12-month-old infants (Wagner et al. 2014), even though they have not formed sensory memories and connections yet. In adulthood, odor is also a powerful predictor of food liking, mostly because it is connected and interpreted in our brains more comprehensively. For instance, even though a garlic scent would not be generally pleasant, it is usually perceived as pleasant in a pizzeria, since it signals the pizza. In other words, adults are able to make the connection between the cues.

Olfaction is so pivotal in taste and food perception that individuals with anosmia (a lack of functioning olfaction) have significantly different food habits. Almost half of anosmic consumers are reported to eat out less frequently, and roughly 30% eat less (Aschenbrenner et al. 2008). Even though impaired olfaction can have some positive effects, such as a lower intake of sweets (Aschenbrenner et al. 2008), these positive aspects can hardly make up for the hedonic and social loss.

Age-related impairment of sensory abilities also has its implications for food. Seniors are less sensitive to changes in flavor profiles of foods, including intensity levels and taste attributes (Doets & Kremer 2016). This does not mean that seniors would not have the desire to enjoy food in a hedonic sense—in fact, they differ strikingly little from the hedonism ratings of young adults (Doets & Kremer 2016). This finding highlights the potential of increasing the enjoyment of food by fortifying other cues holistically when the sense of taste is impaired.

Indeed, the sensuality of foods can be fortified with apt cues, such as matching colors or labeling. For instance, Zellner et al. (2008) noted that methylsalicylate, a key odor in wintergreen but also in root beer, can have different associations depending on its naming. If respondents are told that they are inhaling wintergreen scent, they may think of mints and green and white colors. In contrast, if they are told that it is root beer they are smelling, the corresponding color is brown. Similarly, a descriptive label ("succulent seabass"; "juicy oranges") makes the product more desirable than a non-descriptive one ("seabass filet"; "Florida oranges") to encourage the consumption of healthy foods (Krishna 2010). Changing a color of a food can have substantial impact on the perceived taste. For instance, orange juice with more (better) color was perceived as tastier, and this subtle visual cue had a greater impact than very direct cues of branding or price information did (Hoegg & Alba 2007).

In addition to visual or written cues, audio cues affect our perception of food. From sound–shape symbolism, even the famous "kiki bouba" effect holds true for food items: Brie cheese is associated with the rounder "bouba" shape, while potato chips or cranberry sauce are more like "kiki." Similarly, regular milk chocolate is more "bouba" compared to "kiki" mint chocolate (Gallace et al. 2011). Furthermore,

there is an interlink between food (taste) and music. “Sweet” sounds are low and soft and sour tones are high-pitched (e.g. Mesz et al. 2011). In the presence of music of a specific “taste,” such as “bitter,” consumers evaluated food differently—in this case, as more bittersweet. Kontukoski et al. (2015) studied the relationship further and found that sweet (sour) music made participants prepare drinks that were sweeter (sourer) in taste, which was quantitatively measured. To summarize, even audio has a significant and versatile impact on our sensual, everyday pleasure of food.

Food products are sensual also thanks to their *packaging*. Most food products are well packed when encountered in store and bought; packaging is also present close to the consumption moment. Krishna et al. (2017) define the key stages of multisensory customer–product interaction as follows: attention, expectation formation, engagement, and consumption. Visual salience dominates in *attracting attention*. For instance, in rapid decisions with cognitive load, consumers’ choice is driven by the visuality of the packaging rather than actual preference (Milosavljevic et al. 2012). Once you get their attention, they are more likely to touch the product—and are more likely to buy it (e.g. Peck & Childers 2006; Peck & Shu 2009). In *setting expectations*, a description on the packaging that refers to multiple senses makes people evaluate the taste (after eating) more favorably (Elder & Krishna 2010). The shape can also hint at the taste: Round packaging shapes are connected to sweeter flavors, while angular, sharper shapes in packaging, typefaces, and so on is connected to more sour flavors—even more so if combined with an aptly fitting color (Becker et al. 2011; Velasco et al. 2014). In terms of *engaging* the consumer with the food-product packaging, colors play a well-established role, appealing to our emotions. For instance, cooler hues are connected to relaxation, while warm tones induce excitement (Valdez & Mehrabian 1994; Bagchi & Cheema 2013). No wonder then, that energy drinks are seldomly in blue packaging. Scents also participate in engagement—or they would, if the packaging were not so tightly sealed today. A scent, either as a scratch-and-sniff in an advertisement or as a mere imaginary smell (i.e. asking the consumer to imagine the smell) makes consumers salivate more. One can only imagine if the smell of freshly ground coffee beans greeted consumers in coffee aisles of a supermarket. The tactile dimension can help in engaging the consumer through the packaging, since most food products cannot be touched before purchasing. As an example, shiny and soft packaging can be favorable in a chewing gum context, while a rough-textured bag is a fit choice for potato chips. A study by Rebollar et al. (2017) suggests that while the packaging material of potato chips influences the expectations of product qualities (crunchy, high quality, artisan), visual cues are still more important. However, as Krishna et al. (2017) note, this topic would benefit from further research.

A recent experiment in New Zeeland called “Food in the Nude” combined the sensory modalities of food products in a novel way. They removed all packaging

materials where possible, so that all fresh produce (vegetables, fruits, etc.) was sold as such, without any wrapping. While this approach eliminates verbal cues on packaging, it leaves more space for the tactile and olfactory dimensions. Consumer feedback has been very positive toward the experiment—surely not least thanks to its environmental aspect (*Supermarket News* 26.1.2018).

Finally, *in consumption*, package parameters affect the perceived size of it, altering the judgment of the food consumption volume. The literature is rich in demonstrating how consumers resort to simple heuristics, or rules of thumb, such as choosing a "big" package due to its height dimension (e.g. Raghubir & Krishna 1999). This dominance of visual cues can be enhanced deliberately, either by making the packaging appear smaller or bigger than its volume is. Such a bias brings us to an important topic in food-product marketing; namely, ethics and wellbeing.

2.4.2 Ethical aspects: health and wellbeing

Food-product marketing is a business worth billions of dollars each year (Krishna & Elder 2010). Food products have been traditionally clustered under FMCG products in general, and research has followed the mainstreams of FMCG, such as branding and advertising.

However, recently, food-product marketing has encountered a new aspect: health and wellbeing. Worldwide obesity has nearly tripled since 1975, making it one of the most ubiquitous and severe health problems: According to the World Health Organization (WHO), the world was inhabited by an overweight population of over 1.9 billion adults in 2016 (WHO 2018). In fact, today, being overweight and obese already leads to more deaths than from being underweight (WHO 2018). In the light of such staggering facts, the guilty finger easily points to food. While physical inactivity is one of the main reasons, unhealthy food choices make a vast contribution to obesity as well. The WHO aptly calls for better, more supportive policies from several sectors—including marketing (WHO 2018).

In striving for healthier choices, there are two alternative pathways. Governments and other legal entities can try and limit the consumption of unhealthy food products, or, alternatively, they can support the actions that drive the consumption of healthy items. Studies speak for the latter alternative in gaining more substantial and sustainable results. A comprehensive review by Hawkes et al. (2015) builds upon multi-disciplinary evidence (economics, psychology, public health nutrition) to understand how and which food policies work. In their article, they propose four mechanisms through which food policies can affect diet:

1. Providing an enabling environment for learning of healthy preferences.
2. Overcoming barriers to the expression of healthy preferences.

3. Encouraging people to reassess existing unhealthy preferences at the point-of-purchase.
4. Stimulating a food-systems response.

The authors state that the top policy priority should be "to implement comprehensive policies that create food, information, and social environments that enable infants and young children to learn healthy preferences" (Hawkes et al. 2015, p. 2411). A lion's share of these supporting, encouraging actions can be influenced through labeling, education, and stimulating a food-response system, but also sensory marketing can be harnessed for health purposes.

Let us first review sensory marketing—olfaction in particular—for the first two mechanisms listed by Hawkes et al. (2015) related to preference formation. Many infants are notoriously picky toward new food items, spontaneously rejecting them. When countering a novel food item, multisensory information consisting of both visual and olfactory cues facilitates preference formulation and categorization of the food (Yamada et al. 2014). Moreover, research suggests that a congruent scent can boost the preference for novel fruits, which is important in adopting new foods and broadening an infant's food repertoire, and even infants are able to connect scents with their visual objects (a strawberry scent with strawberries; Wada et al. 2012). Similarly, other senses can be helpful in preference formation. For instance, applying packaging cues from fast food to healthy snacks can help in guiding preference toward healthier snacks instead of fast food (Pires & Agante 2011; Tang et al. 2020). Also the lighting in a restaurant is known to influence food choices, so that brighter lighting encourages restaurant visitors to choose healthier options (Biswas et al. 2017). Through these mechanisms, sensory marketing can help in providing an enabling environment for learning healthy preferences and can overcome the barriers to expressing those preferences.

The third mechanism, preference assessment at the point-of-sale, can also be supported by sensory marketing. Research has shown that the presence of a scent can guide consumer choice between products (Mitchell et al. 1995). Moreover, exposure to a healthy vs. indulgent scent can make consumers prefer healthy or indulgent food choices, depending on the length of scent exposure (Biswas & Szocs 2019). Scents are particularly effective sensory cues for this type of "intervention" at the point-of-sale, as scents are processed by everyone, from infants to adults, irrespective of whether, for example, mobile phone use is distracting the processing of other sensory cues while at the point-of-sale. The guiding impact of scents could be studied further in sensory marketing research.

The fourth mechanism, stimulating a food-response system, is based on evidence that food policies designed to affect consumer choices can "accidentally" stimulate interdependent actions elsewhere in the food system—like a positively contagious

process. Hawkes et al. (2015) give an example from the USA, where the labeling of trans-fats became compulsory. The labeling change incentivized the food industry to also develop the recipes to be healthier, containing less trans-fats. In this aspect, sensory marketing may be less helpful, but not completely useless. For instance, many EU countries have required a legal product name, found on the back of the pack right before the ingredient list to become more descriptive. In addition, product names must comply with real contents, not only a perception. In practice, this could mean writing "Apple juice" instead of "Juice" if the product contains real apple juice, and "Apple-flavored juice" if the product does not really contain apple. Research has established that descriptive product names also engage consumers more (e.g. Elder & Krishna 2010). Such regulations encourage companies to develop recipes that can carry a more favorable, more distinguished product name. Moreover, a multisensory description of a product's taste helps in engaging and educating consumers about the flavor nuances (e.g. Yeomans et al. 2008). This process in important in creating positive food experiences and helping consumers identify (real) flavors. The same logic applies for the sensory descriptions of ingredients: In order to describe them in consumer language, the food industry has been incentivized to replace artificial flavors and colors, marked as mysterious E-codes (e.g. E441), with natural substitutes (e.g. black carrot juice, spirulina).

