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RAMONA DE LUCA

A COGNITIVE APPROACH TO SCENT MARKETING: THE EFFECT OF ODOR PRIMING AND PROCESSING DYNAMICS ON CONSUMER AESTHETIC PREFERENCES AND CHOICES.

SÃO PAULO
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Campo do conhecimento: Administração Mercadológica

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ABSTRACT

Academic research on the effect of scent in marketing and consumer behavior have successfully demonstrated how odors improve cognitive, affective, and behavioral responses of consumers in the marketplace. Little attention has been turned to the cognitive mechanism through which scents provide information, and help individuals, and consumers, to attribute a meaning to physical, and psychological phenomena. In this dissertation, I discuss the underlying mechanism through which smell perceptions contribute to consumer decision-making, and preference formation, relying on the connection between smell, cognitive processing, and emotional paths. The dissertation is composed of three articles, which make an initial contribution to scent marketing by exploring the potential of a cognition-based approach to studies on olfaction (Article 1), empirically testing affective and semantic odor priming effects on consumer product and brand choices (Article 2), and empirically demonstrating how olfactory information added to an unscented product contribute to aesthetic preferences formation and processing style (Article 3). In particular, Article 1 consists of a systematic review of the most relevant studies on olfaction published from 1992 to 2017 and presents the current theories and approaches to the investigation of scent effects on consumer behavior, as well as introduces the opportunity of applying a cognitive-based approach to scent marketing studies. The article 2 contributes to olfactory priming literature demonstrating that the incidental exposure to an odor may non-consciously activate information which regulates consumer's choice of products and brands. Eight experiments demonstrate that odors are primarily perceived through the dimension of their valence and that this process of odor perception and interpretation is an affective-based mechanism (i.e., affective priming) rather than associative-based (i.e., semantic priming). Article 3 explores how olfactory cues added to an unscented product (e.g., pencil) contribute to developing consumers' aesthetic preferences for the product. I empirically test the PIA Model (Pleasure and Interest Model for Aesthetic Liking) in four experiments and demonstrated that olfactory information is processed across the two routes of heuristic and systematic processing simultaneous, whereas attribute-based information is processed primarily heuristically and then systematically. The final chapter presents the implications that a cognitive-based approach may provide to researchers, managers, and public policies makers to advance in scent marketing theory and practice.

Keywords: Scent Marketing, Consumer Behavior, Cognition, Odor Priming, Aesthetic Preferences.

RESUMO

Pesquisas acadêmicas sobre o efeito do cheiro nas áreas de marketing e de comportamento do consumidor demonstram com sucesso como os odores melhoram as respostas cognitivas, afetivas e comportamentais dos consumidores no mercado. Nesta tese discute-se o mecanismo subjacente pelo qual as percepções do cheiro contribuem para a tomada de decisão do consumidor e a formação de preferências, dependendo da conexão entre cheiro, processamento cognitivo e pistas emocionais. A tese, composta de três artigos, faz uma contribuição inicial para o marketing sensorial, explorando o potencial de uma abordagem baseada em cognição para estudos de marketing olfativo (Artigo 1), testando empiricamente os efeitos do *odor priming* afetivo e semântico nas escolhas dos consumidores para produtos e marcas (Artigo 2); e demonstrando empiricamente como as informações olfativas adicionadas a um produto cujo cheiro não representa um atributo central para sua avaliação, regulam a formação das preferências estéticas e o estilo de processamento (Artigo 3). O Artigo 1 consiste em uma revisão sistemática dos estudos mais relevantes sobre o olfato, apresentando as teorias e as abordagens mais utilizadas para a investigação dos efeitos do cheiro sobre o comportamento do consumidor, bem como introduz a oportunidade de aplicar uma abordagem cognitivista aos estudos de marketing olfativo. O Artigo 2 contribui para a literatura demonstrando que a exposição incidental a um odor pode ativar inconscientemente uma informação capaz de regular a escolha do consumidor de produtos e marcas. Oito experimentos demonstram que os odores são percebidos principalmente pela dimensão de sua valência (ou seja, agradável ou desagradável) e que esse processo de percepção e interpretação de um cheiro é um mecanismo afetivo (*affective priming*) e não associativo (*semantic priming*). O Artigo 3 explora como os cheiros adicionados a um produto cujo aroma não é um atributo central para sua avaliação, contribuem para o desenvolvimento das preferências estéticas dos consumidores para o produto. Quatro experimentos testam empiricamente o modelo PIA (Modelo de Prazer e Interesse), demonstrando que a informação olfativa é processada simultaneamente nas duas de processamento heurístico e sistemático, enquanto que a informação baseada em atributos é processada primeiramente de forma heurística e depois de forma sistemática. O capítulo final da tese apresenta as implicações que uma abordagem cognitiva pode fornecer aos pesquisadores, aos gestores de marketing e aos gerentes de políticas públicas para avançar na teoria e na prática de marketing olfativo.

Palavras-chave: Marketing Olfativo, Comportamento do Consumidor, Cognição, Odor Priming, Preferências Estéticas.

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SUMMARY

CHAPTER 1

GENERAL INTRODUCTION

The sense of smell is the most primitive of the five senses and has been historically associated with important biological and physiological functions of human evolution, such as identifying threats and dangers as well as opportunities in the environment. Humans have learned through smelling objects to interact with the environment and attribute a meaning to physical and psychological phenomena, for example distinguishing edible foods from harmful ones, recognizing predators, and detecting threats (Holmes & McCormick, 2010).

For modern Western civilization, the sense of smell is a secondary sense, which comes after other, more important senses, such as vision and hearing. Despite the higher order estimation of other sensory modalities at the expense of the sense of smell, humans experience the environment *synesthetically* (Stein & Meredith, 1993), which means that individuals perceive the world around through the cross-modal interaction of their senses (Calvert, Spence, & Stein, 2004).

Product and service experiences are also multimodal (Auvray & Spence, 2008), and each sense is important to perform a certain function, depending on the information it provides to evaluate specific consumption experiences (Krishna, 2012). This is the reason why research on sensory marketing has explored several dimensions of the store atmosphere, such as music (Yalch & Spangenberg, 2000; Mattila & Wirtz, 2001), colors (Bellizzi, Crowley, & Hasty, 1983), cleanliness (Bitner, 1990), illumination (Summers & Hebert, 2001), crowding, (Hui & Bateson, 1991), and many others. Sensory studies have also explored the impact of sensory cues on brand experience (Hultén, 2011; Lindström, 2006), brand memory (Morrin & Ratneshwar, 2003) and product evaluations and choices (Krishna & Morrin, 2007; Miller & Kahn, 2005).

The underestimation of the sense of smell in modern societies also affected the attention that academic research has turned to the study of olfactory perception until thirty years ago.

Marketing and consumer behavior literature has primarily prioritized sight over the remaining four senses; visual perceptions, in fact, are recognized to better capture the attention (Smeets & Dijksterhuis, 2014), possess multiple attributes for coding (e.g., size, shape, color), and produce a more concrete mental representation, compared with smells (Zucco, 2003).

However, research on olfaction has considerably increased over the last thirty years since the power of olfactory cues on consumer experiences has been recognized as a reality in our everyday life. The Got Milk? Campaign from the California Milk Processor Board was designed to encourage the consumption of cow's milk. However, as a part of the campaign consisted in diffusing a cookie aroma at bus stops in San Francisco, the Metropolitan Transit Commission removed the campaign after only 36 hours because the smell of the cookie persuaded people to overeat. During the Dunkin' Donuts campaign in South Korea, which diffused coffee aroma at the bus stops too, sales of the Dunkin' Donuts' store increased by 16% to 29%.

Some services are also regulated by the multisensory perception of the environment. A study conducted by the Bill & Melinda Gates Foundation shows that 2,5 billion of people in the world do not use toilets and that around 800,000 children die every day because of the lack of hygiene. Despite the construction of millions of new toilets to fight the sanitation crisis, these toilets do not get used because they smell bad, even if they are clean.

Olfactory cues have received greater attention in consumer behavior studies during the last thirty years. In particular, pleasant scents positively affect consumer evaluations of the store environment (Mattila & Wirtz, 2001), brand evaluations (Morrin & Ratneshwar, 2000), purchase intentions (Mitchell, Kahn, & Knasko, 1995), behaviors toward the store (Spangenberg, Crowley, & Henderson, 1996), purchase-related behaviors (Doucé, Poels, Janssens, & De Backer, 2013), and consumer memory (Krishna, Lwin, & Morrin, 2010).

Most of the studies on olfaction have focused the attention more on the effect of scent on a variety of consumer behavior variables than on the process through which scents are elaborated, and processed by individuals. This might be the reason why many studies have provided mixed results regarding the underlying cognitive and emotional processes through which scents affect behaviors (Spangenberg, Crowley, & Henderson, 1996; Morrin & Ratneshwar, 2000; Cirrincione, Estes, & Carù, 2014).

Objectives:

The aim of this dissertation is threefold:

1. To present a systematic review of the existing findings of scent research and present the current theories and approaches to the investigation of scent effects on consumer behavior (Chapter 2, Article 1);
2. To propose a cognitive-based approach to be applied to scent research which may contribute to the advance of scent marketing research in 4 ways: i) solving some inconsistencies of previous studies; ii) extending the notion that odors are multisensory and complex experiences that are not only emotionally perceived but processed through their meanings; iii) exploring the underlying mechanism through which odors regulate behavior and decision-making through cognition; and iv) addressing the implications which may result from a cognitive-based approach to scent studies for managers and public policies makers;
3. To test cognitive-based theories, such as odor priming (Article 2, Chapter 3) and the PIA Model (Pleasure and Interest Model for Aesthetic Preference) (Article 3, Chapter 4), with a set of studies which address significant theoretical and practical implications to scent marketing research applying a cognitive-based approach.

The dissertation is structured in five chapters. After the introduction to the topic of scent marketing (Chapter 1), Chapter 2 consists of the first article of the dissertation and includes a systematic review of 53 empirical studies on olfaction published from 1992 to 2017 to present the current theories and approaches to the investigation of scent effects on consumer behavior. I propose a cognitive-based approach to explore the underlying mechanism through which scent is mentally processed by individuals, and clarify how mental processing of scent information may contribute to developing preferences and meanings for products and environments. I believe that the application of a cognitive-based approach might contribute to the literature on scent marketing restoring the original function of the sense of smell, which is not simply being a product attribute or an entertainment cue but to provide information that supports individuals, and consumers in our case, to ascribe a meaning to physical and psychological phenomena.

The Article 1 also presents a research agenda, and propositions to encourage further studies on cognitive processing of scents, which may have relevant theoretical and practical implications.

Chapter 3 includes the article 2 of the dissertation, to test the potential of odor affective and semantic priming effects on consumer decision-making and choice. In particular, the article 2 extends the idea that olfactory stimuli influence cognitive processing even when they are perceived unconsciously. Eight laboratory experiments show that odor priming regulates product and brand choice, by demonstrating that affective odor priming is more effective than semantic odor priming to drive consumer decision-making. The results also demonstrate that semantic odor priming occurs only under the certain condition of affective-based evaluations, such that when the odor is perceived as pleasant. As opposed to visual stimuli, that possess multiple attributes for coding, olfactory stimuli follow a different underlying cognitive mechanism. This research also contributes by addressing that the underlying psychological and physiological process through which odor priming occurs is one of affective-based versus associative-based mechanism. In other words, the incidental exposure to odors influences information processing and choices primarily via affective rather than semantic priming. These findings also contribute to methodology in scent research by addressing that odors may also be encoded in isolation (Smeets & Dijksterhuis, 2014; Zucco, 2003) and that a mental representation of odors, even if difficult and more abstract, is possible (Shiffrin & Schneider, 1977). Moreover, the intentional odor manipulation demonstrated that laboratory settings are also suitable to reliably predict scent effects on information processing and decision-making (Smeets & Dijksterhuis, 2014).

Chapter 4 includes the third article of the dissertation, which explores and tests empirically the application of the PIA Model (Pleasure and Interest Model for Aesthetic Preference) to olfactory stimuli. The application of the PIA model to scent marketing research might clarify why people choose scented products over other, unscented alternatives, focusing more on the process through which aesthetic liking occurs instead on the very general product evaluations, which represent only the outcome of the process through which aesthetic preferences arouse. In particular, the PIA Model combines the two approaches to the study of aesthetics, the fluency-based theories, and the dual-process theories, to the investigation of the "disinterested" aesthetic preferences and the processing dynamics underlying consumer aesthetic judgments. More specifically, four experiments demonstrate that when a particular, not necessarily congruent scent is added to an unscented product (i.e., product for which scent is not a central attribute for evaluation), it improves perceived product pleasure and interest for the product which, in turn, contribute to shaping aesthetic preferences for the product. Moreover, the article 3 clarifies the underlying processing dynamics under which odors are processed providing empirical evidence that pleasure and interest in the product are two distinct positive affective responses to olfactory stimuli which both contribute to driving aesthetic liking and product attractiveness.

Finally, Chapter 5 summarizes the main conclusion of the dissertation. More specifically, I report the findings of the three articles and show how they address significant contribution to the theory, the method, and the practice of scent marketing research applying a cognitive-based approach.

CHAPTER 2

ARTICLE 1 - New Perspective of Scent Marketing: A Review and Research Agenda

Abstract. The perception of smells in humans involves much more than olfactory receptors and physiological reactions. Smelling incorporates not only biological, physiological, and psychological phenomena but also socio-cultural, and aesthetic experiences. The integration of scent information occurs through the limbic system of the brain, which is the most closely linked to our emotions and memory system. Despite the function of the olfactory system concerns more than simply process and identify what we smell, the sense of smell in attitude and behavior has been drastically underestimated compared with other senses in Western cultures. Scent research in applied social sciences, such as marketing and consumer behavior, have successfully demonstrated how smell contributes to improving cognitive, affective, and behavioral responses of consumers in the marketplace. However, little attention has been turned to the cognitive mechanism through which scents provide information, and help individuals, and consumers, to attribute a meaning to physical, and psychological phenomena. I discuss the underlying mechanism through which smell perceptions contribute to consumer decision-making, and preference formation, relying on the connection between smell, cognitive processing, and emotional paths. In particular, this review makes an initial contribution to scent marketing theory by: i) discussing findings, existing scent marketing literature, and current applications of scent in consumer behavior; ii) exploring the potential of a cognition-based approach to scent marketing studies; iii) introducing a research agenda by means of propositions to encourage further development in the subject.

Keywords: scent marketing, information processing, decision-making, cognition, consumer behavior.

1. Introduction

The sense of smell is our most primitive sense and has been historically associated with important biological and physiological functions of human evolution, such as identifying threats and dangers as well as opportunities in the environment. Humans have learned through smelling objects to interact with the environment and attribute a meaning to physical phenomena, for example distinguishing edible foods from harmful ones, recognizing predators, and detecting threats in the world surrounding them (Holmes & McCormick, 2010; Sarafoleanu, Mella, Georgescu, & Perederco, 2009). The ancient civilizations ascribed to odors an important role in several expressions of human behavior. The Ancient Greek, for example, relied on body odors to detect diseases; the Egyptians represented their God, Nefertem, as the odor of the blue lotus flower, and believed that odors would have led Egyptians in their transformation into the afterlife. The sense of smell has not completely lost its importance in modern societies too. The Brazilian tribe of Desana allows marriage between two members of different tribes only if the body odor of the members of other tribes is dissimilar. The Onge tribe of Andaman Islands marks the time and defines the calendar according to the smell of the flowers at different moments of the year.

For modern Western civilization, the sense of smell is a secondary sense, which comes after other, more important senses, such as vision and hearing. The underestimation of the sense of smell is a result of the rise of the scientific thinking between the 18th and the 19th century, which have considered this sense as a more primitive and emotional sense, which could have threatened rationality and logical thinking. Most of the Western languages also reflect the little consideration that Western cultures turn to smells: there are many English words to praise a person's sensory qualities other than olfactory ones, such as "gourmet", "visionary", "a good listener", "great speaker", but there are no well-known words to praise smelling abilities (Fox, 2006).

Despite the higher order estimation of other sensory modalities at the expense of the sense of smell, humans experience the environment synesthetically (Stein & Meredith, 1993), which means that individuals perceive the world around through the cross-modal interaction of their senses (Calvert, Spence, & Stein, 2004). Each of the five senses has a different role depending on the function they perform (Fox, 2006). Babies and young children, for example, are unable to communicate verbally and their learning occurs exclusively through the five senses; in particular, they recognize the mother primarily through her body odor, and then through her voice or face; babies also start learning by grasping objects or putting them in their mouth, savoring foods, and pronouncing their first words by imitating familiar sounds.

Product and service experiences are also multimodal (Auvray & Spence, 2008), and each sense is important to perform a certain function, depending on the information it provides to evaluate specific consumption experiences (Krishna, 2012). Our purchase decision for a sweater or a smartphone in a store is mostly based on the information we obtain about the product after touching, and grasping it; however, when we buy the same product on the internet, and we cannot touch it, our decision relies more on visual information. The hearing is the most important sense for certain products, such as washing machine, or a car: noise of a new car is associated with power, dominance, and a sense of being in control, while the noise emitted from a washing machine is perceived as annoying, and stressful. Some have come to use an old pair of jeans only because it is more comfortable, and softer, even if it looks uglier than a new one. Some services are also regulated by the multisensory perception of the environment. A study conducted by the Bill & Melinda Gates Foundation shows that 2,5 billion of people in the world do not use toilets and that around 800,000 children die every day because of the lack of hygiene. Despite the construction of millions of new toilets to fight the sanitation crisis, these toilets do not get used because they smell bad, even if they are clean (Sarafoleanu et al., 2009). Thus, smell does matter, and it has a power in the change and modulation of human behavior.

The underestimation of the sense of smell in modern societies also affected the attention that academic research has turned to the study of olfactory perception until thirty years ago. Marketing and consumer behavior literature has primarily prioritized sight over the remaining four senses; visual perceptions, in fact, are recognized to better capture the attention (Smeets & Dijksterhuis, 2014), possess multiple attributes for coding (e.g., size, shape, color), and produce a more concrete mental representation, compared with smells (Zucco, 2003). This is the reason why research on sensory marketing has explored several dimensions of the store atmosphere, such as music (Yalch & Spangenberg, 2000; Mattila & Wirtz, 2001), colors (Bellizzi et al., 1983), cleanliness (Bitner, 1990), illumination (Summers & Hebert, 2001), crowding, (Hui & Bateson, 1991), and many others. Sensory studies have also explored the impact of sensory cues on brand experience (Hultén, 2011; Lindström, 2006), brand memory

(Morrin & Ratneshwar, 2003), and product evaluations and choices (Krishna & Morrin, 2007; Miller & Kahn, 2005).