These different means to influence our choices of, attitudes toward, and consumption of food are often powerful when employed together. It is important to acknowledge that our psychological characteristics moderate our eating habits, just like they moderate the effectiveness of olfactory cues. Given the close connection between scent, food, and emotions, this is hardly surprising. Keller and Siegrist (2015) studied the Big Five personality traits and found that they significantly affect our eating styles and food habits. For instance, neurotic individuals adopt more counter-regulatory foods, and when eating out or in case of emotional eating, they opt for more high-energy sweet and savory foods. Extroverts, who usually enjoy the health benefits of their outgoing nature, are eager to try new things, but tend to do so also when offered unhealthy food. In contrast, highly conscientious consumers try to limit themselves, and this applies to food as well: less meat, more fruit, and vegetables, just like regulatory bodies' advice.

As is clear from the personality trait study, there is hardly one way of encouragement that fits all. In addition to personality, our dieting status, health-related motives, and food values also moderate our perception of food healthiness (Luomala et al. 2015). In their study, Luomala et al. (2015) conclude that against general belief, it is possible to maintain "healthy is tasty" or "unhealthy is untasty" for certain target groups. They note that marketing actions—packaging, labeling, advertising, all rich in sensory marketing potential—have an important role to play.

To summarize, health and wellbeing is a pivotal and constantly growing aspect of food-product marketing. Sensory marketing, especially scents, have potential in being harnessed even better than they are today to support a healthy and sustainable food culture for consumers across the globe.

2.5 Initial theoretical framework

The theoretical background of this dissertation began with relevant literature and findings in sensory marketing research, with a special focus on olfaction. Comparing scents with other sensory cues demonstrated how different and unique scents are: They are processed in a different way and carry a more emotional connection than any other sensory input does. We discussed the perception of a scent and, for instance, the importance of congruence (the perceived fit between a scent and its target or environment) in association forming. Despite the plethora of studies, research on the impact of olfactory cues on *actual behavior* such as purchase behavior is still scarce. In addition, section 2.2 presented the importance of *consumers as processors of scents*, demonstrating that our individual characteristics moderate the outcome, yet this connection to olfactory marketing and actual behavior is still unsettled.

Next, in section 2.3 in the theoretical background, *purchase behavior in FMCG* is covered, presenting the overall process and factors inhibiting or advancing a purchase decision. The focus of this thesis is on situational in-store factors, in particular *point-of-purchase factors*, since sensory marketing is most impactful—and measurable—in the store, close to the moment of the purchase decision. Section 2.3 also discussed the *category management* theory as an important means to support decision-making, and the pendulum between *hedonic and utilitarian consumption.*

In addition, section 2.4 has outlined some special notions of *food-product marketing* with implications on both sensory marketing and purchase behavior alike. Food products share an intimate connection to scents and enable a natural congruence. Food also tends to be hedonic in nature, and its purchase process in the store often puts more emphasis (and demand) on sensory aspects of the product, from packaging to point-of-sale.

As noted in the Introduction, there is no theoretical framework that would acknowledge olfactory marketing's special role compared to other sensory cues, not to mention a framework that would present its potential impact on actual behavior. This thesis aims to *investigate the impact of olfactory cues on consumer behavior*. Therefore, we present an initial framework to study the impact on olfactory cues on consumer behavior, building upon relevant theory in sensory marketing and purchasing behavior, reflecting the original RQs:

Q1: Does the presence of olfactory cues affect consumer behavior?
Q2: What is an optimal scope to target with scents?
Q3: How do individual characteristics affect the effectiveness of olfactory cues?

These RQs are embedded as part of the initial framework, tied together with the theoretical background. Our initial framework is presented below in figure 9.

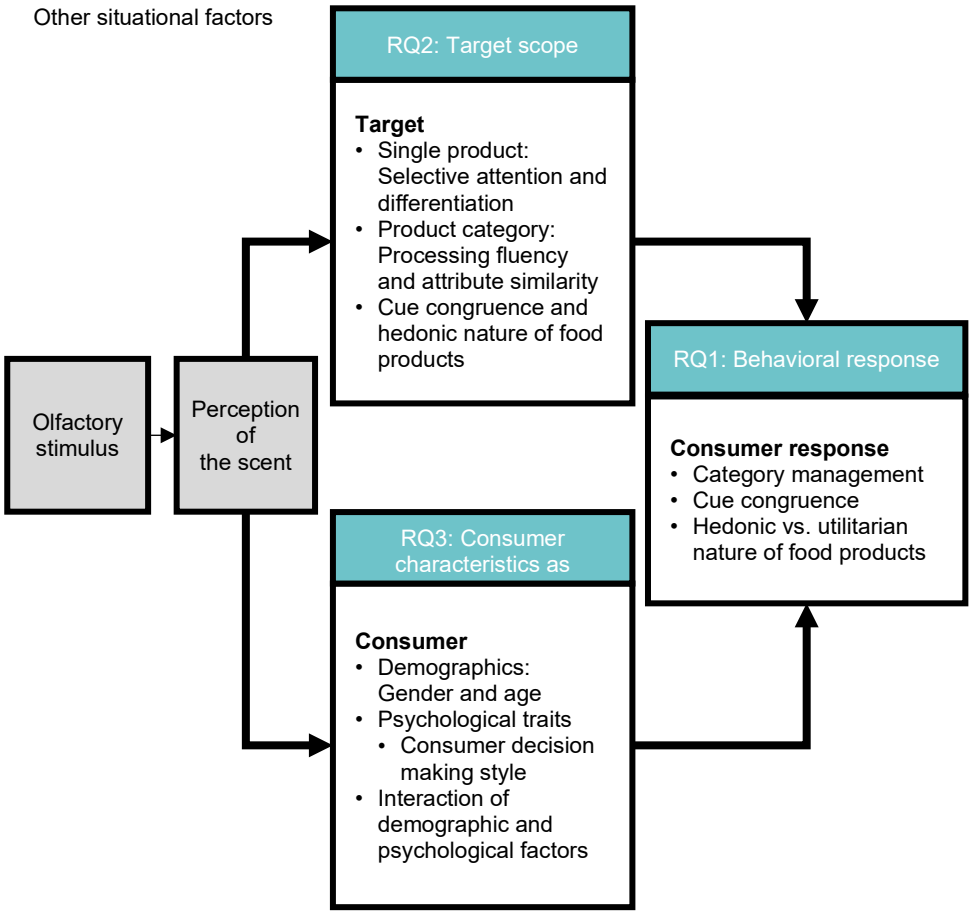

Figure 9. Initial framework for the impact of olfactory cues on consumer behavior.

The proposed framework consists of three main parts. As the centerpiece, we have the process from an olfactory stimulus to—as we hypothesize—*actual purchase behavior* among other behavioral outcomes. We are interested in confirming this

link, as outlined in RQ1. Theories of CM, cue congruence, and hedonic orientation are employed to approach this RQ.

Second, the framework acknowledges *the target* with which the olfactory cue is to be associated with; in other words, the object of the hypothesized purchase decision. This link reflects the original RQ2. Since the extant research in sensory marketing has mostly studied larger environments, yet our context is in retailing with usually more definable objects, we focus on product categories and single products as targets. Given that, to date, significant findings in olfactory cues and behavior have been mostly limited to food objects, we build upon these findings and take into account the special cue congruence and hedonism of food products. For single products, we utilize concepts of selective attention and differentiation to study congruence between a scent and a single product; for product categories, the congruence relies on processing fluency and attribute similarity between a scent and the target.

Third, the consumer as the processor of scents and *consumer characteristics* are presented in the framework, aligned with RQ3. As noted in the theory section, research exists mainly on consumer demographics and their moderating impact on how we perceive scents as such. In contrast, the moderating impact is yet underutilized in the context of affecting actual behavior. Stepping on virgin ground, we hypothesize that it is not only demographic characteristics, but also psychological traits that together constitute a moderating variable—treating the consumer holistically by addressing the interaction of demographic and psychological characteristics.

To maintain focus, we have dedicated each RQ to its own scientific paper. This approach ensures that every RQ receives equal attention and is approached from the specific set of theories and concepts most relevant for it. Moreover, this approach enables a logical deduction of hypotheses from each RQ. Before presenting the individual papers, chapter 3 gives an overview of the chosen methodology and shares the deduction of hypotheses from each RQ.

3 Methodology

3.1 From intentions to action

The literature on consumer behavior and consumer psychology has received criticism for often only measuring intentions instead of actual behavior or using indirect or even far-fetched measures (see Kardes 1996; Baumeister et al. 2007). This criticism is also valid in the purchase behavior literature. An alarming example is provided by Morwitz (2001), whose broad review article revealed that the average correlation (R^2) between intentions and real action was hardly reaching 0.5. Some of the inconsistency can be attributed to the way consumers behave and evaluate their own behavior (Morwitz 2001), but also by the way in which academic researchers design surveys that have an effect on the so-called self-generated validity (Chandon et al. 2005).

The same challenge is present in the scarce sensory marketing literature linked to purchase behavior. Some studies measure only intentions in general (e.g. Mitchell et al. 1995; Spangenberg et al. 1996; Doucé & Janssens 2013) or approach behavior/behavioral intentions (Fiore et al. 2000; Jacob et al. 2014). Moreover, many experiments have been carried out in laboratories (e.g. Bone & Jantrania 1992; Mitchell et al. 1995; Spangenberg et al. 1996, 2005; Orth & Bourrain 2005; Bosmans 2006).

This thesis diverts from the earlier literature on a philosophical level by adopting an empirical realist approach. Empirical realism represents a scientific tradition that regards theoretical terms as playing a pivotal role in scientific activity (Slaney 2011). It suggests that a careful examination of phenomena allows the researcher access closer to the truth that is irrespective of the researcher, viewpoint, or environment. Both quantitative and qualitative data are valuable sources of information and it is paramount to strive to get as close as possible to the real world (e.g. Stang 2018).

The choice of this philosophical path has versatile and important implications for the thesis's methodology. First, to get as close as possible to the real phenomena being studied, field experiments are preferred over laboratories. While controlling for external, intervening factors is less troublesome in laboratories, laboratories are significantly less realistic. In contrast, field experiments enable ecological validity; that is, that an impact caused by a certain stimulus can be replicated despite constantly changing and confounding other elements in the environment (Söderlund 2018). If the effect is strong, it can survive in the cluttered shopper environment,

which has become a growing concern in marketing (Simester 2017). This has been a particular concern in the retailing context, and hence many recent publications call for field experiments in *real store environments* instead of laboratories for acquiring scientific knowledge (Spence et al. 2014) and to measure and explain *actual behavior* instead of mere intentions (c.f. Roschk et al. 2017).