However, research on olfaction has considerably increased over the last thirty years since the power of olfactory cues on consumer experiences has been recognized as a reality in our everyday life. The Got Milk? Campaign from the California Milk Processor Board, was designed to encourage the consumption of cow's milk. However, as a part of the campaign consisted in diffusing a cookie aroma at bus stops in San Francisco, the Metropolitan Transit Commission removed the campaign after only 36 hours because the smell of the cookie persuaded people to overeat. During the Dunkin' Donuts campaign in South Korea, which diffused coffee aroma at the bus stops too, sales of the Dunkin' Donuts' store increased by 16% to 29%.

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The aim of this article is threefold. First, I review 53 empirical studies on olfaction published from 1992 to 2017 to present the current theories and approaches to the investigation of scent effects on consumer behavior. Second, it is proposed a cognition-based approach to explore the underlying mechanism through which scent is mentally processed by individuals, and clarify how mental processing of scent information may contribute to develop preferences and meanings for products and environments. Finally, I develop a research agenda, and propositions to encourage further studies on cognitive processing of scents, which may have relevant theoretical and practical implications. I believe that the application of a cognition-based approach might contribute to the literature on scent marketing restoring the original function of the sense of smell, which is not simply being a product attribute or an

entertainment cue but to provide information that supports individuals, and consumers in our case, to ascribe a meaning to physical and psychological phenomena.

2. Literature Review

This article focuses on an extensive literature review of 53 empirical articles published from 1992 to 2017 in the field of marketing, consumer behavior, and psychology. To conduct the review, I accessed electronic databases relevant to those topics, such as JSTOR, EBSCO, Emerald, and the American Psychological Association's databases, which include a comprehensive collection of journals specialized in publishing sensory research applied to marketing and consumer behavior domain. For the search, I used the terms 'scent', 'product scent', 'ambient scent', 'smell', 'odor', 'odorant', 'fragrance' AND 'consumer behavior', 'retailing', 'marketing' in titles, abstracts, and keywords of all the published articles between 1992 and September 2017. I excluded from the analysis all the articles which focused on olfactory imagery, chemical arguments, and odor recognition tasks since the focus was the review of empirical effects of scent on consumer behavior in retailing, advertising, and marketing in general. The search process ended with 9 theoretical and 53 empirical articles, totaling 62 articles. Each empirical article contains 1 to 5 experimental manipulations of ambient or product scent. Thus, I considered the 53 articles sufficient to capture the most relevant findings of scent marketing research. The review starts pointing out some critical definitions of scent and its dimensions. Then, the review proceeds to examine the most relevant findings on the effect of scent on cognitive, behavioral and affective consumer responses to olfactory stimuli. Finally, two distinctive domains of discussion were identified: the relationship between scent and emotion, and between scent and cognition, for which I suggest propositions and investigations to advancement of the scent marketing literature and applied research.

2.1 Scent: definitions and dimensions

Studies on scent in marketing and consumer behavior have established an important distinction between *product scent*, which is emanated from a specific product, and *ambient scent*, which is not emanated from a specific object but surrounds the environment (Spangenberg et al., 1996). Both types of scents, the product and the ambient scent are perceived across two important dimensions, which are theoretically and practically distinctive: the odorant and the odor. The term *odorant* refers to the chemical component of the odor, which has the potential of eliciting the perception of the scent (Hallem & Carlson, 2006), while the term *odor* refers to the subjective experience of the odor itself (Stevenson & Wilson, 2007). Accordingly, the olfactory experience occurs through both processes, physiological (e.g., the perception of chemical molecules) and psychological (e.g., the individual's perception of the odor). The experience of the odor does not involve only the interaction between the odorant-receptors and chemical substances, but also the individual's interpretation of odors, which includes the system of existing knowledge, prior experiences, and memory for odors (Stevenson & Wilson, 2007).

Studies on olfaction have identified several dimensions through which individuals usually perceive odors (Spangenberg et al., 1996). The most applied scent dimensions to research on olfaction are those of *presence, pleasantness, congruence, intensity, and arousal*. *Scent Presence* refers to the existence of an odor surrounding the environment. Several studies have explored the impact of the presence of ambient scent on consumer behavior. In a field experiment conducted in a shopping mall, Chebat and colleagues (2009) found that shoppers spent significantly more money when the mall was scented rather than when it was not (Chebat, Morrin, & Chebat, 2009). The presence of an ambient scent (compared with the unscented environment) leads to more favorable store evaluations (Spangenberg et al., 1996), service quality (Bouzaabia, 2014), product evaluations (Bosmans, 2006), and enhances memory for verbal information (Lwin, Morrin, & Krishna 2010).

Scent Pleasantness refers to the affective quality of the scent, which means how pleasant the scent is perceived by individuals (Bone & Ellen, 1999). Evidence suggests that when consumers are exposed to pleasant scents they experience a longer looking time and better moods (Mitchell et al., 1995), higher product quality (Chebat & Michon, 2003), approach behaviors toward the store (Spangenberg et al., 1996), more positive brand evaluations (Morrin & Ratneshwar, 2000), and better evaluations of the store (Mattila & Wirtz; 2001). Moreover, the pleasantness (versus unpleasantness) of the scent affects individuals risk-taking, variety seeking, and curiosity-motivated behavior, under the optimal stimulation perspective (Orth & Bourrain, 2005).

Scent Congruence refers to the perceived appropriateness of the scent in a specific context. Examples of scents that suit an environment are the smell of flower in a flower store, the smell of freshly cooked food in a restaurant or the smell of coffee in a coffee shop. As Cognitive Consistency Theory suggests, individuals tend to preserve a psychological consistency with their beliefs and avoid inconsistencies that may lead to a state of psychological discomfort (Abelson et al., 1968). Beyond the level of pleasantness, scent congruence, in many cases, is a necessary condition for a positively perceived scent. Congruent scents improve product evaluations more than incongruent scents (Bone & Jantrania, 1992; Spangenberg, Grohmann, & Sprott, 2005), attention to product attributes (Mitchell et al., 1995), the time spent in the store and the number of items bought (Spangenberg, Sprott, Grohmann, & Tracy, 2006).

Scent Intensity refers to how strong the scent is. Optimal arousal theory suggests that individuals have an optimal level of exposure to sensorial stimuli (Berlyne, 1971). Accordingly, when the scent increases in intensity, consumer reactions become more negative (Richardson & Zucco, 1989). Intensity may interact with the dimension of pleasure, such that optimal intensity is higher for pleasant scents than for neutral scents, in a simulated store environment (Spangenberg et al., 1996). However, the authors did not confirm that different intensities result in different individuals' responses, such as intentions to visit the store and purchase intentions for specific products.

Arousal refers to how likely the scent is to evoke physiological responses and behaviors (Mattila & Wirtz, 2001). According to the aromatherapy literature, some scents are recognized to increase the level of calmness and reduce anxiety, whereas other scents are considered as more arousing and stimulating due to their characteristic aroma (Rose, 1992). Peppermint is commonly associated with sexual arousal and clear thinking; cinnamon improves focus and concentration; lemon and orange promote calm and control of emotional stress. Two studies demonstrated that the exposure to the ambient odor of orange diffused in the waiting room of a dental office decreases the level of anxiety and increases more positive moods and calmness (Lehrner, Eckersberger, Walla, Poetsch, & Deecke, 2000; Lehrner, Marwinski, Lehr, Johren, & Deecke, 2005). Mattila and Wirtz (2001) demonstrated that when the ambient scent and music were both low on their levels of arousal, consumer reactions toward the environment are more positive.

More recent investigations have included other dimensions of olfactory cues as determinants of scent effects on consumer responses and behaviors. Olfactory information is elaborated and conceptualized in a stable network (Schab, 1991) starting from odor semantic associations and episodic memory (Tulving, 1986). *Familiarity* (Rabin & Cain, 1984) and *edibility* (Gaillet, Sulmont-Rossé, Issanchou, Chabanet, & Chambaron, 2013; Stevenson, 2009) are basic features through which individuals primarily perceive odors, beyond their valence (Reisberg, 1997). Only a little attention has been turned to how odor knowledge is processed and stored in the semantic network and how odors are associated with other sensory knowledge or past experiences. Taking into account that odors bring semantic meanings, recent studies have demonstrated that odors might be associated with other sensory experiences, such as touch (Demattè, Sanabria, Sugarman, & Spence, 2006), taste (Stevenson, Prescott, & Boakes, 1999), perception of temperature (Madzharov, Block, & Morrin, 2015); specific events, such as Christmas (Spangenberg et al., 2005); gender (Krishna, Elder, & Caldara, 2010; Spangenberg et al., 2006); and cleanliness (Holland, Hendriks, & Aarts, 2005). In particular, Holland and colleagues (2005) have demonstrated that the exposure to a citrus scent stimulates cleaning behaviors and speeds up processing of cleaning-related words; Madzharov and colleagues (2015) have shown that scent may differ on perceived temperature (warm vs. cool scent), and this difference in perceived temperature biases consumer behaviors toward their power-compensatory preferences (Madzharov et al., 2015). Similarly, Herrmann and colleagues (2013) demonstrated that scents might be perceived as more or less complex, influencing the amount of money spent (Herrmann, Zidansek, Sprott, & Spangenberg, 2013). North and colleagues (1999) shown that playing a French (versus German) music increases French (versus German) wine sales (North, Hargreaves, & McKendrick, 1999). Poon and Grohmann (2014) found that scents may bias subjective levels of anxiety, differing on spatial density (e.g., spacious versus intimate scents). These preliminary results provide a prior support to the idea that olfactory information and their cognitive processing create semantic associations with multimodal sensory cues, and affect unrelated behaviors (Holland et al., 2005), even outside of conscious awareness (Li, Moallem, Paller, & Gottfried, 2007; Schifferstein & Blok, 2002). However, only few studies have explored the mechanism underlying scent effects on behaviors. Accordingly, more investigations are needed to understand to what extent scent cognitive processing affects individual subsequent responses and behaviors.

2.2 Effects of Scent on Consumer Behavior

The second step of the review includes the discussion of the most relevant findings emerged from scent research on the effect of ambient or product scent on consumer responses. I review the most relevant results classifying consumers' responses to olfactory cues as c*ognitive*, *affective*, and *behavioral responses*. I also summarize all findings of the 53 analyzed empirical articles in Table 1 below, including scent manipulations, research context, theories, dependent variables, and effects on consumer behaviors.

Cognitive responses involve individual reactions based on their mental abilities related to knowledge, such as beliefs, thoughts, perceptions, and evaluations. Field and laboratory experiments have affirmed a great impact of odors in modulating consumer cognitive responses and evaluations. For example, the presence of a scent in the store increases product quality perceptions (Chebat & Michon, 2003), store evaluations (Bouzaabia, 2014), evaluation of product selection and service satisfaction (Morrin & Chebat, 2005), attitudes toward ad and brand (Bone & Ellen, 1998), and product judgments (Bone & Jantrania, 1992).

Moreover, when the ambient scent is congruent with product (e.g., gender-based product), it increases evaluations of the store and merchandise (Spangenberg et al., 2006), evaluations of the shopping mall (Michon, Chebat, & Turley, 2005), merchandise (Doucé & Janssens, 2013), evaluations of unfamiliar (versus familiar) brands (Morrin & Ratneshwar, 2000), and decreases price perceptions (Spangenberg et al., 1996). Studies have also focused the attention on the effect of scent on memory.

Memory. Many scent marketing studies have focused the attention on a cognitive response in particular; that is, they explored the effects of scent on memory. Memory for odors is less affected by the passage of time than are auditory and visual memories (Engen & Ross, 1973), since odors produce a much more unitary perceptual experience (Engen & Ross, 1973). Studies exploring the effect of scent on memory demonstrated that scent-based retrieval cues contribute to restore lost information (Morrin, Krishna, & Lwin, 2011), increase the number of product attributes recalled (Lwin et al., 2010), improve not only olfactory but also visual imagery (Lwin et al., 2010), enhance memory for product information (Krishna, Lwin, & Morrin, 2010), improve recall of product information when the scent is congruent with the product category (Mitchell et al., 1995), increase subjects' ability to recall unfamiliar (versus familiar) brands (Morrin & Ratneshwar, 2000), and increase advertising recall more than pictorial and visual cues in the context of movie theatre commercials (Lwin & Morrin, 2012).

Behavioral responses refer to behaviors and all the individual tendencies to act in a certain way toward something. Empirical evidence demonstrated that the presence of a pleasant scent might significantly improve individuals' behavioral tendencies, such as the amount of money spent (Bouzaabia, 2014; Chebat, Morrin, & Chebat, 2009; Doucé & Janssens, 2013; Morrin & Chebat, 2005; Vinitzky & Mazursky, 2011), the time spent in the store (Gueguén & Petr, 2006; Morrison et al., 2011), approach behaviors in the context of a scent congruent with gender-based products (Spangenberg et al., 2006), the amount of purchase of premium brands (Madzharov et al., 2015), behaviors in the shopping mall (Teller & Dennis, 2012). A pleasant ambient scent in retail settings significantly improves general approach behaviors (Adams & Doucé, 2016), buying and variety seeking behaviors (Doucé et al., 2013), time spent on purchase (Helmefalk & Hultén, 2017), amount of purchasing (Jacob, Stefan, & Guéguen, 2014), sales of thematically congruent products (Schifferstein & Blok, 2002), time spent examining products in the store (Seo, Roidl, Müller, & Negoias, 2010), and consumer spending (Teller & Dennis, 2012). Finally, Lwin and colleagues applied eye-tracking to demonstrate that scent has an impact on eye fixation time and frequency on an advertised stimulus (Lwin, Morrin, Chong, & Goh, 2016)

Affective responses concern feelings, moods, and emotions which arise as consequence of the conscious or unconscious exposure to a stimulus. According to the Stimulus-Organism-Response model, investigations of the effect of scent on affective reactions have primarily explored emotions elicited by olfactory stimuli across the three dimensions of pleasure, arousal, and dominance (Mehrabian & Russell, 1974; Donovan & Rossiter, 1982). Experiments conducted in real and simulated settings have found a positive relationship between odors and moods. The exposure to an ambient odor of orange or lavender diffused in the waiting room of a dental office decreases the level of anxiety and increases positive moods and calmness, especially in female participants (Lehrner et al., 2000; Lehrner et al., 2005). Regarding scent congruence, Spangenberg et al. (2006) has shown that when a scent is congruent with gender-based products (male vs. female clothing) it positively influences individuals' affect and arousal. Moreover, mood changes also seem to mediate the effect of scent congruence on judgments (Bosmans, 2006), elicit more favorable feelings about the brand (Lwin & Morrin, 2012), and determine better evaluations of the entire shopping experience (Mattila & Wirtz, 2001). Despite the close connection between odor perception and emotional experience they elicit, many studies have produced mixed results regarding the mediating role of emotions between odors and consumer responses. For example, pleasure and arousal seem to mediate the effect of scent on shoppers' moods only in the presence of a medium (vs. low or high) level of retail density (Michon et al., 2005). Moreover, pleasure and arousal do not mediate the impact of scent on behaviors (Chebat & Michon, 2003), perceptions of service quality (Michon & Chebat, 2004), and affective evaluations of the store (Morrin & Chebat, 2005). In particular, the presence of a scent in the environment has no effect on arousal in the evaluation of artworks (Cirrincione et al., 2014), on moods in a decision-making context (Mitchell et al., 1995), on feelings of happiness during evaluations of brands (Morrin & Ratneshwar, 2000), on attention and memory for familiar and unfamiliar brands (Morrin & Ratneshwar, 2003), on evaluation of the overall shopping experience (Spangenberg et al., 1996). These results suggest that the role of odors in modulating individuals' behavior is driven by affective processes only under certain conditions (Morrin & Ratneshwar, 2000).

The application of environmental psychology model has not clarified the underlying mechanism through which odors affect consumer behaviors, evaluation, and decision-making. In particular, these studies have found support for a positive effect of a scent of a variety of cognitive, behavioral, and affective outcomes, but has not clarified under which conditions these effects are aroused, and whether the mechanism underlying scent perceptions and interpretation is that of an emotional or a cognitive process.

Table 1. Scent effects on cognitive, behavioral, and affective consumer responses

Reference	Scent Dimension	Research Context	Theory	Dependent variables	Experiment
Adams & Doucé. 2016	Ambient scent (coffee, apple pie)	Retailing (store selling cooking materials)	SOR – Environmental Psychology	Store environment evaluations, store evaluations, product evaluations, approach behaviors, intentions to revisit the store, word-of-mouth	Field
Biswas, Labrecque, Lehmann & Markos, 2014	Product scent (lavender, jasmine)	Product choice, food choice	Sensory habituation priming, recency effect	Product preferences, product choice	Laboratory Field Online
Bone & Ellen,	Ad scent (floral,	Advertising	Cognitive Consistency	Attitude toward the ad,	Laboratory

Reference	Scent Dimension	Research Context	Theory	Dependent variables	Experiment
1998	pine)		Theory	attitude toward the brand	
Bone & Jantrania, 1992	Product scent (lemon, coconut)	Convenience goods (sunscreen lotion, household cleaner)	Cognitive Consistency Theory	Product judgment	Laboratory
Bosmans, 2006	Ambient scent (citrus, lavender)	Brand	Cognitive Consistency Theory	Brand Evaluation, Product Evaluation	Laboratory
Bouzaabia, 2014	Ambient scent (Ylang Ylang), scent presence	Shopping experience at the NIKE store	SOR – Environmental Psychology	Evaluations of environment, product, service quality; pleasure, stimulation, intention to visit the store, time and money spent	Field
Chebat & Michon, 2003	Ambient scent (citrus scent, a combination of orange, lemon, and grape)	Shopping Mall	SOR – Environmental Psychology	Evaluations of product quality, pleasure, arousal, evaluation of the shopping environment	Field
Chebat, Morrin, & Chebat, 2009	Ambient scent (citrus scent, a combination of lemon, bergamot, and orange)	Shopping Mall	SOR – Environmental Psychology	Consumer spending	Field
Cirrincione, Estes, & Carù, 2014	Ambient scent (talcum, citrus)	Art Consumption	SOR – Environmental Psychology	Memory for artworks, arousal	Laboratory
Demattè, Sanabria, Sugarman, & Spence, 2006	Product scent, scent pleasantness (lemon, lavender, and animal odor)	Convenience goods (cotton fabric swatches)	Cross-modal interactions, information processing	Tactile perceptions	Laboratory
Doucé & Janssen, 2013	Ambient scent (lemon)	Retailing (prestigious clothing store)	SOR – Environmental Psychology	Pleasure, arousal, evaluations of the store environment and products, intentions to revisit the store	Field
Doucé, Poels, & De Backer, 2013	Ambient scent (chocolate)	Retailing (bookstore)	Cognitive Consistency Theory, Thematic Cue Congruence	Approach behaviors, search for information, buying behavior	Field
Gaillet et al., 2013	Ambient scent (melon, pear)	Decision-making	Odor priming	Reaction time, product choice	Laboratory
Gueguén & Petr, 2006	Ambient scent (lemon, lavender)	Consumption Experience (restaurant)	SOR – Environmental Psychology	Time and Money spent	Field
Gvili, Levy, & Zwilling, 2017	Product scent (lavender, chocolate, coffee)	Advertising	SOR – Environmental Psychology	Affective responses to advertisement, pleasure, arousal	Laboratory
Hall et al., 2010	Product scent (mango, pernod)	Consumer choice at supermarket (jam, tea)	Odor priming	Product choice	Field
Helmefalk & Hultén, 2017	Ambient scent (clean-flowery, herbal-fruity)	Retailing (furnishing store)	SOR – Environmental Psychology	Consumer emotions, arousal, valence, time spent on purchase	Field
Hermans, Baeyens, & Eelen, 1998	Trial scent (lemon, hops, peppermint, bitter almond, Daucus carota, Sassafras albidum, and hyssop, lavender, rosemary, and thyme; rose,	Evaluative decision mechanism	Odor Priming	Cognitive processing of words	Laboratory

Reference	Scent Dimension	Research Context	Theory	Dependent variables	Experiment
	pine, cinnamon, incense, and mandarin, civet.				
Hermans et al., 2005	Product scent (raspberry, civet)	Product preferences (yogurt)	Odor Priming	Product perceived quality, product attractiveness, intentions to purchase	Laboratory
Herrmann, Zidansek, Sprott, & Spangenberg, 2013	Ambient scent (simple: orange; complex: basil-orange with green tea)	Store Evaluation	Processing Fluency	Time and Money spent	Laboratory Field
Herz & von Clef, 2001	Product scent (menthol, patchouli, violet leaf, pine oil, isovaleric and butyric acid)	Perceptual responses to odors	Odor Priming	Perceptual interpretation of odors, pleasantness	Laboratory
Hirsch, 1995	Ambient scent	Consumption Experience (Las Vegas Casino)	SOR – Environmental Psychology	Amount of money gambled	Field
Holland, Hendriks, & Aart, 2005	Ambient scent (lemon)	Cleaning behavior	Cognitive Processing, priming, accessibility	Cleaning behavior, scent associations	Laboratory
Jacob, Stefan, & Guéguen, 2014	Ambient scent (lavender)	Retailing (flower and indoor plant shop)	SOR – Environmental Psychology	Amount of purchasing	Field
Krishna, Elder, & Caldara, 2010	Product scent (feminine: Hanae Mori White; masculine: Hanae Mori Black)	Product evaluations (cologne)	Cross-modal interactions,	Haptic perceptions,	Laboratory
Krishna, Lwin, & Morrin, 2010	Product scent (pine, tea tree)	Convenience goods (pencil)	Distinctiveness, cognitive processing	Memory for products, recall, cognitive processing	Laboratory
Leenders, Smidts, & Haji, 2016	Ambient scent (melon)	Retailing (supermarket)	SOR – Environmental Psychology	Evaluations of the store, evaluations of the store environment, pleasure, arousal, dominance	Field
Lehrner et al., 2000	Ambient scent (orange)	Service Experience (waiting room of a dental office)	SOR – Environmental Psychology	Level of calmness, moods, level of state anxiety	Field
Lehrner et al., 2005	Ambient scent (orange, lavender)	Service Experience (waiting room of a dental office)	SOR – Environmental Psychology	State anxiety, current moods, alertness and calmness	Field
Lwin et al., 2016	Ad scent (lemon)	Advertising	Cross-modal interaction, synesthesia	Ad evaluations, fixation time, fixation frequency, purchase intentions	Laboratory
Lwin, Morrin, & Krishna, 2010	Product/advertising scent (Rose/sandalwood)	Advertising (moisturizers)	Dual Coding Theory	Memory for verbal information (number of correct verbal attribute remembered, number of incremental items of information recalled)	Laboratory
Lwin & Morrin, 2012	Ambient Scent (Rose/sandalwood)	Movie Theatre Commercials	Cross-modal interaction	Feelings toward the brand, brand evaluation, purchase intent, ad	Laboratory

Reference	Scent Dimension	Research Context	Theory	Dependent variables	Experiment
				recall	
Mattila & Wirtz, 2001	Ambient scent (lavender, grapefruit)	Retailing	SOR – Environmental Psychology	Pleasure, approach behaviors, perceived quality of the store environment, impulse buying, satisfaction	Field
Madzharov, Block, & Morrin, 2015	Ambient scent (cinnamon, vanilla, peppermint)	Retailing (optics retail store)	Synesthesia Cross-modal interaction	Social density perception, number of purchased items, preference for prestige-focused advertising, tendency to buy premium brands	Laboratory Field
Michon & Chebat, 2004	Ambient scent (citrus combination of orange, lemon, and grapefruit)	Retailing, Community Shopping Mall	SOR – Environmental Psychology	Service perceived quality, environment perceived quality	Field
Michon, Chebat, & Turley, 2005	Ambient scent (citrus, lavender)	Retailing, Community shopping mall	SOR – Environmental Psychology	Consumers' moods, perception of the mall environment, perception of the product quality	Field
Mitchell, Kahn, & Knasko, 1995	Ambient scent (floral, chocolate)	Convenience goods (candy, flower arrangement)	Cognitive processingaccessibility, Static-Dynamic Choice (single vs. multiple) (product)	Decision Making (information acquisition, choice, memory), pleasure, arousal	Laboratory
Morrin & Ratneshwar, 2000	Ambient scent (geranium)	Brand evaluations	SOR – Environmental Psychology	Pleasure, arousal, dominance, brand evaluation, recognition accuracy	Laboratory
Morrin & Ratneshwar, 2003	Ambient scent (geranium, cloves)	Brand recall	SOR – Environmental Psychology, Arousal Mechanism	Brand recall accuracy (number of familiar or unfamiliar brands recalled), brand recognition accuracy	Laboratory
Morrin & Chebat, 2005	Ambient scent (citrus combination of lemon, bergamot, orange)	Retailing, shopping mall	SOR – Environmental Psychology	Dollar expenditures, Evaluations (product quality, service quality, product selection, service satisfaction), ease of search, Affective Evaluation of the	Field
Morrin, Krishna, & Lwin, 2011	Product scent (orange blossom, sandalwood)	Brand recall and evaluations	Cognitive processing, inhibition, response competition	Retroactive inferences, brand recall	Laboratory
Morrison, Gan, Dubelaar, & Oppewal, 2011	Ambient scent (vanilla)	Retailing (fashion store)	SOR – Environmental Psychology	Approach behaviors, time spent in store, money spent, satisfaction with the shopping experience	Field
Orth & Bourrain, 2005	Ambient scent (green pepper, charcoal, citrus blossom, blackberry)	Retailing (fashion store)	Optimal Stimulation Theory	Exploratory tendencies (actual stimulation, level of risk-taking, level of variety seeking, level of curiosity-motivated behavior)	Laboratory
Parsons, 2009	Ambient scent (coffee, perfume, soap)	Retailing (bookstore, lingerie store, white-ware appliance store)	SOR – Environmental Psychology	Perceived environmental state, purchase intentions, affect, liking for the store, time spent in the store, purchase behavior	Laboratory Field
Pauli, Bourne	Product scent	Olfaction-	Odor Priming	Odor valence, odor	Laboratory

Reference	Scent Dimension	Research Context	Theory	Dependent variables	Experiment
Jr, Diekmann, & Birbaumer, 1999	(vanilla, H2S)	vision interaction		arousal, interference effects,	
Poon & Grohmann, 2014	Ambient scent (seashore, firewood)	Retailing	SOR – Environmental Psychology	Spatial perceptions, anxiety, spatial density, pleasure, arousal	Laboratory
Schifferstein & Blok, 2002	Ambient scent (sunflower, grass)	Retailing (bookstore)	Cognitive Consistency Theory, Thematic Cue Congruence	Sales of thematically congruent products	Field
Seo, Roidl, Müller, & Negoias, 2010	Ambient scent (coffee, orange, lavender, licorice)	Selective attention for products	Odor priming	Time spent examining products, time of eye fixation, number of eye fixation	Laboratory
Spangenberg, Crowley, & Henderson, 1996	Ambient scent (lavender, ginger, orange, spearmint)	Retailing (one-stop shopping for students)	SOR – Environmental Psychology	Evaluations of the store, store environment, merchandise, specific products, intentions to visit the store, purchase intentions for specific products, actual vs. perceived time spent, number of product examined), moods	Laboratory Simulated Store
Spangenberg, Grohmann, & Sprott, 2005	Ambient scent (Enchanted Christmas)	Retailing (opening of a new department store)	SOR – Environmental Psychology	Evaluation of the store, attitudes toward the environment and the merchandise, intentions to visit the store, pleasure, arousal, dominance	Laboratory
Spangenberg et al., 2006	Ambient scent (rose Maroc, vanilla)	Retailing (clothing store)	SOR – Environmental Psychology	Evaluation of the store and the merchandise, time spent in the store, intention to visit the store, approach behaviors, number of items purchased, amount of dollars spent	Field
Teller & Dennis, 2012	Ambient scent (orange, grapefruit, bergamot, cinnamon, cardamom, ginger, peppermint)	Retailing, shopping mall	SOR – Environmental Psychology	Pleasure, arousal, consumer spending	Field
Vinitzky & Mazursky, 2011	Ambient scent (chocolate)	Retailing (simulated web retail setting)	Cognitive Thinking Style, SOR - Environmental Psychology	Time spent in the shop, number of brands selected, time spent examining each brand, number of brand purchased, total expenditure, level of telepresence, consumer attention focus, consumer challenge	Laboratory

3. Emotional perspective on scent

3.1 The SOR Model and the Arousal Mechanism

The most traditional theoretical framework applied in studies on the effects of scent on consumer behavior is derived from Environmental Psychology, and it is known as the Stimulus–Organism–Response (S-O-R). Individuals relate to the environment emotionally, in such that environmental stimuli (S) arouse emotional reactions (O) which determine behavioral responses (R) (Mehrabian & Russell, 1974). Emotional changes in response to environmental stimuli occur across the three dimensions of pleasure-displeasure, arousal-nonarousal, and dominance-submissiveness. Individuals react to the pyshical stimuli approaching or avoiding the environment, depending on the perceived valence (e.g., pleasant versus unpleasant), the perceived arousal (e.g., arousing versus unarousing), and dominance (e.g., dominant versus submissive) of the sensory stimuli (Donovan & Rossiter 1982; Spangenberg et al., 2006). The construct of general arousal is conceptualized as a psychological and physiological state of being awake and reactive to a stimulus. Some theories of emotions consider arousal as a necessary condition for emotions to occur (Zajonc & Markus, 1984). Mehrabian and Russell (1974) conceptualized the concept of arousal across the six differential dimensions of stimulated-relaxed, excited-calm, frenzied-sluggish, jittery-dull, wide awake-sleepy, and aroused-unaroused. Studies on scent applying the SOR model have focused the attention on the understanding of the mediating role of pleasure, arousal, and dominance in the relationship between olfactory stimuli and individual responses. However, these studies have produced contradictory results. Thus, while pleasure directly affects satisfaction and behaviors, arousal only increases these outcomes via pleasure, providing support for an interaction effect between pleasure and arousal (Morrison et al., 2011). Several studies have not definitely confirmed the role of mediation of arousal in the relation between scent and behaviors (Chebat & Michon, 2003), perceptions of service quality (Michon & Chebat, 2004), and affective evaluations of the store (Morrin & Chebat, 2005). The presence or absence of a scent consistently affects evaluations and behaviors without the mediation effect of arousal (Spangenberg et al., 1996). In particular, the presence of a scent in the environment has no effect on arousal in the evaluation of artworks (Cirrincione et al., 2014), on moods in a decision-making context (Mitchell et al., 1995), on feelings of happiness during evaluations of brands (Morrin & Ratneshwar, 2000), on recall for familiar and unfamiliar brands (Morrin & Ratneshwar, 2003), and on evaluation of the overall shopping experience (Spangenberg et al., 1996). According to these findings, the effects of ambient scent on evaluations and behaviors seem to occur without a shift in moods or arousal (Morrin & Ratneshwar, 2000). Spangenberg and colleagues (1996) have found that, in a simulated store, the presence of a scent consistently affects evaluations and behaviors without the mediation effect of arousal. These inconsistencies challenge the basic assumption of the S-O-R paradigm which assumes that increased levels of experienced arousal determine better evaluations of the shopping experience (Mehrabian & Russell, 1972; Donovan & Rossiter, 1984).

3.2 Propositions and future research

I discussed the mixed findings of scent studies regarding the role of emotional states and, in particular, of arousal, in mediating the effect of olfactory experiences on consumer responses and behaviors. The aim, here, is not to discuss the wide range of theories and conceptualizations of emotions. However, I propose possible reasons why the arousal explanation does not always fit the process through which odor experiences occur. First, the SOR model, in contrast to other theories of emotions, allows emotional states conceptualized in more general and bipolar terms (e.g., pleasure-displeasure, arousal-unarousal, dominance-submissiveness) (Russell, 1980), inhibiting the investigation of a variety of discrete emotions (Bagozzi, Gopinath, & Nyer, 1999). Following a theory-based approach, emotions arise under a specific condition of appraisal of events or phenomena (Lazarus, 1991; Lazarus & Smith, 1988; Frijda, Kuipers, & Ter Schure, 1989). The construct of general pleasure and arousal as basic emotional states that regulate consumer responses are difficult to capture by self-report measures and are not sufficient to specify the specific conditions of appraisal, nor the emotion-specific physiology necessary for the emotion to occur (Bagozzi et al., 1999). Previous studies on the relationship between odors and emotions or moods, have not always found a robust support for the effect of olfactory cues on general pleasure and arousal (Chebat & Michon, 2003; Cirrincione at al., 2014; Morrison, et al., 2011), while other studies focusing on discrete, more specific emotional states, such as calm (Lehrner, 2000; Lehrner, 2005), anxiety (Poon & Grohmann, 2014), and feelings for a specific brand (Lwin & Morrin, 2012) have been more successful to confirm a positive relationship between odors and emotions. Thus, I propose future investigations on the ability of odors to elicit more discrete (e.g., excitement, disgust, fear) versus more general emotions (e.g., pleasure, arousal, dominance):

P1: Odors are successful primes for discrete (e.g., specific) versus general emotions

The basic emotions of pleasure and displeasure have not always been operationalized as two extremes of a continuum, but as independent, even if concomitant, constructs (Diener & Emmons, 1985; Zevon & Tellegen, 1982). Odors are appraised primarily through their valence (Smeets & Dijksterhuis, 2014), and the affective judgment of an odor (e.g., whether the odor is evaluated as pleasant or unpleasant), as well as the affective evaluations of an unrelated object (Bagozzi et al., 1999) are transferred more easily to stimuli in other modalities, such as verbal labels (Herz & Von Clef, 2001), visual stimuli (Seo et al., 2010), and gustatory cues (Stevenson, Rich, & Russell, 2012), than to self-perceived moods (Bagozzi et al., 1999; Chebat & Michon, 2003; Morrin & Chebat, 2005).
I propose future investigations on the ability of odors to elicit congruent-valenced emotions directed to specific objects instead of to general self-perceived and self-reported moods:

P2: Odor perceived valence (e.g., positive versus negative) elicits congruent-valenced emotions (e.g., positive versus negative) for a specific object (e.g., products, brands, and advertising), compared with the general self-perceived moods.

Arousal, as a basic component of all types of emotions, operates quite automatically at both levels, physiological body responses and the interpretation of the emotional experience (James, [1980] 1950). According to some theories of emotions (Frijda et al., 1989; Lazarus, 1991; Schachter & Singer, 1962), arousal alone is not sufficient to elicit an emotion without a cognitive interpretation of the source of this arousal. Cognitivists theories of emotions allow that emotions may also occur without any experience of arousal. Olfactory cues, most of the time, are difficult to be recognized (Chebat & Michon, 2003), labeled (Schab, 1991), lack a conscious mental representation (Zucco, 2003), and are subject to ambiguity (Engen, 1972). A consistent number of olfactory studies have not found a full support for mood changes as the process underlying the effect of the perception of odors on behaviors. Several results have insisted that thematic cue congruence through memories and meaning (Kellaris, Cox & Cox, 1993) is a necessary condition to reach mood changes (Spangenberg et al., 2005). Many studies are good examples of how maintaining a thematic cue congruence contributes to enhance consumer responses via arousal.

In an experiment investigating the effect of scent on physical aggression, Baron (1981) found a significant interaction between a pleasant ambient scent and anger arousal. Subjects were first angered (vs. not angered) by a confederate and then provided with an opportunity to aggress against this person. The experiment revealed that the presence of a pleasant ambient scent reduced aggression when subjects had not been previously provoked; oppositely, the presence of a pleasant scent increased aggression in the context of past anger arousal (Baron, 1981). In the context of retailing, Mattila and Wirtz (2001) found that when the arousal levels of ambient scent and background music matched, consumers' evaluations of the shopping experience were enhanced.

Similarly, Morrison and colleagues (2011) had shown that arousal has a significant effect on approach behaviors and satisfaction when high arousal scent (i.e., vanilla scent) was congruent with a high-volume dance music in a real store environment of a shopping mall. Accordingly, Michon and Chebat (2004) observed a strong interaction between a high arousal scent (i.e., citrus scent) and fast tempo music in an experiment conducted in a shopping mall, while Doucé and Janssens (2013) have also found a significant effect of pleasant scent on arousal in the context of a high arousal store (e.g., prestigious clothing store).

Thematic cue congruence on the level of arousal may explain the findings of Spangenberg and colleagues (2005) who found that an arousing scent of Enchanted Christmas (e.g., cinnamon) when combined with a Christmas music led to more positive attitudes toward the store environment, greater intention to visit the store, greater pleasure and arousal. In contrast, Christmas scent, although perceived as pleasant, when combined with a non-Christmas music, did not affect individuals' arousal and evaluations of the environment.