Another implication of empirical realism concerns the nature of the data used. In contrast to, for example, positivism, realists believe that rich and versatile data are pivotal in describing, explaining, and making predictions about the objective world through observable and theoretical concepts (Slaney 2011). Therefore, quantitative data are an apt choice for measuring and analyzing potential changes in consumers' behavior. However, as an addition to the quantitative data and analysis, this thesis complements the descriptive quantitative data with some qualitative data and analysis in a supporting role, even though quantitative data lead the process. Often, different types of data and analysis complement each other and lead to a more saturated, and therefore, one can argue, a more objective representation of the scientific phenomena and the theoretical concepts used to explain them (Creswell 2002). Quantitative and qualitative data and analysis do not need to be in equal roles, but often one can lead and the other can support in knowledge creation (Hurmerinta-Peltomäki & Nummela 2006). This *triangulation of data* is not only aimed at increasing the validity of the findings, but also at broadening and deepening one's understanding of the phenomenon.

3.2 Data collection and analysis

The thesis contains three scientific articles, each dedicated to studying one RQ and the hypotheses related to it. Therefore, the data requirements for each article were also different, making the total data collection and analysis versatile. The common denominator for all articles was the inclusion of a field experiment conducted in a real store environment.

In Article I, the interest was in confirming the impact of olfactory cues on consumer behavior. The author cooperated with a European retailer chain to conduct the experiment and collect the data. The data consisted of sales figures of selected product categories and their related product categories, also on the sub-category level. The quantitative data were analyzed with appropriate statistical methods, listed in detail in table 2. For Article I, the researcher wanted to enrich the quantitative data by conducting semi-structured interviews and observations. This qualitative support helped in forming a preliminary understanding of the reasons behind the purchase decisions, thus complementing the descriptive data. Semi-structured interviews of shoppers who had bought from a category being studied were conducted both in a control period and in a manipulation period. This set-up required the researcher to monitor all shoppers approaching the cash line. A surprising and mildly entertaining learning event was that

not everyone buying an unhealthy product (candy, chocolate) was eager to share their thoughts when in line but wanted to have a more private space instead of revealing their purchase habits openly. Given that candy consumption per capita in Finland is the highest in the world, the researcher would not have expected such bashfulness. In addition to the short, semi-structured interviews, the researcher visited the store twice a week and spent time observing the shoppers in order to detect potential changes in behavior during the control vs. manipulation period. The process also included interviewing the store personnel and ensuring that the scent intensity level was optimal and that the scent equipment was working. The scents used in Article I were provided by a Dutch manufacturer: Retroscent: RS/105 Green Apple for apples and pears; RS/006 Licorice Store for candies and chocolate. The equipment used was Retroscent© Classic.

The second article focused on finding the *optimal target scope* for olfactory marketing. This approach required detailed sales data of both a single product and its parental category. As the article theory also tested differentiation vs. similarity, two different scents were employed. Consequently, altogether six stores participated in the study. The researcher visited each store twice a week to observe shoppers, to check the scent intensity levels, and to interview store personnel. Confidentiality of the sales data was secured with passwords removing unnecessary category data. Prior to the actual study, the researcher pre-tested different scents to find the most congruent ones. Also, this pre-test took place in a real supermarket. An unexpected and pleasant surprise was that shoppers were enthusiastic about sniffing the different scents and sharing their spontaneous associations with them. The scents used in Article II were Retroscent© RS/104a Fresh Strawberries and RS002 Chocolate. As in Article I, the equipment used was Retroscent© Classic.

The third article studied *consumer characteristics* as a potential moderator. Therefore, the data focus was not merely on the product or product-category level but highlighted individual purchase decisions by individual shoppers. The data were collected from a versatile, existing loyalty card database of a European retailer. This database contained information not only about the purchases that the cardholder had made, but also about their lifestyle and their *consumer decision-making style.* This CDMS was used as an operationalization of consumers' psychological characteristics, reflecting the most important ones for purchase behavior. Anonymizing the data played a crucial role in the data processing. As in previous articles, the data were analyzed with the most appropriate statistical methods (see table 2 for details). As from the earlier field experiments, the researcher visited the store regularly and interviewed the store personnel to find out potential changes in consumers' behavior and potential issues with scent intensity levels. In Article III, the chosen scent was provided by Scentcommunication, Chocolate Cookie, with a scent disperser ScentCube from the same manufacturer. Table 2 presents the key methodology of each article, deducted from the RQs and their hypotheses.

Table 2 Methodological summary: Research questions, methodology, primary theories employed, and deducted hypothesis.

Research question/ research paper:	Relevant theoretical concepts	Hypotheses	Unit of analysis and statistical methods used	Qualitative support
RQ1 / Article !: Does the presence of olfactory cues affect consumer behavior?	Category management Cue congruence Hedonic orientation	**H1:** The presence of a scent increases sales in a food-product category. **H2:** The presence of an olfactory cue has a cannibalization impact on a spatially-related product category. **H3**: Congruence moderates the effectiveness of olfactory cues on purchase behavior; the impact is greater for products that are highly congruent with the scent. **H4:** The presence of an olfactory cue has a greater impact on hedonic food-product categories than on utilitarian food-product categories.	Sales of selected product categories and related categories; Sales of sub-categories. Mann–Whitney t-test.	Semi-structured interviews, observations, and questions to store personnel.
RQ2 / Article II: What is an optimal scope to target with scents?	Selective attention; differentiation Processing fluency; attribute similarity	**H1:** The presence of product-congruent, differentiating olfactory stimuli has a positive impact on single product sales. **H2:** The presence of a category-congruent common olfactory cue has a positive impact on product-category sales.	Sales of single product; Sales of product category. Kruskal–Wallis; Mann–Whitney t-test Pre-test: short sniffing interviews for different scents	Observations and questions to store personnel; Pre-test: short sniffing interviews for different scents
RQ3 / Article III: How do individual characteristics affect the effectiveness of olfactory cues?	Processing of olfactory cues; individual characteristic Consumer decision-making style; hedonic orientation Interaction effect	**H1**: Gender moderates the effectiveness of olfactory cues at the point-of-purchase on purchase behavior: the impact is greater on women's than on men's purchase behavior. **H2:** Age moderates the effectiveness of olfactory cues at the point-of-purchase on purchase behavior: the impact is greater on younger than on older consumers. **H3:** Consumer decision-making styles moderate the effectiveness of olfactory cues at the point-of-purchase on purchase behavior. **H4:** The interaction of consumer characteristics, namely demographics and decision-making styles, moderates the effectiveness of olfactory cues at the point-of-purchase on purchase behavior.	Sales of product category by consumer group. Mann–Whitney t-test; Independent factorial ANOVA, bootstrap method.	Observations and questions to store personnel

4 Research Articles

This chapter presents the three scientific articles that each respond to one RQ. Extended summaries are provided, while chapter 4 includes full versions of the original articles.

4.1 Article I: Olfactory cues and category management

Publication details
Sandell, K. (2019a). Olfactory cues and consumers' purchase behavior in food products: a category management approach. *Economia Agro-Alimentare/Food Economy*, 21(1), p. 73-100. https://doi.org/10.3280/ECAG2019-001001

Summary
This article studies the original RQ1: "Does the presence of olfactory cues affect consumer behavior?"
Olfactory cues are used to entice consumers in a store environment, but proof of their *impact on purchase behavior* is contradictory. Within food products, scents seem to be a lucrative way to increase sales, while studies outside of food-product categories demonstrate null results. In accordance with the sensory marketing research, we hypothesize two alternative theoretical reasonings for this duality of research results: *cue congruence* and *hedonic orientation*, both of which are strongly connected to food products and scents. Specifically, the research hypotheses derived from RQ1 in this article were:

- **H1:** The presence of a scent increases sales in a food-product category.
- **H2:** The presence of an olfactory cue has a cannibalization impact on a spatially-related product category.
- **H3:** Congruence moderates the effectiveness of olfactory cues on purchase behavior; the impact is greater for products that are highly congruent with the scent.

The study broadens the extant literature on olfactory marketing by adopting a CM approach. *Category management* is an important tool in affecting purchase behavior. It aims at maximizing not only the sales of a single unit, but a larger entity—a category of products. However, often actions at the point-of-purchase favor specific products at the expense of others. This study is novel in testing whether olfactory cues can be harnessed for CM purposes. Therefore, CM concepts were applied to support theories of cue congruence and a hedonic orientation for purchase behavior. The data were collected through a real-life experiment conducted at a hypermarket belonging to a European chain. To allow for a CM focus, the experiment tested the impact of scent on purchase behavior on the category level, studying both intra- and cross-category movements. As a methodological improvement, actual sales data were measured and analyzed instead of buying intentions. Additionally, qualitative data (semi-structured interviews and observations) were used to support the analysis and understanding.

The results show that consumers' purchase behavior is positively affected by olfactory cues: Product-category sales rose, and there was no significant cannibalization impact detectable on other, spatially-related product categories. The drivers behind category differences and within-category development alike are hedonism and cue congruence. The effect of scent was evident in both utilitarian and hedonic product categories—with the impact higher in hedonic categories—, and cue congruence seemed an efficient way to guide consumer behavior even within a category. These findings demonstrated a need for further research, which the researcher put forward in Article II.

In terms of practical implications, the article confirms the ability of olfactory cues to impact purchase behavior. This finding encourages retailers and marketers alike to add olfactory cues to their sales promotion toolkits and focus on scents that fit well with the targeted products or product categories. Both utilitarian and hedonic categories can be targeted, though hedonic categories would seem to be an even more promising target.

4.2 Article II: Optimal scope of targeting

Publication details

Kivioja, K. (2017). Impact of point-of-purchase olfactory cues on purchase behavior. *Journal of Consumer Marketing*, 34(2), p. 119-131. https://doi.org/10.1108/JCM-08-2015-1506

Summary

This article studies the original RQ2: "What is an optimal scope to target with scents?"

The second article studies further the *optimal scope of targeting* with olfactory cues. Article I suggested that olfactory cues are effective in increasing purchases on the

category level, but it also pointed out a caveat of cue congruence: The tighter the congruence, the easier it is to match a scent with a target product (category), yet the scent simultaneously becomes incongruent with other products or categories. The extant literature has not defined an optimal targeting scope—should the focus be on single products or on product categories?