Finally, arousal congruence with other contextual cues may be responsible also for the mixed results found by Hirsch (1995) in an experiment conducted in the Las Vegas Casino. The author found that one of the two scents used in the experiment particularly increased the amount of money gambled. It seems that that odor (and not the other) was more effective in enhancing gambling mood probably due to the scent congruence on the level of arousal with the context of gambling behavior. These experiments have demonstrated that ambient scent influences evaluations and behaviors via arousal especially when the olfactory cues are congruent with other contextual cues on their level of arousal, such as background music (Mattila & Wirtz, 2001), anger arousal (Baron, 1981), high volume dance music (Morrison et al., 2011), fast tempo music (Michon & Chebat, 2004), prestige of clothes in a store (Doucé &

Janssens, 2013), Christmas music (Spangenberg et al., 2005), and gambling mood in a Casino (Hirsch, 1995). In other words, odors alone are not sufficient to induce arousal, probably due to the ambiguity of olfactory information to which individuals are not able to attribute the source of their mood change.

I believe that, because of the ambiguity of odors, individuals are not always able to identify odors as the source of their arousal, inhibiting the feeling of the emotion elicited. Thus, I propose:

P3: Odors induce mood changes in term of perceived arousal when they fit the arousal level (i.e., high arousal/high arousal; low arousal/low arousal) of other contextual cues (e.g., product category, music, illumination), compared with the incongruent conditions (i.e., high/low or low/high).

According to the cognitivist perspective, emotions are the way in which we appraise and respond to an event or a stimulus (Ekman, 1992). The exposure to a stimulus, such as the exposure to an odor, may induce automatic arousal which, in turn, elicit an emotion (Zillman, 1971). However, olfactory stimuli are not perceived in isolation but may interact with other, concomitant stimuli in the environment (Gallace & Spence, 2006), which also are capable to induce arousal. Thus, I encourage more investigations under a cognitivist approach to clarify to what extent odors may interact with other sources of arousal, and how individuals attribute to olfactory (versus other modalities stimuli) the source of their arousal. Accordingly, I propose that:

P4: Arousal evoked by a single source (e.g., odor) directly affect evaluations, whereas arousal evoked by multiple sources (e.g., odor combined with other cues) affect self-perceived moods.

P5: Odors induce intensely (versus weak) experienced arousal when they are presented close on (versus far from) another stimulus in other sensory modality (i.g., recency effects).

Emotions function as regulating mechanism of goal attainment, coping responses, action tendencies and motivation (Frijda, 1986; Lazarus, 1991; Oatley, 1992) in such that emotions help individuals for correct a disequilibrium between the current state and the desired one (Bagozzi et al., 1999). The exposure to olfactory stimuli may induce arousal which potentially elicits an emotion. However, the stimulus-evoked affect (e.g., olfactory-evoked emotion) may interact with pre-existing, incidental affect (Kim, Park, & Schwarz, 2009; Yan et al., 2016). I propose that when individuals are in a negative mood, a positively-perceived odor induces better moods since people are willing to correct for disequilibrium and return to a normal/better emotional state. In contrast, when people are in a positive mood, the effect of odor pleasantness is not effective to induce mood changes, as individuals are not motivated to change their current moods (Bagozzi et al., 1999; Isen, 1987).

Accordingly, I suggest that future studies should control for previous moods to investigate the effect of scent on mood changes:

P6: Positively-perceived odors induce more positive moods when incidental (e.g., pre-existing) moods are incongruent (versus congruent) with the stimulus-evoked affect.

Stimulus-induced affects also interact with cognitive processing, in such that positive moods lead to heuristic processing, while negative moods induce more systematic processing of information (Bless, Bohner, Schwarz, & Strack, 1990; Mackie & Worth, 1989). Oppositely, an effortful elaboration may create interference with learning (Sweller, 1994), produce irrelevant thoughts (Keller & Block, 1997), and result in negative moods and behaviors (Garbarino & Edell, 1997). This may explain why a wide number of previous studies on olfaction and emotions have produced mixed results on how odor perceptions affect stimulus-induced moods. Pleasant feelings (i.e., pleasure and arousal) contribute very little to determine greater perceptions of product quality and spending (Chebat & Michon, 2003); arousal ratings diminish when individuals are engaged in an effortful evaluation tasks (Mitchell et al., 1995), or in a complex memory recall and recognition tasks (Morrin & Ratneshwar, 2000).

Counter-intuitively, Cirrincione and colleagues (2014) found that arousal self-reported ratings diminished due to the perceived ease of processing of scent information when those are congruent with the style of artworks. I suggest to better explore the relationship between olfactory information and stimulus-induced arousal under the cognitive load perspective (Sweller, 1994; Sweller, Ayres, & Kalyuga, 2011):

P7: Positively-perceived odors induce mood changes when individuals are engaged in a heuristic (versus systematic) elaboration of information.

3.3 Cognitive perspective on scent

Odors are sometimes ambiguous for individuals to process (Milotic, 2003), to be recognized (Schab, 1991), and may produce false alarms (Engen, 1972). Moreover, people have no conscious mental representation of odors, such that thinking of the word "coffee" or imaging a cup of coffee is much easier than mentally represent the odor of coffee (Zucco, 2003).

That is why Engen (1982, p. 156) describes the sense of smell "as an emotional sense as opposed to the so-called "cognitive" senses like seeing and hearing". Pictures and most other visual cues possess multiple perceptual attributes for coding, while odors produce a much more unitary perceptual experience (Engen & Ross, 1973). However, humans have learned through smelling objects to interact with the environment and attribute a meaning to physical phenomena (Holmes & McCormick, 2010). Odors and their interaction with other senses and with the cognitive network of knowledge, function as a source of information which helps individuals to experience the environment holistically (Stein & Meredith, 1993).

The sense of smell has helped individuals to survive throughout their evolution process, supporting them to detect edible foods and plants, select partners, identify a potential danger, and explore new environments. This has only been possible because odors are responsible for the activation of mental representations and concepts. Accordingly, odors make the already available cognition more accessible (Smeets & Dijksterhuis, 2014), like the smell of smoke, which warns us of the danger of fire; or the smell of rotten food, that alert us to avoid eating unhealthy food.

Despite the ability of perceiving odors differs among people, depending on age, culture, odor concentration and intensity, smoking habits and illness, odors are recognized to be extremely powerful to influence human behaviors in social contexts (Baron, 1981), store environments (Spangenberg et al., 1996), service encounters (Lehrner et al., 2005), and shopping experiences (Mattila & Wirtz, 2001; Morrin & Chebat, 2005). The exposure to olfactory cues also influences product choice (Biswas, Labrecque, Lehmann, & Markos, 2014), haptic perceptions (Krishna et al., 2010), decision-making (Mitchell et al., 1995), and purchase intentions for specific products (Spangenberg et al., 2006).

Despite the consistent evidence of a positive effect of scent on consumption, most of the studies on olfaction have focused the attention more on the effect of scent on a variety of consumer behavior variables than on the process through which scents are elaborated, and processed by individuals. This might be the reason why many studies have produced mixed

results about the underlying cognitive and emotional processes through which the scents regulate behaviors (Spangenberg et al., 1996; Morrin & Ratneshwar, 2000; Cirrincione et al., 2014).
I suggest the application of cognition-based theories, such as the accessibility-diagnosticity theory and the priming paradigm as approaches to the study of scent effects on consumer behavior in further investigations to clarify to what extent odors are mentally processed and support consumers decision-making. In particular, the application of theories which focus on the cognitive nature of odors may clarify what smells represent for individuals, and their role in supporting individuals to assign a meaning to physical and social phenomena.

3.4 Propositions and future research: The Accessibility-Diagnosticity Framework

The Accessibility-Diagnosticity framework has been developed in the context of measurement of beliefs, attitudes, intentions, and behaviors. In particular, individuals, at the time of measurement, access their attitudes and beliefs toward the construct being measured retrieving available cognitions, past experiences, and prior knowledge from their long-term memory or the surrounding environment (Feldman & Lynch, 1988). However, the existence of available cognitions in respondent's memory does not ensure the activation of the construct, since which cognition is activated at the time of measurement is a function of environmental cues, events of everyday life (e.g., seeing a product in a store), and other inputs which make that cognition more salient (Feldman & Lynch, 1988). In other words, an earlier judgment will be applied to subsequent response if it is accessible and perceived as more diagnostic that other accessible inputs.
An attribute is perceived as diagnostic to judge an object when it helps in categorizing and assign the object to one (and only one) cognitive category (Herr, Kardes, & Kim, 1991). Therefore, it is expected that in a context in which some of the available information is perceived to be diagnostic and some, instead, ambiguous, the individual will count more heavily on the more diagnostic information at the expense of ambiguous information (Bone & Ellen, 1999).

The concept of diagnosticity has been largely applied in the study of the evaluation of extensions of family brand name and has been conceptualized as the extension information which may indicate the quality of a family brand (Park, Milberg, & Lawson, 1991; Ahluwalia & Gürhan-Canli, 2000). In particular, when the extension information was low in accessibility, more diagnostic cues are used to make inferences about the family brand (Ahluwalia & Gürhan-Canli, 2000).

In the context of sensory marketing, the concept of cue diagnosticity has been applied in an experiment concerning the effect of haptic perceptions on the evaluation of taste (Krishna & Morrin, 2007), which demonstrated that, even when haptic cues are nondiagnostic (not relevant) for evaluating product quality (e.g. touching a cup containing water), haptic perceptions increase product evaluations and price willingness to pay in low (versus high) autotelic consumers (Krishna & Morrin, 2007). The study of Krishna and Morrin (2007) provides evidence that touching a firm (versus flimsy) plastic cup leads to better evaluation of the water contained in the cup, meaning that even when an attribute is not relevant (diagnostic) in the evaluation of the product, it may significantly affect product evaluations.

Scent marketing studies have not explicitly discussed the concept of scent diagnosticity. However, some studies demonstrated that odors could make easier the elaboration process (Bosmans, 2006), the information more available (Morrin & Ratneshwar, 2000), and add compatible information that promotes consistent inferences about product performance and quality (Bone & Jantrania, 1992). Oppositely, when the scent adds no new relevant information to a product, it has a negative effect on judgment (Bone & Jantrania, 1992). As previously suggested in the review of Bone and Ellen (1999), the concept of diagnosticity may clarify why Spangenberg and colleagues (1996) found a specific odor influencing evaluations of the store environment but not specific product judgments; that is, the scent has been probably perceived as diagnostic for the environment but not useful for evaluating any specific product in the store.

Research evidence suggests that people form their attitude toward an object more spontaneously when they have a direct experience with that object than if they merely collect information about it (Fazio & Zanna, 1981). Attitudes are often more accessible (i.e., salient) than attributes (Kardes et al., 2004) since individuals access their attitudes toward an object more easily than retrieve the attribute stored in memory that was initially used as a basis for judgment (Kardes, 1986).

Previous studies have confirmed that experience-based information is more influential than advertising information (Kempf & Smith, 1998) and that sensory experiences, in particular, may have a great influence on judgments (Shapiro & Spence, 2002).
As sensory-based information is more spontaneously activated than attribute-based information, I propose to investigate under which condition odors are perceived as more diagnostic than other cues:

P8: Olfactory-based cues affect product evaluations more than attribute-based cues when they are perceived as more (less) diagnostic to judge the product.

Previous studies demonstrated that the effect of scent on consumer responses might be moderated by product familiarity. In particular, a pleasant scent increases brand recall for unfamiliar brands more than for familiar brands (Morrin & Ratneshwar, 2000). I believe that scent diagnosticity may have different effects on different products, depending on how much consumers have familiarity with them. We, thus, propose that when a scent is perceived as diagnostic for a product category, it increases product evaluations of those products for which consumers have no strong preferences (i.e., new, unfamiliar products). Oppositely, for those products for which consumers have strong preferences (i.e., known, familiar products), the presence of a diagnostic scent determines only a little increase in evaluations. Such effect probably occurs because stimulus-based inductive inferences (i.e., inferences based on information that is situationally available) are formed more strongly when the product category is unfamiliar because consumers are unlikely to have much prior knowledge or experience with the product (Kardes, Posavac, & Cronley, 2004):

P9: The effect of scent perceived diagnosticity improves product evaluations of unfamiliar (versus familiar) products.

As previously discussed, the sense of smell interacts with other senses synesthetically (Calvert, Spence, & Stein, 2004). This is why some experiments have shown that odors affect perceptions of other sensory modalities, such as temperature (Madzharov et al., 2015), social density (Poon & Grohmann, 2014), and tactile perceptions (Demattè et al., 2006). Similarly, haptic perceptions affect evaluations of taste even when touch is a nondiagnostic attribute for product judgment (Krishna & Morrin, 2007). Therefore, the scent diagnosticity may interact with product evaluations depending on how diagnostic the attribute of odor is perceived for the evaluation. Counterintuitively, I suggest that odor is perceived as a more diagnostic attribute for nonscent-based products (i.e., products for which scent is not a relevant attribute) than for scent-based products (e.g., shampoo, perfume), since it functions as unexpected (i.e., surprising) attribute:

P10: Scent perceived diagnosticity affects product evaluations more for unscented (versus scented) products.

3.5 Propositions and future research: Odor Priming

Odors have an important adaptive function in supporting individuals to understand the surrounding environment and social dynamics. As well as odors provide information about our daily lives, edible foods, cleanliness, and health, they provide information about products, services, and brands.

The effect of odors on evaluations and behaviors mostly occurs without individuals' conscious appreciation of odors, but not without an underlying cognitive processing mechanism. Few studies have clarified under which conditions the incidental exposure to olfactory stimuli affects information processing and product and brand choice under the *priming* perspective. Priming effects occur when the exposure to a stimulus regulates the response to another, unrelated stimulus (e.g., target) (Meyer & Schvaneveldt, 1971). Stimuli act as a prime for a subsequent judgment when they activate mental associations compatible with the unrelated stimuli, and outside of individuals' awareness (Bargh et al., 2010).

Even if research on odor priming is still limited, preliminary results show that the exposure to odors successfully affects processing of unrelated information and decision-making. In particular, the unconscious exposure to an odor may bias perception of verbal labels (Herz & Von Clef, 2001), visual cues (Gottfried, O'Doherty, & Dolan, 2003; Seo et al., 2010), auditory, and gustatory stimuli (Stevenson et al., 2012), and activate unrelated behaviors (Holland et al., 2005). In particular, Holland and colleagues (2005) found that the subliminal exposure to a citrus scent, stimulated cleaning behaviors among participants. Odor priming has been investigated mostly across the dimensions of valence and meaning, affective and semantic priming, respectively (Herz & von Clef, 2001; Doucé et al., 2013; Hermans, Baeyens, & Eelen, 1998; Kirk-Smith, Van Toller, & Dodd, 1983). Studies on affective odor priming demonstrated that when the odor and the unrelated stimulus share the same valence (e.g., both are positive or negative), the stimulus is processed faster. For example, the exposure to a pleasant (versus unpleasant) odor leads participants to evaluate faster positively (versus negatively) valenced words (Hermans et al., 1998), and improves food perceptions (Hermans et al., 2005). A recent experiment conducted in a bookstore found that the exposure to a chocolate ambient scent improves approach and goal-directed behaviors toward thematically congruent products (Doucé et al., 2013). However, these studies have not clarified whether the positive effect of scent on behaviors occurs through an affective versus semantic priming process. Thus, I propose that future investigations should focus on clarifying whether: i) the affective priming operates similarly for both, positive and negative priming; ii) the cognitive mechanism through which odors affect behaviors are those of affective (e.g., positive or negative perception of the prime) or semantic (e.g., the prime and the target share the same meaning); and iii) semantic priming occurs independently from affective priming processes. Thus, I propose that:

P11: Positively-valenced odors improve (e.g., speed up) processing of affectively-congruent stimuli in other modalities;

P12: Negatively-valenced odors inhibit (e.g., slow down) processing of affectively-congruent stimuli in other modalities, and improve (e.g., speed up) processing of affectively-incongruent stimuli;

P13: Odors improve (e.g., speed up) processing of semantically related stimuli in other modalities;

P14: Semantic priming effects of odor on unrelated stimuli only occur via affective priming processes (e.g., when the prime is perceived as pleasant).

4. Discussion

The current application of scent to marketing and consumer behavior provides evidences that odors have the potential to contribute to consumer experiences much more than creating a pleasurable environment but helping consumers to attribute a meaning to products and stores. The sense of smell has historically had an adaptive function to the extent that has made relevant to the individuals the social, physical, and psychological phenomena (Holmes & McCormick, 2010). Similarly, odors might provide additional and significant information to products, services, and consumption experiences, considering that consumption is mostly regulated by multisensory perceptions (Auvray & Spence, 2008). However, the traditional conceptualization of the sense of smell as an emotional sense has produced conflicting perspectives on the role of scents in regulating emotions, behaviors, and decision-making. This review offers a conceptualization of the sense of smell as more cognitive than emotional sense, and provides evidences that scent dynamics deserve further investigations under the cognitive-based approach. I present the most relevant findings of scent marketing research through the systematic review of 53 empirical articles published between 1992 and September 2017 in the field of marketing and consumer behavior. In particular, I summarized the effects of scent on cognitive, behavioral, and affective consumer responses to olfactory stimuli. Then, two main domains of interest for further investigations were identified: the emotional and the cognitive perspectives of scent in marketing and consumer behavior. I also discussed previous findings and specified distinctive arguments for each of the two perspectives which may open the potential for further research. Finally, I made tangible the discussion with a set of propositions which specify some areas of interest for future investigations to contribute theoretically and practically to advance in scent marketing field. This article contributes to the literature on olfaction research and to sensory marketing more in general by developing a reconceptualization of the sense of smell under a cognitive-based approach. The development of a cognitive-based approach to scent studies does not necessarily overcome the emotional perspective on scent, nor definitely solves the dilemma of whether the sense of smell is more emotional or cognitive sense. The conceptualization of odors under a cognitive-based approach helps researchers to integrate cognition to the emotional approach of the previous scent marketing studies, which may contribute to scent marketing literature in several ways. First, including cognition-based explanations to scent effects on consumer behavior allows researchers to solve mixed or contradictory results concerning the interplay between olfactory perceptions and emotions, conceptualized as basic pleasure and arousal, in marketing and reach a deeper understanding of the scent dynamics. This review provides evidences that emotions, for several reasons, are not sufficient to capture how consumers react to sensory stimuli and the surrounding environment. Second, the review advances theory by conceptualizing odors as multisensory and complex experiences. This review introduces the notion that, although odors are perceived across some basic dimensions, such as pleasantness and familiarity, they are also processed on the base of their meanings and relevance to the individuals, suggesting that the sense of smell still works through its original and adaptive functions. Third, a more systematic inclusion of the cognitive approach to scent allows researchers to focus more on the underlying mechanism through which odors are elaborated than on the effects, which also allows a greater depth and careful development of targeted scent marketing strategies. Finally, the review contributes to theory and practice with managerial and public policies implications which may result from a cognitive-based approach to scent studies.

5. Implications for research and methodology

The discussion presented in this article, sustained by the systematic literature review and empirical evidence emerged from previous studies, suggests that the emotional perspective on scent and the traditional SOR model have not always been effective to explain the role of scent in regulating consumer behavior and decision-making. In particular, I suggested that future research may prioritize the investigations on how scent affects discrete emotions, instead of basic, bipolar emotional states (Bagozzi et al., 1999), to reach a greater understanding of how scent meanings are appraised as physiological and psychological phenomena (Lazarus, 1991; Lazarus & Smith, 1988). This review also addresses the extent to which sensory stimuli are perceived synesthetically (Gallace & Spence, 2006) and may influence perceptions and emotions in other modalities (Bagozzi et al., 1999; Stevenson et al. 2012). Indeed, researchers should focus their attention on how scent perceptions bias both, congruent-valenced emotions and cognitive appreciation of stimuli in other modalities.

I also discussed the role of basic arousal as regulating mechanism of the effect of scent on consumer behavior and demonstrated that to the extent that I adopt a cognitivist perspective on emotions, arousal occurs automatically and not always under a meaningful interpretation of the source of the arousal. Therefore, several studies have not confirmed the ability of odors of inducing basic arousal and change moods. The discussion encourages further studies to clarify how olfactory stimuli are mentally represented and on how the attribution of meaning to odors might contribute to effectively shift moods and emotions. The contradictory findings concerning the arousal mechanism induced by odors might be clarified and explained focusing more attention to the conditions under which odors elicit arousal in consumer behavior contexts. To reach a greater understanding of the arousing phenomena induced by scents, I encourage more investigations regarding the congruence between the arousal of scent and other potential sources of arousal, the interaction between the incidental arousal and the stimulus-evoked arousal, and the assessment of how arousal induced by scents may also affect individuals' cognitive processing of product and brand information.

This review also discusses the potential for the adoption of a cognitive perspective on scent research. In particular, to clarify how individuals interact with ambiguous (Milotic, 2003; Zucco, 2003), and difficult to process stimuli (Engen, 1972; Schab, 1991), such as scent, I believe that the cognitive dimension of odors and their interpretation deserve more attention. This article extends the boundaries of scent marketing theory by including cognitive-based theories which might provide researchers with the opportunity to restore the original and significant functions of the sense of smell as a mean to learn, interact with the physical world, and to attribute a meaning to psychological phenomena. The understanding of how olfactory information are processed and integrated in the network of knowledge may address the extent that odors help individuals to perceive the environment holistically (Stein & Meredith, 1993), and contribute to the development of meanings individuals attribute to events and objects, sometimes competing with other sensory modalities (e.g., vision, audition). To approach scent effects from a cognitivist perspective, I propose that future investigations should apply the accessibility-diagnosticity theories (Feldman & Lynch, 1988), and the odor priming perspective. I suggest that the accessibility-diagnosticity framework may address to scent marketing literature a greater understanding of how scent information can make some attributes or information of a product or an environment, more accessible and more diagnostic to facilitate the evaluation and the decision-making processes. I also propose that the diagnosticity of odors may work choices and decision-making differently depending on the product category (e.g., scent-based versus nonscent-based products), product familiarity (e.g., products for which consumers already have strong preferences versus new products), and information processing style (e.g., heuristic versus systematic processing styles).

This review has discussed how important are odors to provide information to individuals regarding their lives, the surrounding environment, edibility of foods, and healthiness. Similarly, odors might support consumers to choose among different products and brands. Previous studies on scent have not explored how odors may act as a prime for subsequent judgments and choices of unrelated objects and alternatives. I suggest that further studies should apply a priming perspective to the investigations of the effect of scent on consumer choices and decision-making, since odors are mostly processed without the individual conscious appreciation and mental representation of odors. I believe, supported by the previous limited results, that odors may function as effective primes to successfully impact processing and choice of unrelated products and brands, even more than other sensory cues (Herz & Von Clef, 2001; Seo et al., 2010). Future research should also clarify whether odors act as primes through more affective or semantic processes; in other words, future studies are needed to define whether odors are mostly processed across their valence (e.g., pleasantness versus unpleasantness) or their meanings. Regarding odor valence, which is the primary dimension through which individuals perceive odors, future research might clarify whether positive odors (e.g., positive primes) and negative odors are equally effective to function as the primes.

Finally, this review also addresses methodological issues relative to scent marketing studies. The application of a cognitive-based approach allows researchers to expand the methodological boundaries of scent studies, by introducing the notion that odors may also be encoded and processed in isolation, contrary to the current believe (Smeets & Dijksterhuis, 2014; Zucco, 2003), which does not mean that odors do not interact with other sensory inputs but that the sole perception of an odor may be sufficient, under certain conditions, to induce an emotional and a cognitive responses of individuals and consumers. From a methodological point of view, this notion allows researchers to the benefit of innovative, intentional odor manipulations (i.e., cue-based), contrary to the traditional unintentional odor manipulations (i.e., ambient odor not made salient to participants). Moreover, applying the priming perspective might contribute to the methodology by demonstrating that laboratory settings are also suitable for the exploration of scent effects on consumer choices and decision-making.

6. Implications for management and public policies

The study of odors under a cognitive-based approach discussed in this article may have implications for management and public policies. First, the understanding of how odors are cognitively perceived and which meanings individuals attribute to scents may address relevant issues to seasonal marketing strategies. Many companies are developing ad hoc seasonal marketing campaigns and actions to improve sales and connection of their customers with products, brands, and stores. Starbucks, for example, creates seasonal products, new drinks that are available at the stores only in a specific period of the year such as the Pumpkin Spice Latte, which is sold only during the Halloween. Black Friday, Back-to-school shopping season, and Christmas campaigns are all examples of the notion that every season offers managers the opportunity to better plan their marketing strategies. The taste of spicy pumpkin is highly evocative and emotionally connected to Halloween, holidays, and family times. Similarly, odors may represent an easy-to-develop, and low-cost tool to connect consumers with products and stores, as well as to create a thematic, season-congruent holistic environment.

Second, odor meanings may have implications not purely from the consumer perspective but also from public policies. Previous research demonstrates that odor perceptions are strongly related to overeating and obesity, and that the exposure to certain food-related odors leads people, especially those in overweight, to eat more (Wang, Pu, & Shen, 2013). However, a study assessing the role of olfaction in determining weight demonstrated that the inhalation of certain odors leads to weight loss (Hirsch & Gomez, 1995). If on one hand companies and managers are using odors as triggers for the desire to eat more and improve sales and food consumption, on the other hand olfactory cues are equally effective to reduce the feeling of hunger and, combined with other public interventions, such as a nutrition program, may help to limit overeat and facilitate weight reduction.

Third, the interpretation of olfactory meanings might also contribute to urban marketing (Henshaw, 2013). People experience urban environment through their senses and, when visiting a city, does not just look and hear it but also smell it. Odors strongly contribute to place's identity in such a way that from the smell we distinguish between a big urban place, which suffers from air pollution, garbage, and traffic emissions, and small towns immersed in nature. Modern globalization has led to a decline of urban place's identity, creating cities in which we experience "an alienating sense of placeness" (Drobnick 2006). The application of scent marketing not only to private spaces (e.g., retail settings) but also to public places (e.g., metro station, trains) may offer benefits for public managers and public policies makers to neutralize bad smells, create a more immersive experience of a city, and also represents a great opportunity for co-creation place identities and urban narratives. Finally, odor meanings and associations are also relevant in medical services, since the smell of medical spaces is always associated with sad moments, anxiety, sickness, and sterile environments. Studies on olfaction as determinants of affective responses toward medical environments have shown that certain odors (e.g., lavender, orange) lead to reduce anxiety in the waiting room of a dental office (Lehrner et al., 2000; 2005). Thus, odors that are incongruent with medical contexts might develop more favorable associations, regulate positive moods, as well as improve the overall patient experiences.

7. Conclusions

This review introduces the cognitive-based approach to the study of scent effects on marketing and consumer behavior. In particular, the paper had three objectives: i) to present the current theories and approaches to the investigation of scent effects on consumer behavior; ii) to propose a cognition-based approach to explore the underlying mechanism through which scent is mentally processed by individuals; and iii) to develop a research agenda and propositions to encourage further studies on cognitive processing of scents.
The discussion of the application of cognition-based approaches to the study of scent in marketing and consumer behavior has highlighted that greater attention needs to be turned to what smells represent for individuals, what are their meanings, and how odors might help us attribute a sense to the physical and psychological phenomena.

With this article, I hope to encourage further investigations on the underlying cognitive mechanism through which odors drive consumer behavior and decision-making, meaning that odors should no longer been considered as emotional stimuli but also as means of meaning which bring information to consumers in a competitive environment.
The literature review, propositions, and the discussion of theoretical and practical implications should encourage researchers, managers, and public policies makers to look at the use of scents not only as a tool to create a more favorable environment but also as an opportunity to drive consumers' preferences and decision-making, co-create meaningful environments, change unhealthy behaviors, and in some cases also improve social and cultural well-being.

CHAPTER 3

ARTICLE 2 - The Unconscious Nose: The Effect of Odor Priming on Product and Brand Choice

Abstract. This article extends the idea that olfactory stimuli influence cognitive processing and decision-making even when they are perceived unconsciously. Eight laboratory experiments investigate the two routes underlying priming effects, those of affective and semantic priming and show that odor priming may regulate product and brand choice. In particular, this research demonstrates that the affective odor priming is more effective than semantic odor priming to drive consumer decision-making since the semantic odor priming occurs only under the certain condition of affective-based evaluations, such that when the odor is perceived as pleasant. As opposed to visual stimuli, which are processed mostly through the semantic association with other cues, olfactory stimuli follow a different underlying cognitive mechanism, primarily based on the affective evaluation of the odor. This research demonstrates that incidental odors unconsciously activate a mental representation when they are matched for valence, even if they are unrelated to the intended semantic category. In other words, pleasant odors are more influential to activate semantic associations than unpleasant odors. This article contributes to scent marketing theory and practice. First, these findings confirm that semantic odor priming is a real phenomenon, but it is not always reliably predictable as affective odor priming since it occurs only via affective-based evaluations in the context of decision-making and choice. Second, this research shows that odors may be encoded in isolation and also in laboratory settings. Third, this research addresses that odors are crossmodally correlated with other senses, and anticipate sensory experience in other modalities providing managers and retailers with the opportunity to design a scent marketing strategy which better fits their specific goals.

Keywords: odor, affective and semantic priming, product and brand choice, decision-making.

1. Introduction

Imagine walking through the aisles of a grocery store and suddenly smelling a freshly baked bread aroma; or when you are at the cinema and smell the aroma of popped popcorn, which immediately makes your mouth water! Almost everything in our physical world has a scent that our olfactory receptors may or may not identify. Although the olfactory region in humans has smaller sizes compared to other mammals, the sense of smell has played a major role in human evolution and adaptation functions too far, especially for what concerns the integration of olfactory perceptions and the interpretation of object-specific events. Thus, olfaction, as the most ancient of human senses (Sarafoleanu et al., 2009), represents the most powerful route of the interaction of people with their environments. The sense of smell has helped individuals to survive throughout their evolution process, supporting them to detect edible foods and plants, select partners, identify a potential danger, and explore new environments. This has only been possible because odors are responsible for the activation of mental representations and concepts. Accordingly, odors make the already available cognition more accessible (Smeets & Dijksterhuis, 2014), like the smell of smoke, which warns us of the danger of fire; or the smell of rotten food, that alert us to avoid eating unhealthy food. This knowledge is activated outside of awareness (Bargh & Morsella, 2008; Bargh, Williams, Huang, Song, & Ackerman, 2010), and in response to incidental stimuli (Smeets & Dijksterhuis, 2014). Despite the ability of perceiving odors differs among people, depending on age, culture, odor concentration and intensity, smoking habits and illness, odors are recognized to be extremely powerful to influence human behaviors in social contexts (Baron, 1981), store environments (Madzharov, Block, & Morrin, 2015; Spangenberg, Crowley, & Henderson 1996), service encounters (Lehrner, Eckersberger, Walla, Poetsch, & Deecke, 2000; Lehrner, Marwinski, Lehr, Johren, & Deecke, 2005), and shopping experiences (Mattila & Wirtz, 2001; Morrin & Chebat, 2005). The exposure to olfactory cues also influences product choice (Biswas, Labrecque, Lehmann, & Markos, 2014), haptic perceptions (Krishna, Elder, & Caldara, 2010), decision-making (Mitchell, Kahn, & Knasko, 1995), and purchase intentions for specific products (Spangenberg, Sprott, Grohmann, & Tracy, 2006).

Since these effects may occur without individuals' conscious appreciation of odors, I examine the underlying mechanism through which the exposure to olfactory stimuli affects information processing and product and brand choice from the *priming* perspective. With the term "priming" we refer to an implicit memory effect which occurs when the exposure to a stimulus (e.g., prime) affects the response to another, subsequent stimulus (e.g., target) (Meyer & Schvaneveldt, 1971). This phenomenon occurs mostly through the automatic activation of mental representations in response to an incidental situational stimulus (e.g., odor) (Smeets & Dijksterhuis, 2014), and outside of individuals' awareness (Bargh et al., 2010).

Priming effects have been investigated in several fields (Auty & Lewis, 2004; Bargh, Chen, & Burrows, 1996; Kreuter, Chheda, & Bull, 2000; Schacter, Dobbins, & Schnyer, 2004). However, only a few studies have applied the priming paradigm to olfaction research (De Lange, Debets, Ruitenburg, & Holland, 2012; Herz & von Clef, 2001; Holland, Hendriks, & Aarts, 2005). Prior research on odor priming has shown that the exposure to odors (e.g., priming stimulus) influences subsequent judgments and behaviors (Bone & Jantrania, 1992). This effect of odor priming may occur through two different processes, which are affective priming and semantic priming, among others (e.g., perceptual priming, goal priming, cross-modal priming). Affective priming refers to the process through which a stimulus (e.g., the prime) is experienced firstly along its affective dimension (e.g., pleasant versus unpleasant) (Reisberg, 1997), whereas semantic priming refers to the process in which the prime and the target are perceived to belong to the same semantic category (Ferrand & New, 2003). For example, the word *cat* may represent a semantic prime for the word *tiger,* because the two are similar animals; an auditory stimulus (e.g., French versus German music) may have an impact on wine sales (e.g., more French wine was sold when French music was played) (North, Hargreaves, & McKendrick, 1999). Studies on affective priming have shown that positive priming typically speeds up processing of pleasant stimuli, while slows down processing of unpleasant stimuli (Mayr & Buchner, 2007). Semantic priming, instead, speeds up processing within the associative network, in such that thinking of an item in a category activates the processing of similar items in the same category (Reisberg, 1997; Marslen-Wilson, Tyler, Waksler, & Older, 1994).

There is no consensus on whether odors are suitable primes for processing of unrelated information and decision-making. However, a study on odor priming demonstrated that priming odors via valence (i.e., pleasant or unpleasant quality of the odor) is more successful than priming odors via semantic associations with other cues (Pauli, Bourne Jr, Diekmann, & Birbaumer, 1999), probably because odors are appraised firstly regarding their affective dimension (e.g., pleasant or unpleasant) (Smeets & Dijksterhuis, 2014). Other studies have demonstrated that the semantic odor priming only occurs when the odor matches stimuli in other sensory modalities, such as verbal labels (Herz & Von Clef, 2001), visual stimuli

(Gottfried, O'Doherty, & Dolan, 2003; Seo, Roidl, Müller, & Negoias, 2010), and visual, auditory, and gustatory cues (Stevenson, Rich, & Russell, 2012).

However, previous studies exploring the effect of scent on consumer decision-making and choice have not always applied olfactory priming procedures and, thus, failed to explain the effect of scent on evaluations and memory under the priming paradigm.

The purpose, here, is not to lead to abstraction something that appears as very intuitive, like our way to process odors. Instead, this research aims to investigate the effect of odor priming on subsequent unrelated judgments and clarify the underlying cognitive mechanism through which odors may successfully act as a prime in a decision-making context and, thus, affects consumer information processing and product and brand choice. The experiments show that odor priming is a real phenomenon, and the results demonstrate that odors are effective as primes especially when the underlying mental processes through which they make cognition more accessible are those of affective rather than semantic priming. Accordingly, odor priming is more reliably predictable when the underlying mechanism of information processing includes affective-based than associative-based evaluations. Evidence of this research demonstrates that odors are encoded in isolation, and odor priming may also occur in laboratory settings, particularly when they are perceived across the dimension of their valence.

This article has general and specific purposes. According to results emerged from research in cognitive psychology, this research has the specific aim of confirming the existence of a connection between the olfactory perceptions and behavios and to clarify whether the unconscious exposure to a stimulus may influence consumer thinking and action. In particular, the purpose of this article is to demonstrate that odors may effectively act as affective and semantic primes and that, even when perceived outside of awareness, they are effective to activate mental concepts which, in turn, trigger choices and behaviors. This article also reaches more generic goals, according to the general purposes of this dissertation, such those of i) exploring and empirically testing the potential of a cognitive-based approach (i.e., odor priming) to be applied to scent studies in marketing and consumer behavior; ii) investigating the underlying mechanism through which odors regulate behavior and decision-making through cognition; and iii) extending the notion that odors are multisensory and complex experiences that are not only emotionally perceived but processed through their meanings.

2. Theoretical Background

In cognitive psychology, the term "priming" refers to all those implicit memory effects (Schacter, 1992), which occur when the perception of a stimulus (e.g., prime) has an impact on responses to a subsequent, unrelated stimulus (e.g., target) (Kahneman, Treisman, & Gibbs, 1992; Meyer & Schvaneveldt, 1971; Schvaneveldt & Meyer, 1973). The concept of priming incorporates the idea that the exposure to a primed event (e.g., the exposure to sensory stimuli, like visual or olfactory) activates mental representations stored in long-term memory that, in turn, influences the processing of the later stimulus and the way in which humans respond to it by making the already available cognition more accessible (Feldman & Lynch, 1988). For the priming effect to occur, two separated steps are needed, thus: i) the incidental exposure to the primed stimulus, which may belong to several sensory modalities (e.g., olfaction, vision, audition) (Gaillet, Sulmont-Rossé, Issanchou, Chabanet, & Chambaron, 2013); and ii) the learning phase (Degel & Köster, 1998). The exposure phase is responsible for the activation of mental representations, concepts and knowledge already existing in individuals' long-term memory (Shiffrin & Schneider, 1977), which will affect subsequent judgments and actions during the learning and unrelated phase. This effect occurs mostly automatically and unconsciously (Gaillet et al., 2013; Schacter, 1992; Smeets & Dijksterhuis, 2014). Moreover, three conditions need to be satisfied for the priming effect to arise, such that: i) the mental representation activated by the prime must already exist in long-term memory; ii) the strength of the connection between the prime and the target determines the strength of the priming effects; and iii) the effect of priming occurs only in such situations in which the target responses to a stimulus is relevant (Gaillet et al., 2013).