This article investigates and compares two theoretical viewpoints. First, following the theory of *selective attention and differentiation*, we propose a close cue congruence with a single product. Second, building upon *attribute similarity and processing fluency,* we propose a common category-congruent approach. To answer the original RQ2, the following hypotheses were formulated:

- **H1:** The presence of product-congruent, differentiating olfactory stimuli has a positive impact on single product sales.
- **H2:** The presence of a category-congruent common olfactory cue has a positive impact on product-category sales.

The operationalization of the two competing viewpoints was carried out with a real-life experiment. The test target was within hedonic goods; namely, chocolate. Sales of a single, differentiated item (strawberry-flavored chocolate) and the parent category (chocolate plates) were measured and analyzed. During the experiment, visual cues were equal in both scenarios, depicting the differentiated item (strawberry-flavored chocolate) in an appealing way.

The results clearly indicate *that a common category-congruent scent that is easy to process and identify is the optimal choice* both when targeting a single product from the category or when boosting the sales of the total category. The importance of processing fluency outweighs selective attention in the way consumers process and interpret olfactory and visual cues together.

The article contributes to the limited literature that has studied the connection between olfactory cues and purchase behavior. The study provides an alternative approach detached from earlier views embedded in atmospherics and environmental psychology: The article proposes that *scents can be linked to a clearly defined target*. By so doing, it applies the general sensory marketing framework of Krishna (2010) to olfaction. Importantly, the article demonstrates that scents that are common and describe the primary attributes of a product or product category are enough to generate congruence between the scent and target; here it is not necessary to address valence or arousal.

From a practical perspective, the article provides a novel contribution. The findings support the idea of scents in food products in a retailing context. Pleasant scents can promote sales and hence work as an efficient sales promotion tool directly at the point-of-sale—contrasting with the earlier focus on atmospheric cues that are meant for creating a certain atmosphere in a larger space. It is possible and lucrative

to pick single products and product categories for targeting. Importantly, the scent should always connect to a primary attribute of the parent product category (e.g. a chocolate scent for chocolates).

4.3 Article III: Consumer characteristics as moderators

Publication details

Sandell, K. (2019b). Olfactory cues and purchase behavior: consumer characteristics as moderators. *European Journal of Marketing*, 53(7), p. 1378-1399. https://doi.org/10.1108/EJM-12-2017-0918

Summary

This article studies the original RQ3: "How do individual characteristics moderate the effectiveness of olfactory cues?"

The third article adopts a different viewpoint from the first two articles by putting *the consumer* as the processor of scents in the limelight. Most extant research in olfactory marketing has found ambiguous, contrasting results. Reasons have been sought in the research settings, the chosen scents, and in the targeted products or categories. Simultaneously, the academic research in brain chemistry and psychology acknowledges that consumers' olfactory abilities—such as the threshold to detect a scent or form associations with a scent—depend on individual traits. However, these findings have not found their way into the sensory marketing research in full, yet. This article investigates the *moderating role of consumer characteristics in olfactory marketing*.

The theories of consumer characteristics and their effects on olfactory abilities are presented. Characteristics include *physiological factors*—gender and age—, which have been demonstrated to significantly affect olfactory processes by earlier research. Furthermore, the paper includes *psychological traits*, which have received less attention in the sensory marketing literature. The operationalization of these traits was carried out with the CDMS literature. The following hypotheses were formulated to capture both demographic and psychological factors:

- **H1:** Gender moderates the effectiveness of olfactory cues at the point-of-purchase on purchase behavior: The impact is greater on women's than on men's purchase behavior.
- **H2:** Age moderates the effectiveness of olfactory cues at the point-of-purchase on purchase behavior: The impact is greater on younger than on older consumers.

- **H3:** Consumer decision-making styles moderate the effectiveness of olfactory cues at the point-of-purchase on purchase behavior.
- **H4:** The interaction of consumer characteristics—namely, demographics and decision-making styles—moderates the effectiveness of olfactory cues at the point-of-purchase on purchase behavior.

An experiment was included in the article. The experiment tested the theories, utilizing a loyalty card database in addition to traditional sales data. These data were analyzed using quantitative methods.

The findings demonstrate that *consumer characteristics moderate the effectiveness of olfactory cues on purchase behavior*. Specifically, the article found that scents are most efficient and prominent (for the purpose of increasing sales) when the respondent (consumer) is male with either a hedonistic or quality-oriented decision-making style. This article is pioneering in addressing the effectiveness of smells on purchase behavior when the *interaction* of different consumer characteristics are taken into account. In other words, addressing the consumer as a whole, instead of studying a single trait, proved paramount in understanding the differences in responses to the olfactory cue. In addition, Article III sets itself apart from earlier studies that have only studied olfactory performance: Instead, the study also addressed the CDMS as a demonstration of psychological factors. From a theoretical point of view, the study explains part of the extant ambiguity of the earlier research results. *Practitioners* are encouraged to pay special attention to clientele before employing olfactory marketing as a sales promotion tool.

4.4 Summary of article designs

Real-life experiments are an essential part of this thesis. To facilitate a fluent comparison between the three articles and their experimental set-ups, table 3 below provides a summary of the experimental details of each article.

Table 3 Summary of the experimental details of each article.

	ARTICLE I	ARTICLE II	ARTICLE III
EXPERIMENT SET-UP	2 focal categories + their spatially-related categories targeted with scents: addressing inter- and intra-category behavior	Single product (strawberry chocolate) and parental category (chocolate plates) targeted with 2 (differing vs. fluent to process) scents	Product category (cookies) targeted with a congruent scent; addressing differences in consumer responses based on the CDMS
SCENT PRE-TEST SAMPLE AND MEASURE	Convenience sample of 23 under-graduate students Verbal spontaneous associations	105 (chocolate scent) / 103 (strawberry scent) consumers in real store environment Verbal associations Pleasantness and familiarity on a 7-point scale	97 consumers in a real store environment, pre-testing four different scents Verbal associations Pleasantness and familiarity on a 5-point scale
EXPERIMENT: DATA	Sales development of product category (control period = index 100) Apples and pears: Weekly data Candies and chocolate: Daily data 1000–6000 customers per day	Daily sales per customer (X products sold/Y customers visiting the store) 1000–6000 customers per day	15,892 cookie purchases in total 1000–6000 customers per day Loyalty card data
ANALYSIS	 <u>*Experiment:*</u> Mann–Whitney; Semi-structured interviews and observations	<u>*Scent pre-test:*</u> Fisher's exact ANOVA for scent associations between respondent groups (age, gender) <u>*Experiment:*</u> Kruskal–Wallis (3 conditions); Mann–Whitney (scent vs. no scent)	<u>*Scent pre-test:*</u> Friedman's ANOVA and Wilcoxon test to compare scent pleasantness and familiarity <u>*Experiment:*</u> Mann–Whitney (general impact of scent); Factorial ANOVA, bootstrap method (addressing consumer groups)
NUMBER OF STORES INVOLVED	1 hypermarket	6 hypermarkets 2 x chocolate scent 2 x strawberry scent 2 x control	1 hypermarket
NUMBER OF SCENTS USED	2 (1 for apples and pears, 1 for candies and chocolate)	2 (for single product and product category) 1 strawberry 1 chocolate	1 (chocolate cookie) for cookie category
LENGTH OF MANIPULATION PERIOD	5 weeks	4 weeks	41 days (7 weeks)
LENGTH OF CONTROL PERIOD	8 weeks (5 weeks pre- and 3 weeks post-manipulation)	4 weeks (same weeks, control stores)	82 days (almost 12 weeks)

As table 3 demonstrates, the experiments have certain mutual factors. All three experiments were conducted in real store environments and the primary data source is actual (quantitative) sales data. The manipulation periods lasted for several weeks (varying from 4 to 7 weeks), as well as involving control periods (varying from 4 to 12 weeks). These choices set the experiments apart from most earlier studies into olfactory marketing. The method of analysis is in many cases a non-parametric one since the real-life data rarely meet all the requirements of linear models.

The main differences between the experimental set-ups stem from the RQ for each article. For instance, in Article II, to facilitate a *ceteris paribus* approach, the different scents had to be tested simultaneously (in conjunction with a new product launch of strawberry chocolate), and thus the experiment design required the involvement of several stores instead of one store. It is also worth noting that proceeding from Article I to the subsequent ones, knowledge gained from the experiments grew and could be better addressed in the later studies: As an example, the scent pre-test procedure became more sophisticated in later experiments.

5 Discussion and Conclusions

5.1 Theoretical contribution

5.1.1 Addressing the research gap and questions

The purpose of this thesis was to *investigate the impact of olfactory cues on consumer behavior*. To guide the work, the following research questions were formulated:
Q1: Does the presence of olfactory cues affect consumer behavior?
Q2: What is an optimal scope to target with scents?
Q3: How do individual characteristics moderate the effectiveness of olfactory cues?

First, the three scientific articles have each studied one of the RQs. In *Article I*, the researcher demonstrated that for food products in a retailing setting, scents are an effective means to impact purchase behavior. The article solidified the stream of sensory marketing literature that has highlighted the importance of cue congruence. As opposed to a thematic congruence (e.g. Schifferstein & Blok 2002), food products can offer fruitful ground for executing a concrete, tight congruence between a scent and its target. A straight-forward congruence has been regarded as a prerequisite for many desired consumer outcomes, and Article I confirms a positive outcome also in terms of behavioral outcome (purchase behavior).

Regarding the theory of cue congruence, Article I also broadened the literature, as most earlier studies have focused on larger objects such as shopping malls (e.g. Chebat et al. 2009) with no particularly congruent scent, or have experimented with a scent with one object (e.g. Krishna, Lwin et al. 2010). In contrast, Article I combined sensory marketing and CM, addressing for the first time both the intra- and cross-category changes.

Furthermore, Article I compared the classic dichotomy of utilitarian versus hedonic products. Hedonism has received some attention in the past literature, but earlier research has not concluded whether olfactory cues affect consumer behavior for both utilitarian and hedonic goods. The findings provide a continuum with earlier research, highlighting the close connection between scents and emotions: The emotional aspect has already been studied for scents per se (Chebat & Michon 2003;

Haberland 2010), and research has found that more emotional consumers are more behaviorally responsive, which is also measured in terms of sales (Bouzaabia 2014). This paper broadened the connection by turning the focus to the targeted product categories and their emotionality. In sum, Article I answered RQ1 promptly and broadened the extant literature by embedding key concepts from the purchase behavior literature—namely, CM and the hedonism–utilitarianism dichotomy—into the sensory marketing research. Article I also prompted further questions, tackled in Article II.