Priming effects occur under three different stimulus repetition types, which are perceptual, semantic, and affective priming (Mandel & Johnson, 2002). *Perceptual priming* refers to a priming effect that involves two stimuli with the same form and that share a similar physical appearance (Wiggs & Martin, 1998). Perceptual priming effects are generally evaluated through lexical decision tasks (e.g., word-nonword, word-stem completion task, word fragment completion task), in which respondents are exposed to several trials of prime-target word pairs that share same physical attributes, like *ball-apple* (both rounded and podgy) (Schreuder, Flores d'Arcais, & Glazenborg, 1984), or *pizza-coin* (both rounded and flat) (Pecher, Zeelenberg, & Raaijmakers, 1998). The idea surrounding perceptual priming is that the response to a word (e.g., coin) is faster and more correct when it is associated with a prime word (e.g., pizza) with which shares similar physical features (Flores d'Arcais, Schreuder, & Glazenborg, 1985). *Semantic priming* is a type of priming in which the prime and the target stimuli belong to the same semantic category (Neely, 1991; Reisberg, 1997). Semantic priming effects typically occur when the exposure to a primed stimulus (e.g., dog) in a category stimulates thinking of a target stimulus (e.g., wolf) in the same category (Joordens & Becker, 1997). This activation arises because of the structure of knowledge representation in the human semantic network (Sowa, 1987), in which are stored and organized concepts and relations between concepts. The effect of semantic priming is evaluated through lexical decision tasks (e.g., word-nonword classification task). However, recent studies in psychology have demonstrated that semantic priming is possible to occur through evaluative priming task (North et al., 1999; North, 2012). For example, an auditory stimulus (e.g., French versus German music) may have an impact on wine sales (e.g., more French wine was sold when French music was played) (North et al., 1999), and on perception of gustatory object (e.g., wine was perceived more refreshing when a more refreshing music was played) (North, 2012). *Affective priming* refers to a priming effect in which the prime and the target stimuli are congruent on their valence (e.g., positive or negative) (Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Ferré & Sánchez-Casas, 2014), and response to the target stimulus is facilitated. Affective priming is generally evaluated during lexical decision task (Binder, Westbury, McKiernan, Possing, & Medler, 2005), and occurs when the congruence between the prime and the target contributes to speed the mental processing of the stimuli (Reisberg, 2007), such that the simple exposure to a positive primed stimulus speeds up mental processing (Reisberg, 2007), while the exposure to a negative primed stimulus leads to ignore the stimulus and proceed to subsequent task (Mayr & Buchner, 2007). Examples of affective priming effects had shown that affective prime might influences moods and preferences, such that pictures of smiling (versus angry) faces were judged more (less) positive (Winkielman, Zajonc, & Norbert Schwarz, 1997), even when subjects were exposed to the primed stimuli outside of consciousness.

Priming effects have been investigated in several fields, including experimental psychology (Bargh et al., 1996; Kahneman et al., 1992; Tulving, Schacter & Stark, 1982), social psychology (Macrae & Johnston, 1998), medicine (Dehaene et al., 1998; Kreuter et al., 2000), neuroscience (Gruber & Müller, 2002; Schacter et al., 2004), marketing (Auty & Lewis, 2004; Bowman & Gatignon, 1996), advertising (Harris, Bargh, & Brownell, 2009; Yi, 1990), and consumer behavior (Dijksterhuis, Smith, Van Baaren, & Wigboldus, 2005; Herr, 1989; Fitzsimons, Chartrand, & Fitzsimons, 2008; Mandel & Johnson, 2002). However, very few studies have investigated the effect of olfactory stimuli from the priming perspective (Smeets & Dijksterhuis, 2014).

3. Odor Priming

Scent marketing research has focused the attention primarily on the consumers' affective, cognitive, and behavioral responses to odors in consumption situations and shopping experiences. Studies on ambient scent have shown that the presence of a perceived pleasant scent enhances perception of product quality (Chebat & Michon, 2003); evaluation of the store (Mattila & Wirtz, 2001); evaluation of the merchandise (Doucé & Janssens, 2013; Spangenberg et al., 2006); satisfaction (Morrison, Gan, Dubelaar, & Oppewal, 2011); feelings for the brand (Lwin & Morrin, 2012); the number of items bought and the amount of dollars spent (Spangenberg et al., 2006); risk behavior (Hirsch, 1995); decision-making (Mitchell et al., 1995); and price perception (Spangenberg et al., 1996). Moreover, odors positively influence human cognitive processing. Evidence from previous studies have found that scent-based retrieval cues restore lost information (Morrin, Krishna, & Lwin, 2011a); increase the number of product attributes recalled (Lwin, Morrin, & Krishna, 2010); improve not only olfactory but also visual imagery (Krishna, Lwin, & Morrin, 2010); enhance memory for product information (Krishna, Lwin, & Morrin, 2010); increase subjects' ability to recall unfamiliar (vs. familiar) brands (Morrin & Ratneshwar, 2000); elicit more emotional memory compared to other sensory cues (Herz & Cupchik, 1995); and increase advertising recall more than pictorial and visual cues in the context of movie theatre commercials (Lwin & Morrin, 2012). Affective, cognitive and behavioral reactions to scents occur because of the connection between olfactory nerve and the limbic system of the brain, which regulates human emotions (Wilkie, 1995). Odors are mostly perceived along with some basic features, such as familiarity, intensity, valence, which contribute creating both semantic and episodic memory for odors (Tulving, 1986). Odor features and other olfactory information are integrated in what is known as odor knowledge, conceptualized as a stable informational specificity (Schab, 1991), that is generally less likely to be affected by the passage of time and results from a much more unitary perceptual experience than visual or auditory stimuli (Engen & Ross, 1973). Thus, as memory for odors is long-lasting and results from encoding olfactory stimuli as a unitary perceptual event (Larsson, 1997), odor processing and retrieval activates associations between odors and other sensory knowledge, like touch (Demattè, Sanabria, Sugarman, & Spence, 2006), or taste (Stevenson, Prescott, & Boakes, 1999), as well as between odors and semantic knowledge. Several experiments have demonstrated that odor perceptions are semantically associated with temperature (Madzharov et al., 2015); Christmas

(Spangenberg, Grohmann, & Sprott, 2005); gender (Krishna et al., 2010); or cleaning behavior (Holland et al., 2005). The activation of these associations between odors and other types of sensory and semantic knowledge exceeds the mere link between the olfactory nerve and the limbic system (Larsson, 1997). Holland and colleagues (2005) have demonstrated that participants exposed (versus not exposed) to a citrus scent completed cleaning-related words faster. Moreover, the exposure to citrus scent also activated cleaning behavior (e.g., removing crumbs after eating a cookie) more often. According with previous research on odor semantic meanings (Krishna et al., 2010), these results suggest that odors may create strong semantic associations, which have an impact on behavior (Holland et al., 2005), and may occur outside of conscious perception (Li, Moallem, Paller, & Gottfried, 2007; Schifferstein & Blok, 2002). Thus, I believe that subliminal exposure to odors is responsible for the activation of automatic cognitive processes, which are the basis of evaluations and preference judgments, similarly to pictures and words (Li, Zinbarg, Boehm, & Paller, 2008). Due to the strong semantic associations activated by odors, I believe that odor priming may represent the common underlying mechanism through which smell perceptions influence a variety of unrelated evaluations of subsequent congruent elements (Dijksterhuis et al., 2005), such as products, brands, and stores.

4. Hypotheses

Only a few studies investigated the effect of odor priming on subsequent unrelated judgments. Most of these studies have focused on affective and semantic odor priming effects (Herz & von Clef, 2001; Doucé, Poels, Janssens, & De Backer, 2013; Hermans, Baeyens, & Eelen, 1998; Kirk-Smith, Van Toller, & Dodd, 1983), instead of perceptual priming, which is difficult to be applied via odors since it concerns object size and shape (e.g.,coin share with pizza the similar size of rounded object).

Previous affective priming studies have shown that when prime and target stimuli share the same valence (e.g., positive-positive), the speed and the accuracy of responses toward the target stimulus is decreased (Bargh, Chaiken, Govender, & Pratto, 1992; Fazio et al., 1986; Hermans & De Houwer, 1994). It is also well-established that odors arouse affective reactions (Bosmans, 2006; Ehrlichman & Halpern, 1988; Kirk-Smith et al., 1983). The few studies on affective odor priming have demonstrated that the exposure to a pleasant (versus unpleasant or no scent) odor: i) leads participants to evaluate faster positively (versus negatively) valenced words (Hermans et al., 1998); ii) changes food perceptions in the same direction (e.g., pleasant odor–positive perception) (Hermans, Baeyens, Lamote, Spruyt, & Eelen, 2005); iii) improves both, recall and recognition of familiar and unfamiliar brands (Morrin & Ratneshwar, 2003), regardless of scent congruence with the product category. However, these studies have not always applied affective priming procedures and, thus, failed to explain the effect of scent on evaluations and memory under the priming paradigm. Another recent study observed positive approach and goal-directed behavior when a chocolate scent was diffused in a book store in response to thematically congruent products (Doucé et al., 2013). However, this study has not investigated whether the positive effect of scent on behaviors occur through an effective priming effect, which means that smell perceptions activate an automatic knowledge which, in turn, influences behaviors (Schifferstein & Blok, 2002). Given the limitations of previous studies in discussing scent effects under the priming paradigm, and given that odor valence is considered the most important dimension through which humans perceive scents (Engen, 1982; Kaeppler & Mueller, 2013), it is expected that:

H1a: Positively-valenced odors improve (e.g., speed up) processing of affectively-congruent stimuli in other modalities, such as visual or verbal (Study 1, Experiment 1.1 and 1.2).

To investigate the affective odor priming process, I adopt the prime and the target of different sensory modalities (i.e., cross-modal priming). In other words, I used odor (e.g., olfactory modality) as a prime and pictures and words (i.e., visual and verbal modality) as the targets. Odors are recognized as extremely powerful in activating the emotional region of the brain (i.e., amygdala) when compared with cues in other sensory modalities, such as visual or auditory (Royet, Zald, Versace, Costes, Lavenne, Koenig, & Gervais, 2000). Visual stimuli are more explicit than stimuli in other modalities (e.g., verbal, auditory), due to the vividness of their presentation attributes (Biederman & Cooper, 1991). Images also are found to be more powerful than words to i) enhance semantic memory (Guenther, Klatzby, & Putnam, 1980; Shepard, 1967); ii) increase memory for printed advertisements (Starch, 1966); iii) improve attitudes toward the brand (Mitchell & Olson, 1981); iv) increase both, immediate and delayed ads recall tasks (Childers & Houston, 1984); v) improve learning (Paivio & Csapo, 1969); vi) facilitate attitude-behavior consistency (Kisielius & Roedder, 1983); and vii) improve attitudes toward products and purchase intentions (Kim & Lennon, 2008). However, Kousta and colleagues (2011) have demonstrated that abstract stimuli are processed faster than concrete stimuli. As pictures are more concrete and vivid than words (Paivio, Rogers, & Smythe, 1968), and odor-based information are processed faster than visual and verbal information (Willander & Larsson, 2006), I hypothesize that:

H1b: Positively-valenced odors improve (e.g., speed up) processing of affectively-congruent verbal stimuli more than affectively-congruent visual stimuli (Study 1, Experiment 1.1 and 1.2).

Odors may be sometimes difficult to be identified by humans (Chebat & Michon, 2003), to be recognized and labeled (Schab, 1991), and may produce false alarms (Engen, 1972), due to the lack of a conscious representation of olfactory stimuli (Zucco, 2003). Accordingly, the sense of smell is also considered as an implicit sense (Köster, Degel, & Piper, 2002), often seen as secondary sense compared with vision and touch, that better capture individuals' attention (Smeets & Dijksterhuis, 2014). However, a recent study has shown that sniffing a scent while viewing a print advertisement (e.g., olfactory-visual condition) improves visual attention to the advertised object, when the object is semantically related to the scent, more than not sniffing a scent (e.g., visual-only condition) (Lwin et al., 2016). Moreover, Seo and colleagues (2010) demonstrated that odors improve visual attention to congruent objects. Accordingly, I hypothesize that olfactory stimuli are stronger than visual-only sensory inputs not only to capture individual attention but also to speed up processing of more complex stimuli in other (e.g., visual, verbal) modalities. Counterintuitively, I expect that:

H1c: Positively-valenced odors improve (e.g., speed up) processing of affectively-congruent visual and verbal stimuli more than positively-valenced pictures and positively-valenced words (Study 1, Experiment 1.2).

As stated earlier, semantic priming occurs when the prime and the target stimuli belong to the same semantic category (Neely, 1991; Reisberg, 1997). Studies in the field of scent marketing and consumer behavior have shown that odor perception involves more complex crossmodal sensory processes (Lwin, Morrin, Chong, & Goh, 2016) since odors might be semantically associated with stimuli in other modalities, such as temperature (Madzharov et al., 2015); Christmas (Spangenberg et al., 2005); gender (Krishna et al., 2010); cleaning behavior (Holland et al., 2005); colors (Kemp & Gilbert, 1997); product taste (Nasri, Beno, Septier, Salles, & Thomas-Danguin, 2011); wine taste (Morrot, Brochet, & Dubourdieu, 2001); and object in print advertisements (Lwin et al., 2016). This process of connection between odors and semantic knowledge may also occur outside of individuals' awareness (i.e., semantic odor priming) (Li et al., 2007; Schifferstein & Blok, 2002). Despite these results, studies relating odor perceptions to consumer decision making under the semantic priming perspective are still limited. I believe that subliminal exposure to odors may activate semantic associations, which in turn influence consumer decision making of a variety of objects, (Dijksterhuis et al., 2005), such as products, and brands.

Contrary to previous studies, which considered the sense of smell as an implicit sense (Köster et al., 2002), a secondary sense compared with vision and touch, that better capture the attention (Smeets & Dijksterhuis, 2014), Lwin et al. (2016) has shown that sniffing a pleasant scent while viewing a print advertisement improves visual attention to the advertised object, when the object is semantically congruent with the scent. Similarly, a field experiment conducted in a grocery store has shown a significant effect of background music on product choices (North et al., 1999). In particular, consumers that were not consciously aware of the presence of background music in the store, bought more French (German) wine when primed with a typical French (German) music. This experiment demonstrated that an auditory stimulus, even when perceived unconsciously, may influence buying behavior and product choice, confirming evidence for an effective auditory priming effect (North et al., 1999). Previous studies have demonstrated that olfactory stimuli may have an impact on behavior

(Chebat, Morrin, & Chebat, 2009; Gueguén & Petr, 2006) and product choice (Spangenberg et al., 2006), in a variety of situations. Similarly to auditory priming, it is expected that a semantic olfactory priming effect is also likely to occur since the sense of smell is the most immediate and emotional of the senses (Wilkie, 1995). Accordingly, I expect that:

H2a: Pleasantly perceived odors improve (e.g., speed up) consumer's choice of semantically congruent products (Study 2, Experiment 2.1, 2.2).

H3a: Pleasantly perceived odors improve (e.g., speed up) consumer's choice of semantically congruent brands (Study 3, Experiment 3.1).

As previously discussed, the scent is an incredibly powerful cue to capture individual attention, even more than visual stimuli (Lwin et al., 2016). A recent study has shown that sniffing a scent while viewing a print advertisement (e.g., olfactory-visual condition) improves visual attention to the advertised object more than not sniffing a scent (e.g., visual-only condition) (Lwin et al., 2016). Thus, I expect that olfactory stimuli are stronger than visual-only sensory inputs not only to capture individual attention but also to drive consumer choice for products and brands. Counterintuitively, I expect that:

H2b: Pleasantly perceived odors improve consumer's choice of semantically congruent products more than pictures (Study 2, Experiment 2.1 and 2.2).

H3b: Pleasantly perceived odors improve consumer's choice of semantically congruent brands more than pictures (Study 3, Experiment 3.1 and 3.2).

As stated earlier, negative priming belongs to a different cognitive process compared to positive priming. In particular, while positive priming consists of experiencing a stimulus that speeds up processing (Reisberg, 2007), negative priming consists of perceiving a stimulus and ignoring/avoiding it (Mayr & Buchner, 2007; Neumann & DeSchepper, 1991). Thus, I expect that:

H2c: Unpleasantly perceived odors inhibit (e.g., slow down) consumer's choice of semantically congruent products, and improve (e.g., speed up) consumer's choice of semantically incongruent products (Study 2, Experiment 2.3, 2.4).

Studies in scent research have demonstrated that odors also improve product attributes recall (Lwin et al., 2010), olfactory and visual imagery (Lwin et al., 2010), memory for product information (Krishna et al., 2010), product information recall (Mitchell et al., 1995), brand recall (Morrin & Ratneshwar, 2000), and increase advertising recall more than pictorial and visual cues in the context of movie theatre commercials (Lwin & Morrin, 2012). Accordingly, I expect that:

H3c: Pleasantly perceived odors improve consumer's memory for semantically congruent brands (Study 3, Experiment 3.1).

H3d: Pleasantly perceived odors improve consumer's memory for semantically congruent brands more than pictures (Study 3, Experiment 3.2).

H3e: Pleasantly perceived odors improve consumer's perceived fluency of semantically congruent brands (Study 3, Experiment 3.1).

H3f: Pleasantly perceived odors improve consumer's perceived fluency of semantically congruent brands more than pleasantly perceived pictures (Study 3, Experiment 3.1 and 3.2).

To test the hypotheses, I conducted a set of three studies with a total number of eight laboratory experiments. Study 1 test the effect of affective odor priming on visual and verbal stimuli; study 2 investigates the effect of semantic odor priming induced by pleasant and unpleasant scents on product choices; and study 3 explores the effect of semantic odor priming on brand choice, memory and recall for semantically related brands.

5. Study 1

5.1 Overview of the study

Study 1 consists of two experiments, 1.1 and 1.2, which were designed to test whether the incidental exposure to a pleasant odor induces affective evaluations of unrelated stimuli in other modalities. In particular, the experiments 1.1 and 1.2 demonstrates that positively perceived odors facilitate processing of positively valenced stimuli in other visual and verbal sensory modalities. Moreover, the results also suggest that the affective odor priming is more likely to occur when the target is a verbal stimulus rather than visual stimulus.