Article II continued to RQ2 by studying the scope of targeting with olfactory cues. The extant literature had left a gap in the knowledge, as research had focused on ambient spaces (e.g. a whole store, Haberland 2010; a whole laboratory, Spangenberg et al. 1996) but less attention had been given to clearly definable targets. Article I had sparked a theoretical idea that while cue congruence is important, a cue that is at the top of the mind for a category might suffice. This idea had support from some earlier research pointing out that scents that are simple or easy to process lead to more favorable outcomes in consumer behavior (Haberland 2010; Herrmann et al. 2013). On the other hand, such a cue might be insufficient if the target is a single product that must stand out from its rivals. Thus, Article II intriguingly juxtaposes two theoretical approaches, both of which are common in explaining consumer behavior and are also somewhat used in the sensory marketing context: (a) selective attention and differentiation versus (b) attribute similarity and processing fluency. The results challenge the traditional view of a tight congruence by suggesting that a top-of-the-mind cue that highlights similar attributes across a larger entity (product category) is optimal both when maximizing the purchase behavior of a single differentiated item or a whole product category.

Furthermore, the article broadens the existing knowledge of multisensory marketing by introducing a combination of visual stimuli and olfactory stimuli where only the olfactory stimulus is changing. This set-up helps in bridging the gap of cross-modality that is still under-researched (Krishna 2012). Article II indicates, in accordance with Helmefalk and Hultén (2017), that congruent multisensory cues enhance the shopping experience—and prove that it also leads to higher purchase rates. To summarize, Article II suggests that for RQ2, an optimal scope for olfactory cues would be a total product category, as it maximizes behavioral responses both for an individual item and for the reference group. This effect seems to be due to attribute similarity and processing fluency that overrule the need for differentiation and selective attention.

Lastly, *Article III* directs the attention from olfactory cues and their targets to the consumer. The theoretical contribution is substantial, as it is pioneering in demonstrating the moderating impact that consumer characteristics have on the effectiveness of olfactory cues on actual behavior. The finding glues together the

few fragmented studies from olfactory marketing that have found behavioral responses to differ between consumers, depending on a singular trait (impulsiveness vs. contemplativeness, Morrin & Chebat 2005; age, Chebat et al. 2009; affect intensity, Doucé & Janssens 2013) and incorporates the psycho-physical research that has established a connection between olfaction and psychological characteristics (c.f. Frasnelli & Hummel 2005; Olsson et al. 2006) and olfaction and demographics (Hummel et al. 2007). The inclusion of the interaction of these various characteristics, both demographic and psychological, is also novel. Moreover, the extant research has demonstrated that olfactory cues induce different emotions in consumers and consumers react to these emotions in various ways. However, emotions are often described as fluctuating and hence it can be argued that anchoring to a more permanent characteristic, namely CDMS, provides more options for real-life marketers and retailers.

Marketing research has already unveiled how to leverage our other senses to affect purchase behavior while accounting for consumer characteristics. For example, consumers who score high on the NFT Scale are more likely to buy a product when given a chance to touch it, while those scoring low do not mind whether they get to touch the product or not (Peck & Childers 2003a, 2003b). Analogically, visually-driven consumers are best lured into buying when objects are aesthetically presented (e.g. Reimann et al. 2010). Article III establishes olfactory marketing as one equal means among other sensory cues to affect purchase behavior while accounting for our personal characteristics. As Article III operationalized psychological characteristics with the CDMS, it also brings olfactory marketing closer to purchase behavior theory by highlighting characteristics that are universally known and widely used.

Most importantly, Article III provides a clear and intriguing answer to RQ3: Our individual characteristics do moderate the effectiveness of olfactory cues. The fact that it is not only about demographics, but rather a combination of psychological and demographic traits, challenges earlier viewpoints. The findings altogether explain some of the disturbing ambiguity that has hampered research on olfactory cues and consumer behavior: It is not only about the scent or its target, but also about what kind of a person is processing the scent—and ultimately buying a product.

Together the three articles have formed a thorough understanding of the impact of olfactory cues on consumer behavior. Next, we revisit the initial theoretical framework that was proposed in section 2.5, enriching it with the findings and conclusions of this thesis.

5.1.2 Enriched theoretical framework

An initial theoretical framework of the impact on olfactory cues on consumer behavior was presented in section 2.5. This framework deviated from earlier general models of sensory marketing since the processing of olfactory cues is different from the processing of other sensory cues. With this olfaction-specific framework, the researcher aimed at acknowledging olfactory marketing's special role compared to other sensory cues and at fulfilling the research aim of *investigating the impact of olfactory cues on consumer behavior*. It built upon relevant theory in sensory marketing and purchasing behavior, reflecting the original RQs and hypotheses derived from each RQ. The thesis provides unwavering support for using a specific model for olfactory cues: The three articles demonstrate how the unique processing mechanism of olfactory inputs affects the total process and outcome, compared to the other four senses.

The central process of the framework led from an olfactory cue to actual purchase behavior (RQ1). To test RQ1, we applied relevant theories in the purchase behavior literature: CM that guides our decision-making, and cue congruence and hedonic orientation, both of which are particularly relevant for FMCG and food products. Article I's findings confirmed this central process: Olfactory cues have an impact on actual purchase behavior. As summarized above in section 5.1.1, Article I demonstrated that the effect on purchase behavior is evident both for utilitarian and for hedonic goods, but the effect is greater for hedonic goods. *This is a novel addition to the existing sensory marketing models*. It is surprising that the hedonic approach has not received more attention in olfactory marketing, despite the general acknowledgment of the emotionality of our sense of smell (e.g. Herz 2010) and the quaint processing of scents primarily in our "emotional" part of the brain (e.g. Hultén et al. 2009; Herz 2010). This study suggests that the emotional and hedonic role should be emphasized even more.

Another intriguing finding of Article I is related to CM as part of purchase behavior theory. The experiment demonstrated that the presence of an olfactory cue triggered *a positive spill-over effect* between product categories, contrasting with many other sales promotion mechanisms that often benefit one category at the expense of others (cannibalization). Within a category, RQ1 and its related Article I suggested that the level of congruence can be used to *guide consumer behavio*r (e.g. a licorice scent to guide behavior within candy toward licorice products).

The second part of the framework explored *the target* with which the olfactory cue was to be associated with—the object of the now-confirmed purchase behavior. A *product category* proved to be the most feasible scope of targeting, instead of a single product. For the enriched framework, an interesting conclusion can be made for RQ2: Despite the importance of the congruence between a scent and its target, a *category-congruent scent is the optimal choice* both when targeting a product

category or a single product. Congruence should be built, above all, on attribute similarity and processing fluency. In other words, congruence does not need to be specific to one product; it is sufficient that the olfactory cue works as a top-of-the-mind evoker of a desire to buy, leaving the final choice to the consumer. Furthermore, while the scent should be a top-of-the-mind evoker*, other cues such as congruent visual point-of-sale material* is beneficial in creating appeal for a hedonic product. While the selection of an olfactory stimulus should focus on attribute similarity, processing fluency, and a top-of-the-mind position, other sensory cues can take a guiding role, funneling consumers' attention further and more precisely. This is an intriguing finding that provides a continuum to the scarce literature on multisensory marketing. As Spence et al. (2014) point out, there is little known yet of how the multisensory retail environment shapes our shopping behavior. A multisensory approach is known to create a more hedonic shopping environment and experience (Ballantine et al. 2010), but this research and RQ2 demonstrate that this multisensory approach also impacts actual purchase behavior.

Thirdly, the initial theoretical framework addressed the consumer as the processor of scents (RQ3). The hypothesis was that the interaction between both the demographic and psychological characteristics moderates the effectiveness of scent on purchase behavior. The findings from Article III confirm this moderating impact. Although gender and age have been investigated to some extent in the sensory marketing context (Chebat et al. 2009), acknowledging and proving the role of psychological traits is a significant contribution of this framework. *The interaction between demographic and psychological factors* unlocked the equation and suggests that consumers should be considered as a whole, instead of studying single traits or characteristics. In particular, *hedonic, or quality-oriented men were most affected by the presence of scent*. This part of the framework increases our understanding of why the impact on purchase behavior is higher for hedonic goods than for utilitarian ones. It seems that the hedonic or emotional aspect has been an underrated or at least an understudied factor in olfactory cues and their impact on consumer behavior. Whether the hedonic desire is ensured by (a) targeting consumers who share this trait or by (b) choosing a hedonic target and a matching scent, evoking an emotional and hedonic desire seems an unexpectedly important aspect.

In sum, the three research questions and their subsequent hypotheses confirmed connections presented in the initial framework but also provided surprising findings. An elaborated version of the theoretical framework is presented below in figure 10, complemented with the main conclusions.