5.2. Olfactory Stimuli Pretest

As the aim of the study 1 is to test whether the exposure to a pleasant odor induces congruent affective evaluations of visual and verbal stimuli, the olfactory stimuli pretest was conducted to select the pleasant scent used in the main study (Study 1). In particular, the pretest had the aim of checking the affective dimension of scent. Other dimensions, such as familiarity, liking, and arousal were also included in the analysis in line with previous studies (Spangenberg et al., 2005). Forty-four participants (27 men and 17 women), ranging in age from 18 to 55 (M= 25.9 years), were asked to sniff ten different scents, representing all the main olfactory families (Spangenberg et al., 1996). All selected scents were common odors, which can be easily found in nature, divided into the following category: two woody, two floral, two spicy, two citrus, and two water scent. Each scent was put on a paper string measuring 7 cm in length and 2 cm in height, and identified by an alphanumeric code. Scents and paper strings were developed in cooperation with a commercial aroma supplier from the local market in Brazil. On each paper string, two drops of each scent were put, to control for scent intensity. All scents were colorless to neutralize the effect of color on scent evaluation (Zellner & Kautz, 1990). Before taking part in the pretest, participants read and signed an informed consent screening for allergies (e.g., see Spangenberg et al., 1996). Following Krishna and colleagues (2010) participants were asked to smell coffee beans contained in an opaque plastic box in front of them before starting the pretest and also between one test and another, to neutralize the effect of a previous scent on the next (Secundo & Sobel, 2006). Participants were asked to sniff the paper string as long as they wish and then rated each scent regarding pleasantness (bad/good, negative/positive) (Cronbach's a= 0.92), arousal (very relaxing/very arousing), and familiarity (very unfamiliar/very familiar). All questions were measured with a seven-point semantic differential scale. Respondents found the mandarin scent as more pleasant (M= 5.46, SD= 1.44), significantly different from the scale midpoint of 4, t (43) = 6.75, $p < 0.001$, with an average arousing effect (M= 4.22, SD= 1.66), not significantly different from the scale midpoint of 4, t (43) = 0.903, p= 0.371. In term of familiarity, participants rated the mandarin scent as familiar (M= 4.9, SD= 1.72), significantly different from the midpoint of 4, t (43) = 3.5, $p < 0.001$. Thus, I selected mandarin scent for the main study as the more pleasant, the more familiar, and not so arousing, maintain the optimal stimulation level for the majority of participants.

5.3 Experiment 1.1

5.3.1 Participants

To test the hypotheses H1a and H1b, forty-nine undergraduate business students (26 men and 23 women) from a business school of a large Brazilian metropolitan area, ranging in age from 18 to 23 (M= 20.24, SD= 6.53) took part in a 2 (target: visual versus verbal) X 2 (valence: positive versus negative) within-subjects design in exchange of a course credit. In this experiment, I primed participants only with mandarin scent.

5.3.2 Materials

The experiment consisted of two phases: the acquisition phase and the object decision task (i.e., affective priming phase). To test the hypotheses H1a and H1b, I used only mandarin scent in the acquisition phase as a positive (e.g., pleasant) prime, while I manipulated the object format and the object valence in the subsequent object decision task as the target. In particular, I selected object stimuli in two modalities: visual (e.g., images) and verbal (e.g., words), and different valences: positive (e.g., flowers, positive words), and negative (e.g., insect, negative words).

Visual decision task. I selected two sets of 12 images, from a total of 24 images. Half of the images were positive (e.g., images of flowers) and half were negative (e.g., images of insects), following the idea of implicit association test (Greenwald, McGhee, & Schwartz, 1998). All the images were presented in the same jpeg format (500x333 pixels) and size (10x15 cm) on a computer screen.

Figure 1.1 – Example of positive and negative visual stimuli

Lexical decision task. I selected two sets of 12 Portuguese words, for a total number of 24 words. Half of the words were positive (e.g., love, pride, family) and half were negative (e.g., murder, abuse, divorce), following the method suggested for implicit association test (Nosek, Greenwald, & Banaji, 2007). Each word was between four and eight characters in length and was presented on a computer screen.

5.3.3 Procedure

The experiment was introduced as a study intended to verify the existence of a relationship between odors and elements of nature or common words. First, participants took part in the acquisition phase, in which they were given a paper string measuring 7 cm in length and 2 cm in height, in which two drops of the colorless fragrance of mandarin were put. According to the pretest, before taking part in the experiment, participants read and signed an informed consent screening for allergies (e.g., see Spangenberg et al., 1996). In the acquisition phase, participants were asked to smell the paper string for 15 seconds (the time of the task was measured and controlled by the experimenter), and then rated the scent regarding its valence (negative/positive) on a nine-point semantic differential scale. After the acquisition phase participants were asked to sit in front of a computer screen at a distance of about 50 cm (object decision task). It was explained, as part of the instructions, that with an interval of 20 seconds pictures and words would appear on the computer screen, so participants had to evaluate as quickly as possible whether pictures and words were “positive” or “negative”, by clicking the bottom “i” of the keyboard for “positive” responses and the bottom “e” for “negative” ones. In total, the object decision task phase consisted of 48 trials, 12 trials of positive pictures, 12 trials of negative pictures, 12 trials of positive words, and 12 trials of negative words. Each trial was presented once, and presentation order was randomized for each subject separately. Accordingly, the object decision task consisted of 24 affectively congruent trials (e.g., positive odor and positive picture/word) and 24 affectively incongruent trials (e.g., positive odor and negative picture/word). The target word appeared on the computer screen until the response was registered by the click on the keyboard, with a maximum presentation time of 5000 milliseconds. The inter-trial interval (ITI) was always 5 seconds. At the end of the object decision task, participants completed demographic measures.

5.3.4 Results

The total number of trials was 2352 (48 stimuli of pictures and words X 49 respondents), considering both affectively congruent and affectively incongruent trials of pictures and words. I analyzed only the correct trials (i.e., trials in which participants made the correct response), and I excluded from the analysis values over three standard deviations from the mean, for a total number of 2187 trials (% errors = 0.07). Reaction times (RTs) that were more than three standard deviations above and below the participant's mean determined the exclusion of the observation to neutralize the influence of outliers. Only one observation was excluded (0.02% of the data). Response time to the overall questionnaire was between 382 and 825 seconds (M= 543.97, SD= 104.24). According to results of the pretest, participants rated the scent as very positive (M= 7.85, SD= 1.39), significantly different from the scale midpoint of 5, $t(47) = 14.29$, $p < 0.001$. Table 1.1 shows participants' means of reaction times and the percentage of errors. The analysis of RTs shows that participants responded faster to pictures (M= 1093.59, SD= 67.83) and words (M= 900.76, SD= 213.4) in the affectively congruent condition than to pictures (M= 1382, SD= 105) and words (M= 1047.89, SD= 416.4) in the affectively incongruent condition. These differences were statistically significant for both, pictures $t(47) = 2.148$, $p < 0.05$, and words $t(47) = -2.062$, $p < 0.05$.The results of this experiment show that participants responded faster when prime (e.g., pleasant scent) and targets (e.g., pictures and words) were affectively congruent (e.g., the scent and the picture/word were both positive) than affectively incongruent (e.g., the scent was positive and the picture/word negative), that is, there was an affective priming effect (H1a: *Positively-valenced odors improve (e.g., speeds up) processing of affectively-congruent stimuli in other modalities, such as visual or verbal*). Moreover, the results also suggest that participants responded faster to words (M= 900.76, SD= 213.4) than pictures (M= 1093.59, SD= 67.83) in the affectively congruent pairs, and this difference was statistically significant, $t(47) = -4.113$, $p < 0.001$. Although participants responded faster to words (M= 1047.89, SD= 416.4) than pictures (M= 1382, SD= 105) also in the affectively incongruent pairs, this difference was not statistically significant, $t(47) = -0.031$, $p = 0.975$. Counterintuitively, this result suggests that an affective odor priming is more likely to occur when the target is a verbal (e.g., more abstract) stimulus rather than visual (e.g., more concrete) stimulus *(H1b - positively-valenced odors improve processing of affectively-congruent verbal stimuli more than affectively-congruent visual stimuli).* A possible explanation of these findings is that emotional information (e.g., the scent as a prime) may have a stronger effect on the mental representation of more abstract (e.g., lack vivid attributes, such as words) than concrete (e.g., more vivid, such as pictures) stimuli (Vigliocco, Meteyard, Andrews, & Kousta, 2009), facilitating their cognitive processing.

Table 1.1 Results of Experiment 1.1 - Mean, Standard Deviation (in parenthesis), and Percentage of Trial Errors

	Reaction Times (Milliseconds)	Percentage of Trial Errors
Affectively Congruent – Scent - Picture Pairs	1093.59 (67.83)	1,1054%
Affectively Incongruent – Scent - Picture Pairs	1382.23 (105)	3.9116%
Affectively Congruent – Scent - Word Pairs	900.76 (213.4)	1.1054%
Affectively Incongruent – Scent - Word Pairs	1047.89 (416.4)	0.8929%

5.4 Experiment 1.2

5.4.1 Participants

To test the hypotheses H1a, H1b, and H1c, one hundred and seventy-one undergraduate and graduate business students (68 men and 103 women) from a business school of a large Brazilian metropolitan area, ranging in age from 17 to 35 (M= 24.87, SD= 6.368) took part in a 3 (prime: olfactory versus visual versus verbal) X 2(target modality: visual versus verbal) X 2(stimulus valence: positive versus negative) mixed design in exchange of a course credit.

5.4.2 Materials

As in experiment 1.1, experiment 1.2 consisted of two phases: the acquisition phase and the object decision task (i.e., affective priming phase). To confirm the hypotheses H1a and H1b, and to find support to H1c, I manipulated the prime as the between-subjects factor, and the target as the within-subjects factor, for a total number of twelve experimental conditions: positive odor priming- positive visual target; positive odor priming- positive verbal target; positive visual priming- positive visual target; positive visual priming- positive verbal target; positive verbal priming- positive verbal target; positive verbal priming- positive visual target for the affective congruent conditions (e.g., both the prime and the target were positive); positive odor priming- negative visual target; positive odor priming- negative verbal target; positive visual priming- negative visual target; positive visual priming- negative verbal target; positive verbal priming- negative verbal target; positive verbal priming- negative visual target, for the affective incongruent conditions (e.g., the prime was positive, and the target was negative). I decided to focus, here, only on positive priming (e.g., pleasant stimuli as prime) since it is well-established in the literature that negative stimuli may act as distractors and be responsible for inhibition and selective attention effects during a memory task (Tipper, 1985).

For this reason, as the positive prime stimulus in the acquisition phase, I used mandarin scent for odor prime, a flower image for visual prime, and a positive word for verbal prime, while I manipulated the object format and the object valence in the subsequent object decision task as the target. In particular, I selected object stimuli in two different modalities, which are visual (e.g., images) and verbal (e.g., words), and different valence, which is positive (e.g., flowers, positive words), and negative (e.g., insect, negative words).

Visual decision task. I selected two sets of 12 images, for a total number of 24 images. Half of the images were positive (e.g., images of flowers) and half were negative (e.g., images of insects), following the idea of implicit association test (Greenwald et al., 1998). All the images were presented in the same jpeg format (500x333 pixels) and size (10x15 cm) on a computer screen.

Figure 1.2 – Example of positive and negative visual stimuli

Lexical decision task. I selected two sets of 12 Portuguese words, for a total number of 24 words. Half of the words were positive (e.g., love, pride, family) and half were negative (e.g., murder, abuse, divorce), following the method suggested for implicit association test (Nosek, Greenwald, & Banaji, 2007). Each word was between four and eight characters in length and was presented on a computer screen.

5.4.3 Procedure

The experiment was introduced as a study intended to verify the existence of a relationship between odors (i.e., odor condition), pictures (i.e., visual condition), or words (i.e., verbal condition) and elements of nature or common words. First, participants took part in the acquisition phase, in which they were primed with a pleasant odor (e.g., mandarin scent), with a flower picture (e.g., pleasant image), or with a positive word (e.g., positive verbal stimulus), alternatively. In the odor priming condition, participants were given a paper string measuring 7 cm in length and 2 cm in height in which two drops of the colorless fragrance of mandarin were put. According to the pretest, before taking part in the experiment, participants read and signed an informed consent screening for allergies (e.g., see Spangenberg et al., 1996). In the visual priming condition, participants were primed with a flower picture presented in jpeg format (500x333 pixels) and a 10x15 cm size, on a computer screen. In the verbal priming condition, participants were primed with a positive word with a length between four and eight characters, presented on a computer screen.

In the acquisition phase, participants were asked to smell the paper string, look at the flower picture or at the positive word for 15 seconds (the time of the task was measured and controlled by the experimenter), and then rated the scent, the picture or the word regarding their valence (negative/positive) on a nine-point semantic differential scale. After the acquisition phase participants were asked to sit in front of a computer screen at a distance of about 50 cm (object decision task). It was explained, as part of the instructions, that with an interval of 20 seconds pictures and words would appear on the computer screen, which they had to evaluate as quickly as possible whether pictures and words were "positive" or "negative", by clicking the bottom "i" of the keyboard for "positive" responses and the bottom "e" for "negative" ones. In total, the object decision task phase consisted of 48 trials, 12 trials of positive pictures, 12 trials of negative pictures, 12 trials of positive words, and 12 trials of negative words. Each trial was presented once, and presentation order was randomized for each subject separately. Accordingly, the object decision task consisted of 24 affectively congruent trials (e.g., positive odor and positive picture/word) and 24 affectively incongruent trials (e.g., positive odor and negative picture/word). The target word appeared on the computer screen until the response was registered by the click on the keyboard, with a maximum presentation time of 5000 milliseconds. The inter-trial interval (ITI) was always 5 seconds. At the end of the object decision task, participants completed demographic measures.

5.4.4 Results

The total number of trials was of 8208 (48 stimuli of pictures and words X 171 respondents), considering both affectively congruent and affectively incongruent trials of pictures and words. I analyzed only the correct trials (i.e., trials in which participants made the correct response), for a total number of 8064 trials (% errors = 0.018). Reaction times (RTs) that were more than three standard deviations above and below the participant's mean determined the exclusion of the observation to neutralize the influence of outliers. Only five observations were excluded (0.03% of the data). Response time to the overall questionnaire was between 209 and 927 seconds ($M= 404.73$, $SD= 161.77$). According to results of the pretest, participants rated the scent as very positive ($M= 7.92$, $SD= 1.22$), significantly different from the scale midpoint of 5, $t (162) = 16.72$, $p < 0.001$. Participants also rated the flower picture and the word as very positive ($MP= 8.31$, $SDP= 1.58$; $MW= 8.08$, $SDW= 2.27$), both significantly different from the scale midpoint of 5, $t (162) = 16.3$, $p < 0.001$, and $t (162) = 10.58$, $p < 0.001$. Table 1.2 shows participants' means of reaction times and the percentage of errors. The analysis of RTs shows that participants responded faster to pictures ($M1= 1367.20$, $SD1= 636.70$; $M2= 2949.50$, $SD2= 1778.16$) and words ($M1= 1042.66$, $SD1= 375.71$; $M2= 2705.42$, $SD2= 1892.44$) in the affectively congruent condition when primed with a pleasant scent more than with stimuli in other modalities (i.e., visual or verbal), than to pictures ($M1= 2056.12$, $SD1= 1219.38$; $M2= 4705.82$, $SD2= 1998.66$) and words ($M1= 2019.00$, $SD1= 334.46$; $M2= 4218.85$, $SD2= 2136.35$) in the affectively incongruent condition, respectively. Response time scores to words when the priming was in the same modality (e.g., word-word pairs) were faster in the incongruent condition ($M3= 3137.44$, $SD3= 2041.49$) than in the congruent condition ($M3= 3515.91$, $SD3= 1758.91$). This result partially confirms the generalized belief that words are more difficult to be processed (Paivio et al., 1968) than concrete stimuli. Despite this unexpected result, there was a significant main effect of the stimulus valence (i.e., the affective congruence between the prime and the target) on response time scores overall $F (1, 162) = 32.928$, $p < 0.001$, $\eta 2 = 0.169$, meaning that response time scores are faster in the affectively congruent conditions (i.e., both the prime and the target were positive) than in the affectively incongruent conditions (i.e., the prime was positive, and the target was negative), regardless of the effects of other variables. Moreover, the interaction effect between the stimulus valence and whether the prime was in the olfactory, visual or verbal modality was also significant $F (1, 162) = 18.922$, $p < 0.001$, $\eta 2 = 0.189$, meaning that the affective priming effect is stronger in the odor priming condition than in the visual and verbal priming condition. These results find support for an affective odor priming effect, as suggested by the hypothesis H1a.

The analysis of RTs also shows that participants responded faster to positive words ($M1= 1042.66$, $SD1= 375.71$) than to flower pictures ($M1= 1367.20$, $SD1= 636.70$) in the odor priming condition. The main effect of the target modality (e.g., olfactory versus visual versus verbal) on response time scores was also significant, $F (1, 162) = 5.588$, $p = 0.01$, $\eta 2 = 0.03$, meaning that response time scores are faster when participants are primed with a stimulus in olfactory versus visual or verbal modality, regardless of the other effects. The interaction effect between the target modality (e.g., visual versus verbal) and the stimulus valence (e.g., positive versus negative) is not statistically significant $F (1, 162) = 0.263$, $p = 0.60$, $\eta 2 = 0.02$.

However, the analysis of the Tukey post-hoc test shows that there is a statistically significant difference between all the three priming conditions (i.e., olfactory versus visual versus verbal) ($p < 0.001$), except for the verbal-visual pairs ($p = .94$). These results find support for an affective odor priming effect that is stronger for the verbal target more than the visual target, as suggested by the hypothesis H1b. These results also confirm the results of experiment 1.1, which propose that an affective odor priming is more likely to occur when the target is a verbal (e.g., more abstract) stimulus rather than visual (e.g., more concrete) stimulus (H1b). I explain this effect as a consequence of the emotional nature of olfactory information (e.g., the scent as a prime), which may have a stronger effect on the mental representation of more abstract (e.g., lack vivid attributes, such as words) than concrete (e.g., more vivid, such as pictures) stimuli (Kousta, Vigliocco, Vinson, Andrews, & Del Campo, 2011; Vigliocco et al., 2009), facilitating their cognitive processing.