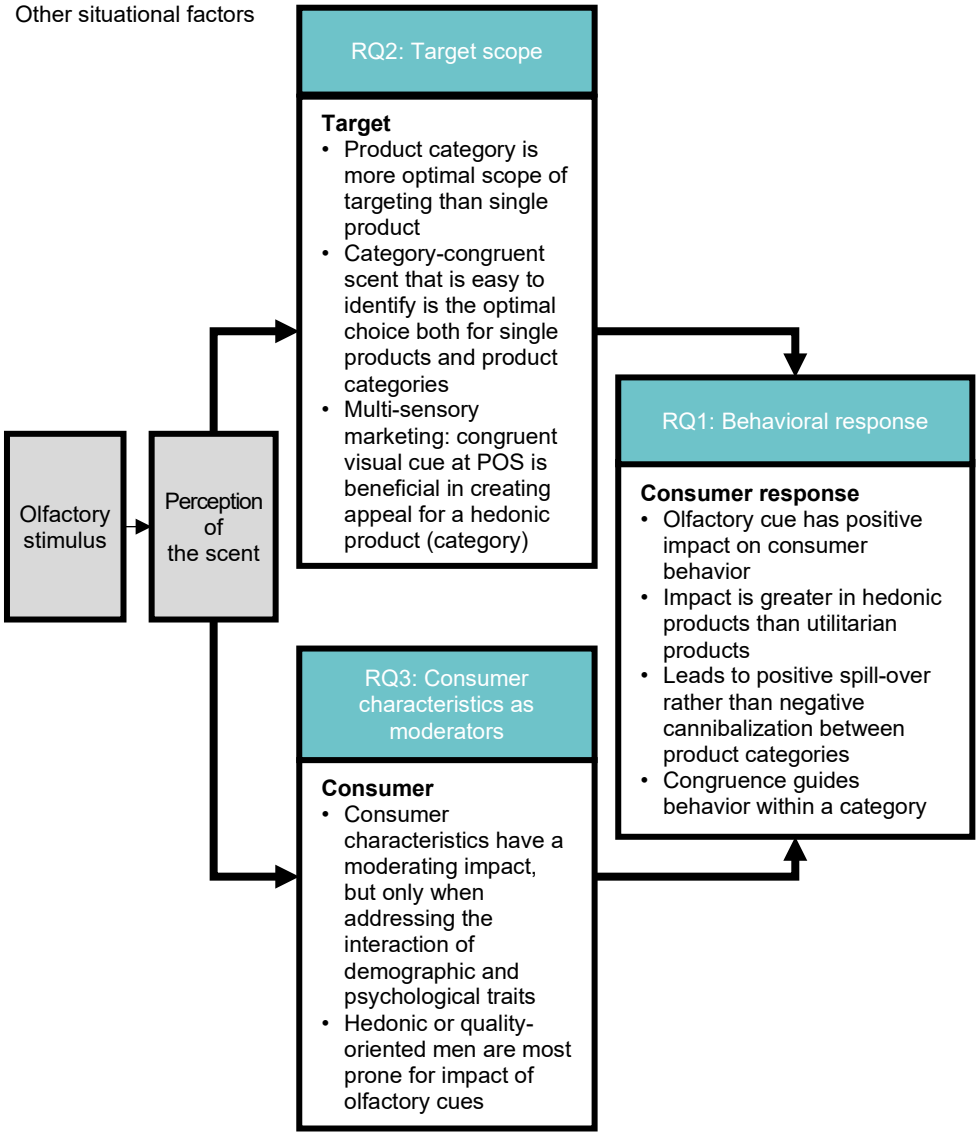

Figure 10 The elaborated theoretical framework for the impact of olfactory cues on consumer behavior.

To summarize, the contributions of the enriched theoretical framework are substantial and well aligned with the original theoretical positioning. The dissertation *contributes to the field of sensory marketing research by applying theories from consumer purchase behavior and FMCG and food-product marketing*. The deliberate restriction to the retailing context ensures that the theoretical

contribution is relevant and applicable to the specifics of retailing. *The theoretical framework provides a pioneering contribution, as it is tailormade for olfactory stimuli, as opposed to all extant frameworks that describe sensory stimuli in general.* As the above summary of the framework and findings demonstrate, such an olfactory-specific framework was clearly called for.

Theories in *consumer purchase behavior* that have proven relevant for sensory marketing—for olfactory marketing in particular—included *category management* that investigates how changes in purchase behavior affect intra- and inter-category sales (Dupre & Gruen 2004; Hong et al. 2016). This thesis has established sensory marketing as part of CM theory, suggesting that olfactory cues can be successfully approached from a CM perspective. This is a novel approach and contributes substantially to sensory marketing research that, to date, has not addressed CM. Another theoretical concept within the consumer purchase behavior literature that proved relevant is the *hedonism–utilitism dichotomy*. The thesis indicates that in line with the consumer purchase behavior literature, *products* can be classified as hedonic or utilitarian and that targeting more hedonic products with olfactory cues has a greater impact. A rich body of literature has studied the nature of product and product categories as either hedonic or utilitarian (e.g. Crowley et al. 1992; Dhar & Wertenbroch 2000; Baltas et al. 2017). This thesis lends support to this classification and embeds this product dichotomy within sensory marketing research, and by so doing, it broadens the extant theory of sensory marketing. Furthermore, the research domain of *in-store marketing* as part of the consumer purchase behavior literature proved to be significant. Since the thesis is positioned within the retailing context, the research domain of in-store marketing is particularly relevant. The findings imply that sensory marketing is an essential aspect of in-store marketing and that sensory cues can be pivotal in creating a desire to buy. This approach contributes to the sensory marketing research by establishing olfactory cues as point-of-sale situational factors that contribute to a purchase decision.

Turning then to the domain of FMCG and food-product marketing, the thesis contributes to sensory marketing research by addressing and including the special role of FMCG and food products. Most extant research in sensory marketing has been positioned closer to atmospherics and larger environments, while this thesis investigated how hedonism and congruence, both essential in FMCG and food products, affect sensory marketing. *Hedonism in food products* (e.g. Cramer & Antonides 2011) proved a substantial factor in creating a behavioral response with olfactory cues. Importantly, a focus on food products has settled the extant ambiguity in sensory marketing research, where some studies have demonstrated a behavioral connection while others have not. The close connection between food and olfaction is proven as pivotal in this thesis. A related contribution to the sensory marketing research is to approach hedonism not only through products, but as a *consumer trait*

(Hirschman & Holbrook 1982; Voss et al. 2003; Alba & Williams 2013). The contribution of this thesis is ground-breaking as it demonstrates that not all consumers are equally prone to the impact of olfactory cues. Hedonism and quality-orientation in shopping style have since long been established in the CDMS literature (e.g. Bauer et al. 2006), but now their importance is understood for sensory marketing effectiveness.

Even though food products have traditionally been classified as low-involvement products, consumers increasingly use food products as part of their self-expression and lifestyle (e.g. Carfora et al. 2019; Ditlevsen et al. 2020). In this aspect, the findings of this thesis suggest that using an olfactory cue may not only provoke a spontaneous, low-involvement act of purchase, but may possibly also fortify an individual's *self-expressive choices*. Noteworthily, it was not only hedonistic consumers who were most influenced by the olfactory stimuli, but also quality-oriented consumers (men, in particular). Hence, olfactory cues could be used not only in a hedonistic context, but also in more general terms to support a quality perception. This preliminary finding further contributes to the theoretical intersection between sensory marketing and food-product marketing.

The theoretical contribution of this thesis is not only reliant on theories from consumer purchase behavior or FMCG and food products. In contrast, several theories are cultivated from the sensory marketing field per se. These theories include *cue congruence and sensory congruence* (Mattila & Wirtz 2001; Krishna, Elder et al. 2010; Krishna 2012), *scents' emotionality* (Warrenburg 2002, 2005; Krishna 2010), and *scents' hedonism* (Herz 2005). Similarly, the context of retailing has set up boundaries and guided the use of theories. *Attribute and feature similarity theory* (Treue & Martinez-Trujillo 1999; Martinez-Trujillo & Treue 2004; Reynolds & Heeger 2009; Seo et al. 2010), and research into *in-store attention and decision-making* (Hendrickson & Ailawadi 2014; Nordfält et al. 2014) root our contributions deeply in the retailing context.

Following the theoretical contribution and the versatility of theoretical domains linked to this thesis, this work also spun out various ideas for future research. Before leading a detailed discussion on them, we briefly describe the methodological contribution of this work.

5.1.3 Methodological contribution

As brought forward in chapter 3, the methodological approach of this thesis is interlinked with the philosophical viewpoint of *empirical realism*. Therefore, the methodological choices of this thesis strive to allow for a versatile investigation of the phenomenon that would give as objective an understanding of sensory marketing

and consumer behavior as possible. Following empirical realism in methodological choices ensures the *methodological contribution* of this thesis.

First, the research setting is realistic. The researcher conducted a *real-life experiment* for each article. In contrast, many extant experiments in sensory marketing have been carried out under laboratory conditions. A review by Roschk et al. (2017) found 34 studies on olfactory cues, of which only 13 had been conducted in real retail environments to measure behavioral intentions. At the same time, there is a growing concern and call for field experiments in real store environments instead of laboratories (Spence et al. 2014). A real environment for field experiments, busy and cluttered as it is, ensures ecological validity; that is, that an impact created by a stimulus can be replicated even though other elements in the environment keep changing (Söderlund 2018). Thus, the thesis at hand provides a rare methodological angle on sensory marketing research.

Second, to study a real-world phenomenon, the researcher wanted to ensure a *representative sample of consumers* in their shopping environment. The benefits of larger sample sizes are versatile, such as allowing for an analysis of sub-samples. Continuing Roschk et al.'s (2017) review, of those 13 studies that had measured behavioral intentions in a real environment, two still missed a sample that would have included both genders and/or different age groups. Yet, variety in demographic backgrounds is essential since both age and gender are known to impact olfactory performance, as pointed out in section 2.2. In addition, a representative sample allows for higher external validity. Even though this concept, initially popularized by Campbell (1969), has received criticism (even from the author himself), most marketing scholars still agree that a finding in an experiment, in a sample, should also be detectable across real sub-populations that vary in some background factor (Lynch 1999; Söderlund 2018).

A third and substantial means of methodological contribution compared to earlier studies on olfactory cues is that this thesis measured and analyzed *actual consumer behavior*. As highlighted in chapter 3, marketing and consumer psychology have recently been widely criticized for measuring mere intentions. Following the same review article on sensory marketing by Roschk et al. (2017), there were 34 studies devoted to olfactory cues, but a closer look reveals that only a fraction, eight studies, had measured an impact on actual behavior. As Baumeister et al. (2007) aptly note: "In fact, a remarkable amount of 'behavior' turns out to be really just marks on a self-report questionnaire" (p. 397). In this thesis, each field study utilized real sales and receipt data from retailer databases that were not subject to the consumers' own estimates of their spending. This is important, particularly since some of the studied product categories were hedonistic and somewhat unhealthy (chocolate, candy) and consumers sometimes tend to downplay the consumption of such items.

Another methodological consequence from empirical realism is the use of different data and analysis methods in this thesis. Outlined in chapter 3, critical realism does not shy away from using multiple types or forms of data and their analysis. Since actual consumer behavior was in focus, quantitative data and their analyses serve a primary function throughout the thesis. However, in Article I, the researcher complemented the traditional quantitative data with semi-structured interviews (control period vs. manipulation period), striving to support the hypotheses (whether the scent operated subconsciously and whether hedonism was a primary driver of purchase decisions). Employing different data-type approaches is often described as possessing a "process nature," and this became evident in an intriguing way throughout the study. For instance, the semi-structured interviews made the researcher think of adding a visual cue to further guide consumers' attention within a category, prompting the idea for Article II. Similarly, observing shoppers who indulged in their hedonic purchases further endorsed the researcher's hypothesis that hedonism could explain some variety in the extant results. Earlier studies into olfactory marketing have mostly relied on quantitative data only (e.g. measuring sales or other numerical consumer responses) or qualitative data only (e.g. studying the impact on consumers' emotions). Thus, this thesis contributes to the literature of sensory marketing also in a methodological way by employing multiple types of data to support one another.

The use of data was not only limited to traditional sales (receipt) data and supporting qualitative sources. Instead, the thesis *presented a novel way to utilize retailer's shopper data*: In addition to demographic background factors, CDMS information was analyzed as an operationalization of psychological traits. This application proved relevant and, arguably, retailer databases provide a more reliable classification than traditional CDMS questionnaires do: Retailer databases are based on millions of transactions and questions asked from consumers, while a traditional CDMS classification must rely on consumer questionnaires—as many as a researcher is willing to conduct. Even with a larger sample of questionnaires, that approach would need to trust the consumers' own evaluation and would have no back-up from actual sales.

As is often the case with multiple experiments and studies, this thesis also offered some new and unexpected methodological knowledge gains during the process. The field experiments turned out to be as arduous as they are often described. The importance of finding a well-matching scent, stores that are almost replicates of one another, and a place for physical scent machines cannot be highlighted enough. Conducting *scent pre-tests* was a positively surprising experience, as most consumers were eager to try the scents and talk about their spontaneous associations. The enthusiasm that these respondents radiated when trying to describe the scents and sharing their personal memories made the researcher think whether consumers

could be even more involved in the early-stage development of scents or designing sensory cues to launch campaigns. These pre-tests also supported the hypothesis of processing fluency and the certain familiarity of scents as a positive influencer on consumer behavior.

The methodological learning process included some less-positive experiences, too. As an example, the researcher originally considered including alcoholic drinks (cider, beer) in an experiment. However, the initial shopper interviews quickly revealed that Finnish consumers were embellishing their usage of such products and tried to hide their real motives behind rational excuses. Therefore, it was safer to focus on product categories that were socially more acceptable.

5.2 Future research and limitations of the study

5.2.1 Further research avenues

This thesis has disclosed, in an intriguing way, how olfactory cues can impact consumer behavior. The main conclusions have been summarized in the elaborated framework (figure 10 in section 5.1.2). While some of the theoretical connections that the thesis confirmed provide a continuum to the extant literature, several conclusions were more novel and provide rich ground for further research.

First, the moderating role of hedonism and emotions proved even more substantial than originally hypothesized or presented in the extant sensory marketing research. Although the emotionality of scents has been recognized (e.g. Herz 2010) and significant results in olfactory cues and consumer behavior have often been tested on hedonic targets (e.g. chocolates and flowers, Mitchell et al. 1995; gifts, Mattila & Wirtz 2001; flowers, Jacob et al. 2014), the importance of hedonism and emotions has not been fully disclosed. This thesis found that hedonism is an essential driver of consumer responses, either linked to the target or the consumer traits. Future studies could shed more light on the utilitarianism vs. hedonism dichotomy. For instance, the possibilities of influencing consumer behavior with olfactory cues in fully rationale-driven categories could be of interest.

Hedonism and emotions are also present in our everyday food behavior. Food gives, besides nutrition, pleasure, but hedonism can also have a negative impact on food choices. Recently, healthy food habits have received academic attention both from the marketing field (e.g. emotions and food consumption, Evers et al. 2013) and from the non-marketing literature (e.g. Jaime & Lock 2009). Healthy choices have been discussed from a school perspective (e.g. Wordell et al. 2012) and for the parental upbringing angle alike (e.g. Orrell-Valente et al. 2007), and according to a comprehensive review, it seems that children and young adults are best attracted to healthy food when the message is not forced upon them (DeCosta et al. 2017).

Instead, subtle means like cool packaging can help (Pires & Agante 2011; Tang et al. 2020). Similarly, the use of sensory cues could be studied in this context. Given the fresh insight that hedonic olfactory cues (e.g. pizza scent, cookie scent) can either increase or decrease the desire to indulge in unhealthy foods (depending on the length of exposure, Biswas & Szocs 2019), olfactory cues could be further studied as a means to advance healthy food habits. Such evidence has already been provided from research into other sensory cues. For instance, bright lighting in a restaurant promotes healthier meal choices compared to dim lighting (Biswas et al. 2017), and high-pitch music promotes healthier food choices and the ordering of lower-calorie food (Dong et al. 2019). In the case of olfactory cues, there seems to be at least two alternative ways to influence consumer choices. First, as indicated by Biswas and Szocs (2019), a longer exposure to an indulgent scent can "satisfy" the desire and hence make the actual unhealthy food less desirable. Secondly, certain scent compositions, such as a fresh scent, can help in decreasing a craving for unhealthy food, even with shorter exposures (Firmin et al. 2016). Since olfaction is the most emotional sense, scents could be further studied even as a remedy to eating disorders or low control over eating, both of which are typically of an emotional nature (e.g. Macht 2008). In such contexts, it would be intriguing to find out which of the two alternative approaches would produce more effective results: To satisfy the craving with a longer exposure to a congruent, indulgent scent, or to encourage a healthier option by inhaling a fresh, healthy scent?

The findings of this thesis nudge toward a third way of influencing consumers' food choices; namely, by funneling consumers' attention within or across product categories. This process could be further studied to establish whether a scent is powerful enough to also shift purchase decisions from a notoriously unhealthy category to a category with a healthier (and thus often less tasty) perception. Here, the potential of multisensory cues could provide fruitful ground for future studies. The extant research has proven the combination of olfactory and visual stimuli to be effective (e.g. Fiore et al. 2000; Bosmans 2006; Ruzeviciute et al. 2020). Such a combination is easy to realize in an actual purchase environment since stores are full of visual stimuli. The challenge might be, in fact, in finding a visual stimuli that distinguishes the desired target but is fluent and simple enough to process. In this thesis, the visual cue depicted the targeted single product (a strawberry-flavored chocolate plate). Both the chocolate and strawberry scents had a positive impact on sales, yet the chocolate scent outperformed the strawberry scent. Perhaps future studies could investigate the option of placing healthy products—for instance, freshly squeezed fruit juices or smoothies—next to an unhealthy category and complement the environment with fruit odors and appealing visuals of juices and smoothies.

Alternatively, a combination of olfactory and audio cues could produce a similar positive impact, as such a multisensory stimulus is proven effective in consumer intentions and, to some extent, behavior (e.g. Spangenberg et al. 2005; Morrison et al. 2011; Helmefalk & Hultén 2017). Extant studies have confirmed that it is often pleasure and arousal that serve as mediators between the sensory stimuli and consumer responses. Yet, the versatility of emotions that scents can produce in consumers (Ferdenzi et al. 2013) could be studied further. By so doing, the stimuli could be tailormade to evoke those emotions that the food research has already found as important in guiding healthier options. Since emotional eating is related to both negative and positive emotions (Braden et al. 2018; Sultson et al. 2017), finding optimal multisensory strategies to support healthier choices could be interesting—and there is a real need for them.

Another interesting avenue for future research can be found in olfactory cues and congruence. The findings of this thesis highlighted the role of top-of-the-mind congruence between a scent and its target, but also demonstrated the guiding impact within a given product category when a tight congruence between a scent and its target is used. Importantly, *processing fluency* and *attribute similarity seemed* to foster a substantial impact on purchase behavior. Processing fluency refers to the ease of processing an external cue; the literature suggests that a cue that requires less effort to process has higher liking ratings and a positive impact on evaluations as well as choice behaviors (Lee & Labroo 2004; Schwarz 2004). In a sensory marketing context, the processing fluency of a scent has a positive impact on the effectiveness of the cue—such as using a simple orange scent instead of a complex mix of orange, green tea, and spices (Haberland et al. 2010; Seo et al. 2010; Herrmann et al. 2013). Attribute similarity, in turn, suggests that shared attributes between cues and objects enhance attention toward an object (e.g. Treue & Martinez-Trujillo 1999; Reynolds & Heeger 2009). For instance, consumers' categorization of products is facilitated with product-feature similarity (Park et al. 1991; Moreau et al. 2001). Moreover, feature or attribute similarity enhances the sales, evaluations, and purchase intentions of a brand line extension (Chakravarti et al. 1990; Farquhar et al. 1990). These two theories could be employed to further clarify the role of cue congruence and how to utilize it. Overall, the close link between our senses and consumer psychology could increase our understanding of why sensory cues affect our purchase behavior in various ways.

This thesis has contributed to the sensory marketing domain in the context of retailing. *Retailing research* has seen many recent advancements, such as eye-tracking studies, that facilitate a deeper understanding of consumers' attention, decision-making, and behavior in the store. Articles discussing the future of retailing emphasize these technological advancements (e.g. Grewal et al. 2017; Nordfält et al.

2019). Future studies could combine sensory marketing knowledge and retailing research even more closely with the aid of these methodological choices—for instance, consumers' attention toward a certain object, prompted by an olfactory cue, could be verified with eye-tracking. In addition, varying one element in a multisensory experiment would advance our understanding of which sensory "pairs" are optimal. The researcher is not aware of any studies combining price promotion or other more rationale-driven mechanisms with the more emotional olfactory cue, even though price promotions as such have been widely studied (for a meta-analysis, see Santini et al. 2016). Last but not least, research (e.g. Ballantine et al. 2010) has demonstrated how multisensory cueing is pivotal in creating *a more hedonic retail experience*. Such a wholesome approach to retailing environments could also provide an interesting future area for sensory marketing scholars.

5.2.2 Acknowledging the limitations

As with all new research, this thesis has its limitations. It studied the impact of olfactory cues on consumer behavior in the context of retailing. The researcher deliberately chose to study the least-known part of the process: The impact on actual behavior. Consequently, this thesis paid less attention to potential preceding states in the process. However, as presented in chapters 1 and 2, the extant research is already rich in studying these preceding states, such as pleasure and arousal (Morrin & Ratneshwar 2000; Morrison et al. 2011; Roschk et al. 2017), stimulation (Orth & Bourrain 2005), or cognitive and emotional responses (Fiore et al. 2000).

Aligned with the aim of this thesis, only real purchase behavior was measured and analyzed. Here, too, the extant literature is already rich in studying intentions (e.g. Spangenberg et al. 1996; Fiore et al. 2000). Criticism for instead measuring intentions of real behavior has been discussed broadly in section 3.1 and this criticism is valid both for consumer behavior research in general and specifically in sensory marketing research, advocating for the measurement of real behavioral outcomes. A related restriction and source of criticism for this thesis can arise from the research environment. The researcher followed a real shopping situation stringently. All experiments were conducted in real stores, and even some of the scent pre-tests took place in a store environment. Consequently, the possibility of other intervening factors cannot be ruled out. As Söderlund (2018) notes, an experiment in a real environment ensures that the cue can survive in a cluttered environment. In this thesis, we observed consumers during their shopping experience and conducted semi-structured interviews to ensure a correct interpretation of the real-life experimental results.

A related limitation regards the use of artificial scents. As highlighted in section 2.2.3, artificial scents rarely provide a perfectly matching imitation of their natural,

original counterparts. Interestingly, the researcher is not aware of any studies into olfactory cues and consumer behavior that would have included spontaneous identification in scent pre-testing. Instead, the extant studies have settled with asking about scent pleasantness, familiarity, or evaluation based on given answer options (see section 2.2.3). In the thesis at hand, the researcher took a conscious risk and asked respondents about spontaneous associations with the scents, without giving any other cues (e.g. a set of answer options or providing visual cues). Admittedly, the identification rate of the chosen scents could have been higher. If the scents had been better identified, the results in Articles II and III could have been different. In particular, the differences between the control and manipulation conditions could have been more prominent. In Article II, the strawberry scent was more commonly identified as something generally sweet and candy-like than pure strawberry, since the scent was closer to a strawberry candy or strawberry ice-cream than to a fresh strawberry. Better identification might have assisted in detecting greater intra-category changes as well. The challenge of finding representative commercial scents remains for future studies, albeit that the quality of artificial commercial scents is constantly improving.

An additional limitation stems from the operationalization of consumer characteristics in Article III. The researcher utilized an established retailer database, selecting a few consumer groups that had their close counterparts in major academic sources. Nevertheless, this operationalization is only one of countless possible ones. An alternative option could have been to profile consumers based on a survey when entering a store. However, despite substantial pre-testing, introducing a new survey could have been equally or even less reliable, as the sample would have been a fraction compared to a long-lived existing classification. Using a survey would also have made consumers aware of an experiment taking place in their store.

The researcher also acknowledges a geographic-demographical restriction. Conducted in Europe, the sample is undeniably "WEIRD" (Western, Educated, Industrialized, Rich, and Democratic; cf. Henrich et al. 2010). This impeaches the generalizability in other parts of the world. While olfaction is universal, the role of scents is partially dependent on culture, and the degree of hedonism in grocery shopping is certainly smaller if consumers have less expendable income. On the other hand, M&M, Snickers, and KitKat have invaded even the remotest corners of the globe, suggesting that the love for hedonic goods is ubiquitous—so who could resist a whiff of chocolate scent in the air?

5.3 Managerial implications

5.3.1 Engage and impact with scents

The thesis has intriguing managerial implications. The findings encourage retailers to employ scents in the pursuit of increased sales of a product category or even a single item. As the positive impact of a scent benefits rather than damages the sales of other spatially-related categories, category managers can regard olfactory cues as a low-risk tool for experimentation. In this sense, scents differ strikingly from many other point-of-sale actions.

Retailers, marketers, and category managers alike can utilize scents to guide consumer behavior between or within a category for incremental sales. The potential is evident for fresh products (dairy, fruits, and vegetables) with short best-before dates and fluctuating demand. Scents can also prove useful in fortifying or evening out seasonal peaks. From a marketing perspective, a scent can be effectively accompanied by traditional visual point-of-sale materials for maximal impact.

When choosing a scent, this thesis recommends a scent that represents a primary attribute of a product or product category. Furthermore, the scent should optimally be familiar and easy to process. In some cases, this equation is easy to solve—such as a chocolate scent for chocolates—as all category representatives share mutual primary attributes. But in other cases, there may be several recognizable and easy scents—think of soft drinks or yogurts that have versatile flavors. In such cases, marketers are advised to pick a scent that resembles the category captain: Cola for all soft drinks, strawberry, or banana for all yogurts. This approach ensures that the scent engages the consumer and evokes the desire to buy but leaves the final choice up to the consumer's own preferences. In the best of worlds, retailers could leverage naturally-occurring scents to make the purchase environment more appealing and engaging. For instance, an orange juice machine that freshly squeezes the fruits is an adorable and real scent that can benefit not only the orange juice machine sales, but also oranges or juices in general.

If the choice of scent is important, so is the choice of its target. As covered in this thesis, scents have a positive impact on sales, both for utilitarian and hedonic goods. However, the studies suggest that the impact is greater for hedonic products. This highlights the potential of not only cookies and confectioneries, but also of so-called comfort food such as pizza or bakery products. Retailers often have a solid understanding of which goods are considered hedonic vs. utilitarian, and the academic literature (e.g. Cramer & Antonides 2010) provides further assistance in evaluation if needed.

Another type of practical implication considers the growing concern of healthy food habits and the guiding impact of olfactory cues. As described, scents can help

in funneling consumers' attention (subconsciously) toward a certain object, and the length of exposure to a scent (e.g. a hedonic vs. healthy scent) influences the intake of unhealthy and healthy foods (Biswas & Szocs 2019). Therefore, perhaps the public sector could investigate the use of scents in school canteens to promote desired food habits. As a practical idea, a juicy orange scent could be dispersed in the afternoon to facilitate the choice of fruit as a snack, instead of a chocolate bar.

Overall, practitioners should keep in mind that less is more when it comes to olfactory and other sensory stimuli. Even though the thesis has demonstrated the versatile possibilities of scents in the marketplace, a retailing environment should not become overloaded with scents. A large-sized hypermarket can perhaps carry a few scents simultaneously if the targeted product categories are physically adequately apart from one another. This thesis is limited to food products, where the connection between a scent and the product is natural. If olfactory cues are used in, for example, personal hygiene products, the demands could be different. For instance, consumers nowadays demand more unscented personal hygiene products than the market can offer (Meng et al. 2018). If the product per se should not smell, there should hardly be any point-of-sale scent either. Moreover, olfactory cues are best fit with products that are expected to smell. Ruzeviciute, Kamleitner, and Biswas (2020) demonstrated that a scented ad increases product appeal but only for products that are expected to smell (e.g. a scented candle but not a drinking glass).

5.3.2 Know your audience and aims

This thesis provides practical remarks regarding the target audience and aims of an olfactory campaign, too. First, the results encourage retailers and marketers to consider, as with any marketing activity, the target audience carefully. The good news is that scents affect consumers regardless of their gender or age, so there will hardly be any lost efforts. Instead, the potential audience is broad. However, if a storekeeper or industry marketer is keen on optimization, they should look for hedonic or quality-oriented consumer groups. Above-average results can be expected from men with these shopping traits. Looking at a retailer's or marketer's own consumer classification usually points in the right direction.

One challenging consumer group nowadays seems to be modern consumers who increasingly use mobile phones while in the store. Mobile phone usage leads to less information processing at check-outs and hence fewer impulse purchases (Grewal et al. 2018). A similar effect is detectable with self-scan check-outs, as consumers have less waiting time and pay less cognitive attention to impulse products placed during the proximity of the last tired mile of their shopping marathon. In contrast, a scent remains an effective cue even at check-outs and for impulse products, because you cannot turn off your nose. It affects you even when you are scrolling through social

media or piling items on to self-scan, because processing does not require cognitive effort.

The studies in this thesis have demonstrated that the aims of a scent marketing campaign should be clearly defined in advance: Which category or single product is of interest? Being clear with the objective ensures that scents can be used sparingly. Obtaining substantial results does not require diffusing a whole supermarket full of disturbingly strong smells; instead, one or two scents simultaneously will suffice to increase sales of one or several product categories. Consumers' noses adapt and disadapt to all smells in a store. Hence, it pays off to employ a less-is-more tactic with scents.

Last but certainly not least, scents can provide practitioners with a competitive advantage. Not only does a pleasant, congruent scent increase sales, but it also enhances the shopping experience and thus differentiates the store from its competitors. As noted in the Introduction, Kotler (1974) pioneered in atmospherics research. He defined atmospherics as "the effort to design buying environments to produce specific emotional effects in the buyer that enhance his purchase probability" (p. 50). He aptly points out that the atmosphere or feeling of a store may become more important, almost as important as the goods themselves, as competition toughens. These words from the 1970s could not be more apt than today, as low-cost retailers are gaining shares and e-commerce is challenging the role of traditional stores. Let us harness the power of scents to increase the appeal of retail environments and brands alike.

5.4 Concluding reflections

This research project, triggered by a master's thesis, has shown the power of scents. A simple, pleasant, and congruent scent at the point-of-sale is capable of altering our purchase behavior. As a researcher, the project has involved countless hours pre-testing different scents with consumers, observing and interviewing shoppers, and analyzing sales data. I feel the urge to emphasize that even though the research aim was mainly quantitative and purely sales-oriented ("cold," one could argue), the power of scents is much deeper and more versatile. I could never have guessed in advance the reactions of consumers when they were asked to sniff a colorless cotton stick in the middle of their shopping trip. Contrary to my pessimistic expectations, most consumers were eager to try. They would close their eyes when fetching that old yet so powerful memory that the scent evoked in them. They would smile triumphantly upon recognizing the scent. Once the recorder was off, I would get curious questions about the scent. It became evident in this pre-test phase that scents in the shopping environment were completely underrated.

From a qualitative side, observations and interviews only fortified this discovery. Seeing a suited-up man hurrying past the fruit and vegetable shelves, slowly stopping midway and picking apples to put in his cart almost as if hypnotized, was eye-opening. The interviews demonstrated that while most of us operate on autopilot in the store, a whiff of a scent was able to stop the consumers for a moment and break the habit. It was fascinating.

Looking back at all the findings and encounters with consumers, it is fair to conclude that scents make our environment much more alive and pleasant. Writing it in black and white makes it sound self-evident; after all, our most loved memories and experiences are filled with scents—they would not be complete without the smell. If I asked you to think of that summer house of your family, or reminisce about a scout camp from childhood, you would instantly have a scent in your mind. Or the smell of gingerbread cookies would likely evoke warm thoughts of Christmas. Even at our favorite cafés and restaurants, we feel more at home already when entering and inhaling that familiar smell.

But what if I asked you to think of your usual supermarket? I am afraid that the contrast is striking. Surely, retailers and marketers are investing in making the store environment more appealing: lighting has been a hot topic in recent years; colors are increasingly used to communicate a quality perception; and consumers are guided with better signage. Yet there is so much unleashed potential in the sensory domain. For instance, the coffee industry has made major improvements in packaging design and story-telling. I bet that a whiff of freshly ground coffee would make the coffee aisle feel more real and the brands more prestigious.

As mentioned in the Introduction, in section 1.1, consumer experiences and sensory systems emerge as the last frontiers of marketing (Achrol & Kotler 2012). This thesis is just one manifestation of all the research opportunities in the field. With the wise words of Achrol and Kotler in mind, I am confident that sensory marketing will continue to increase in importance and I look forward to being part of that research community for many years to come.

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