Finally, the analysis of RTs highlights that participants responded faster to positive words (M1= 1042.66, SD1= 375.71) than to flower pictures (M1= 1367.20, SD1= 636.70) in the odor priming condition than to positive words (M2= 2705.42, SD2= 1892.44; M3= 3515.91, SD3= 1758.91) and flower pictures (M2= 2949.50, SD2= 1778.16; M3= 3353.76, SD3= 1695.10) in the visual (i.e., means and standard deviations M2 and SD2) and verbal (i.e., means and standard deviations M3 and SD3) priming conditions. The main effect of the target modality (e.g., olfactory versus visual versus verbal) on response time scores was also significant, $F (1, 162) = 5.588$, $p = 0.01$, $\eta2 = 0.03$, meaning that response time scores are faster when participants are primed with a stimulus in olfactory versus visual or verbal modality, regarding the other effects. The three-way interaction between the stimulus valence (e.g., positive versus negative), the target modality (e.g., visual versus verbal), and whether the prime was in olfactory, visual, and verbal modality was also significant $F (1, 162) = 3.238$, $p = 0.04$, $\eta2 = 0.04$, meaning that the combined effect of the valence of the stimulus and the target modality was the same for participants primed with the pleasant odor, with the flower picture, and with the positive word. I also found a significant main effect of the between-subjects factor, the prime modality (i.e., olfactory versus visual versus verbal), $F (1, 162) = 105.02$, $p < 0.001$, $\eta2 = 0.56$. From these findings, it is possible to conclude that odors are more likely to improve affective processing of stimuli in other modalities (e.g., pictures and words) than visual or verbal stimuli, as suggested by the hypothesis H1c.

Table 1.2 Results of Experiment 1.2 - Mean, Standard Deviation (in parenthesis), and Percentage of Trial Errors

	Reaction Times (Milliseconds)	Percentage of Trial Errors
Affectively Congruent – Scent - Picture Pairs	1367.20 (636.70)	2.2%
Affectively Incongruent – Scent - Picture Pairs	2056.12 (1219.38)	7.8%
Affectively Congruent – Scent - Word Pairs	1042.66 (375.71)	3.1%
Affectively Incongruent – Scent - Word Pairs	2019.00 (334.46)	1.8%
Affectively Congruent – Picture - Picture Pairs	2949.50 (1778.16)	3.9%
Affectively Incongruent – Picture - Picture Pairs	4705.82 (1998.66)	23%
Affectively Congruent – Picture - Word Pairs	2705.42 (1892.44)	2.04%
Affectively Incongruent – Picture - Word Pairs	4218.85 (2136.35)	1.78%
Affectively Congruent – Word - Word Pairs	3515.91 (1758.91)	4.7%
Affectively Incongruent – Word - Word Pairs	3137.44 (2041.49)	1.9%
Affectively Congruent – Word - Picture Pairs	3638.95 (1777.81)	4.9%
Affectively Incongruent – Word - Picture Pairs	3353.76 (1695.10)	27%

5.5 Discussion

Experiment 1.1 and 1.2 were designed to address the idea that the incidental exposure to odors may lead to strong affective evaluations and affect consumer behaviors and choices. In particular, the results of the experiments 1.1 and 1.2 show that odors may act as affective prime stimuli since they are primarily perceived through the dimension of valence (i.e., positive or negative). According to the notion that odors have an important biological and social adaptive function, pleasantly perceived odors trigger approach behaviors and serve to identify opportunities and beneficial aspects of the human environment, while unpleasantly perceived odors serve to identify threats and dangers and trigger avoidance behaviors (Klauer & Musch, 2003). However, these findings go beyond the intention of confirming the positive effects of pleasant odors on consumer responses and clarifying the underlying mechanism at the basis of odor processing and interpretation. Results show that positively perceived odors (i.e., pleasant odors) facilitate processing of positively valenced stimuli in other sensory modalities, such as visual (i.e., pictures) and verbal (i.e., words). Specifically, the perceived pleasantness of the odor activates an associative process through which the related concept of pleasantness becomes more accessible and is used as a source of information for further processing. In other words, positively perceived odors facilitate (e.g., speeds up) processing of further information in other modalities, such as images and words, improving consumer affective evaluations toward visual and verbal targets. Moreover, these results also suggest that the affective odor priming is more likely to occur when the target is a verbal stimulus rather than visual stimulus. This result suggests that odors are more powerful as affective primes for those stimuli that are more abstract (e.g., words) than those that are more concrete (e.g., pictures). The possible explanation for these findings is that as visual stimuli have multiple and more vivid attributes for coding (e.g., shape, size, color), the effect of odor priming for those stimuli is positive but not as strong as for more abstract stimuli, such as words (Vigliocco et al., 2009). Accordingly, as odors are more immediately and emotionally processed than visual and verbal stimuli (Willander & Larsson, 2006), they are also more effective in facilitating processing of information that is more abstract, thus difficult to be processed (Paivio, Rogers, & Smythe, 1968).

Finally, the experiments also show that odor priming is more effective than visual or verbal modalities to trigger positive affective evaluations of target stimuli in other modalities (e.g., visual and verbal). Participants primed with a pleasant odor processed pleasant pictures and pleasant words faster than participants primed with pleasant visual or verbal stimuli. These results contradict the traditional belief that odors lack a clear mental representation (Zucco, 2003) and, because of this, dissipate individual attention to other stimuli (Smeets & Dijksterhuis, 2014). According to the results of a more recent research conducted by Lwin and colleagues (2016), these studies show that, under the certain condition of perceived pleasantness, odors may improve visual and verbal processing of unrelated stimuli (Lwin et al., 2016), facilitating their cognitive elaboration, compared with visual-only and verbal-only affective priming.

Study 1 confirmed that affective odor priming might occur when the olfactory stimulus is perceived as particularly pleasant. The next study tests whether odors may also act as semantic primes, and also compare the different effect of pleasant and unpleasant odors to induce associative-based product choices.

6. Study 2

6.1 Overview of the Study

Study 2 consists of four experiments. Experiments 2.1 and 2.2 were designed to test whether the incidental exposure to a pleasant odor induces semantic associations with unrelated stimuli in other modalities (e.g., pictures) which influence product choices. Oppositely, experiments 2.3 and 2.4 test the effect of unpleasant odors on the processing of unrelated stimuli in visual modality and explore how the perception of the unpleasantness of the odor affect subsequent product choices.

6.2. Olfactory Stimuli Pretest

As the aim of experiments 2.1 and 2.2 is to test whether the exposure to a pleasant odor induces congruent affective evaluations of semantically related products, the olfactory stimuli pretest was conducted to select the pleasant scent used in the main study (experiments 2.1 and 2.2). The choice of the food domain for this study was intended to follow previous attempts to demonstrate a semantic priming effect (Coelho, Polivy, Herman, & Pliner, 2009; Fedoroff, Polivy, & Herman, 2003; Gaillet et al., 2013). In particular, the pretest had the aim of checking the affective, edibility and sweetness dimensions of scent (e.g., positive versus negative; edible versus not edible; sweet versus sour). Eighteen participants (12 men and 4 women), ranging in age from 17 to 22 (M= 18.27, SD= 1.40 years old), were asked to sniff 14 different scents, representing all the main olfactory families (Spangenberg et al., 1996). All selected scents were common odors, which can be easily found in nature, divided into the following category: two woody, two floral, two spicy, two citrus, two water, and four food scents were tested. Scents from non-food categories were included in the pretest to ensure that food scents were perceived as more edible than non-food scents. Each scent was put on a paper string measuring 7 cm in length and 2 cm in height, and identified by an alphanumeric code. Scents and paper strings were developed in cooperation with a commercial aroma supplier from the local market in Brazil. On each paper string, two drops of each scent were put, to control for scent intensity. All scents were colorless to neutralize the effect of color on scent evaluation (Zellner & Kautz, 1990). Before taking part in the pretest, participants read and signed an informed consent screening for allergies (e.g., see Spangenberg et al., 1996). Following Krishna and colleagues (2010) participants were asked to smell coffee beans contained in an opaque plastic box in front of them before starting the pretest and also between one test and another, to neutralize the effect of a previous scent on the next (Secundo & Sobel, 2006). Participants were asked to sniff the paper string as long as they wish and then rated each scent regarding liking (negative/positive), edibility (not edible/very edible), and sweetness (very sour/very sweet). All questions were measured with a nine-point semantic differential scale. Respondents evaluated the grape scent as positive ($M= 6.38$, $SD= 1.78$), significantly different from the scale midpoint of 5, $t(17) = 3.298$, $p = 0.004$; edible ($M= 6.00$, $SD= 1.49$), significantly different from the scale midpoint of 5, $t(17) = 2.838$, $p = 0.01$; and sweet ($M= 6.33$, $SD= 1.87$), significantly different from the scale midpoint of 5, $t(17) = 3.01$, $p = 0.008$. Thus, I selected the grape scent for the main study as the more positive, the more edible, and the sweeter to arouse the concept of sweetness in the participants.

6.3 Experiment 2.1

6.3.1 Participants

To test the hypotheses H2a, twenty-eight undergraduate and graduate business students (19 men and 9 women) from a business school of a large Brazilian metropolitan area, ranging in age from 17 to 36 ($M= 20.46$, $SD= 5.42$) took part in a simple within-subjects design in exchange of a course credit.

I primed all participants with the fruity scent of grape and exposed to the same two target manipulations: semantically congruent products versus semantically incongruent products.

6.3.2 Materials

The experiment consisted of two phases: the acquisition phase and the object decision task (i.e., semantic priming phase). To test the hypothesis H2a, I used only grape scent in the acquisition phase as a sweet prime (e.g., arousing the concept of sweetness), while I manipulated the object meaning as the target (e.g., sweet product versus sour product) in the subsequent product choice task. In particular, I selected object stimuli with different levels of semantic congruence with grape scent. In the semantically congruent condition, I selected 8 dishes that were semantically congruent with grape, while in the semantically incongruent condition I selected 8 dishes that were semantically incongruent with grape but were related to sour food in general (e.g., parmesan cheese, tomato, chicken salad).

Menu Choice Task. I selected two sets of eight images of dishes for a total number of 16 dishes. Half of the images were showing fruity dishes (e.g., fruit salad, fruit cake, yogurt with fruits) and half were showing sour dishes (e.g., parmesan cheese, tomato, chicken salad), following the idea of implicit association test (Greenwald et al., 1998). All the dishes were presented in the same jpeg format (500x333 pixels) and size (10x15 cm) on a computer screen.

Figure 2.1 – Example of semantically congruent and semantically incongruent products

6.3.3 Procedure

The experiment was introduced as a study conducted by a restaurant that wanted to change its menu and was interested in the opinion of new potential clients. First, participants took part in the acquisition phase, in which they were given a paper string measuring 7 cm in length and 2 cm in height in which two drops of the colorless fragrance of grape were put. According to the pretest, before taking part in the experiment, participants read and signed an informed consent screening for allergies (e.g., see Spangenberg et al., 1996). In the acquisition phase, participants were asked to smell the paper string for 15 seconds (the time of the task was measured and controlled by the experimenter), and then rated the scent regarding its valence (negative/positive), edibility (not edible/very edible), and sweetness (very sour/very sweet). All three items were measured with a nine-point semantic differential scale. After the acquisition phase, participants were asked to sit in front of a computer screen at a distance of about 50 cm to complete the brand choice and the free recall tasks. It was explained, as part of the instructions, that with an interval of 20 seconds a set of dishes selected from a restaurant menu would appear on the computer screen. Participants were also instructed to imagine being at this restaurant and choosing the dishes they would like to try as quickly as possible. The experiment was conducted immediately after breakfast/lunch, during a lecture period of about 100 minutes, to control the effect of hunger on the menu choice. Participants had to evaluate as quickly as possible whether they would choose the dish, by clicking the bottom "e" of the keyboard for the "not choose" responses and the bottom "i" for the "choose" responses. In total, the menu choice task consisted of 16 trials, 8 trials of congruent pairs (e.g., sweet prime-sweet target), and 8 trials of incongruent pairs (e.g., sweet prime-sour target). Each trial was presented once, and presentation order was randomized for each subject separately. Accordingly, the menu choice task consisted of 8 semantically congruent trials (e.g., grape odor and fruity dishes), and 8 semantically incongruent trials (e.g., grape odor and sour dishes). The target dishes appeared on the computer screen until the response was registered by the click on the keyboard, with a maximum presentation time of 5000 milliseconds for each trial. The inter-trial interval (ITI) was always 15 seconds. At the end of the experiment, participants completed demographic measures.

6.3.4 Results

The total number of trials was of 464 (16 stimuli of pictures X 29 respondents), considering both semantically congruent and semantically incongruent trials of scent-dishes pairs. I analyzed only the correct trials (i.e., trials in which participants made the correct choice), and I excluded from the analysis values over three standard deviations from the mean, for a total number of 305 trials (% errors = 0.34). Reaction times (RTs) that were more than three standard deviations above and below the participant's mean determined the exclusion of the observation to neutralize the influence of outliers. I excluded one observation (0.0357% of the data). Response time to the overall questionnaire was between 108 and 227 seconds (M= 143.33, SD= 32.22). According to the results of the pretest, participants rated the scent as positive (M= 5.92, SD= 1.92), significantly different from the scale midpoint of 5, $t(26) = 2.506$, $p = 0.019$; edible (M= 5.59, SD= 1.11), significantly different from the scale midpoint of 5, $t(26) = 2.753$, $p = 0.01$; and sweet (M= 6.11, SD= 1.90), significantly different from the scale midpoint of 5, $t(26) = 3.026$, $p = 0.006$. Table 2.1 shows participants' means of reaction times and the percentage of errors. The analysis of RTs shows that participants responded faster to fruity dishes (M= 1465.74, SD= 448.86) than to sour dishes (M= 1779.55, SD= 634.30). This difference was statistically significant, $t(26) = -2.382$, $p = 0.025$. The results of this experiment show that participants responded faster when prime (e.g., scent) and targets (e.g., dishes on a menu) were semantically congruent (e.g., the scent and the dish were both sweets) than semantically incongruent (e.g., the scent was sweet, and the dish was sour), that is, there was a semantically priming effect during the menu choice task (H2a).

These findings suggest that the incidental exposure to an odor activates the related semantic knowledge and facilitate the cognitive processing of stimuli in other modalities. These findings give support to a semantic odor priming effect in such that odors activate semantic knowledge which, in turn, influences consumer choice of semantically congruent products (H2a).

Table 2.1 - Results of Experiment 2.1 - Menu Choice Task - Mean, Standard Deviation (in parenthesis), Percentage of Trial Errors, and Standard Error of the mean

	Reaction Times (Milliseconds)	% Trial Errors	Standard Error
Semantically Congruent – Scent – Picture Pairs	1465.74 (448.86)	0.38%	86.38
Semantically Incongruent – Scent – Picture Pairs	1779.55 (634.30)	0.20%	122.07

6.4 Experiment 2.2

6.4.1 Participants

To confirm H2a and to test H2b seventy undergraduate and graduate business students (42 men and 28 women) from a business school of a large Brazilian metropolitan area, ranging in age from 17 to 33 (M= 21.78, SD= 5.00) took part in a 2 (prime: olfactory versus visual) X 2 (target congruence: congruent versus incongruent) mixed design in exchange of a course credit.

6.4.2 Materials

As in experiment 2.1, experiment 2.2 consisted of two phases: the acquisition phase and the object decision task (i.e., semantic priming phase). To confirm the hypothesis H2a, and to find support to H2b, I manipulated the prime as the between-subjects factor, and the target as the within-subjects factor, for a total number of four experimental conditions: sweet odor prime - sweet visual target; sweet visual prime - sweet visual target, for the semantically congruent conditions (e.g., both the prime and the target were sweets); sweet odor prime - sour visual target; sweet visual prime - sour visual target, for the semantically incongruent conditions (e.g., the prime was sweet, and the target was sour). In particular, I used grape scent in the olfactory priming condition and a picture of grape berries in the visual priming condition during the acquisition phase as a sweet prime (e.g., arousing the concept of sweetness), while I manipulated the object meaning as a target (e.g., sweet dishes versus sour dishes) in the subsequent menu decision task.

In particular, I selected object stimuli with different levels of semantic congruence with grape scent and with the picture of grape. In the semantically congruent condition, I selected 8 dishes that were semantically congruent with grape scent and grape picture, while in the semantically incongruent condition I selected 8 dishes that were semantically incongruent with grape but were related to sour food in general (e.g., parmesan cheese, tomato, chicken salad).

Menu Choice Task. I selected two sets of 8 images of dishes for a total number of 16 dishes. Half of the images were showing fruity dishes (e.g., fruit salad, fruit cake, yogurt with fruits) and half were showing sour dishes (e.g., parmesan cheese, tomato, chicken salad), following the idea of implicit association test (Greenwald et al., 1998). All the dishes were presented in the same jpeg format (500x333 pixels) and size (10x15 cm) on a computer screen.

Figure 2.2 – Example of semantically congruent and semantically incongruent products

6.4.3 Procedure

The experiment was introduced as a study conducted by a restaurant that wanted to change its menu and was interested in the opinion of new potential clients. First, participants took part in the acquisition phase, in which they were primed with a sweet odor (e.g., grape scent), or with a picture of grape berries (e.g., sweet image), alternatively. In the odor priming condition, participants were given a paper string measuring 7 cm in length and 2 cm in height in which two drops of the colorless fragrance of grape were put. According to the experiment 1, before taking part in the experiment, participants read and signed an informed consent screening for allergies (e.g., see Spangenberg et al., 1996). In the visual priming condition, participants were primed with a picture of grape berries presented in jpeg format (500x333 pixels) and a 10x15 cm size, on a computer screen. In the acquisition phase, participants were asked to smell the paper string, or look at grape berries picture for 15 seconds (the time of the task was measured and controlled by the experimenter), and then rated the scent or the picture regarding its valence (negative/positive), edibility (not edible/very edible), and sweetness (very sour/very sweet). All three items were measured with a nine-point semantic differential scale. After the acquisition phase, participants were asked to sit in front of a computer screen at a distance of about 50 cm to complete the brand choice and the free recall tasks. It was explained, as part of the instructions, that with an interval of 20 seconds a set of brand logos would appear on the computer screen. Participants were also instructed to imagine being at this restaurant and choosing the dishes they would like to try as quickly as possible. The experiment was conducted immediately after breakfast/lunch, during a lecture period of about 100 minutes, to control the effect of hunger on the menu choice. Participants had to evaluate as quickly as possible whether they would choose the dish, by clicking the bottom "e" of the keyboard for the "not choose" responses and the bottom "i" for the "choose" responses. In total, the menu choice task consisted of 16 trials, 8 trials of congruent pairs (e.g., sweet prime-sweet target), and 8 trials of incongruent pairs (e.g., sweet prime-sour target). Each trial was presented once, and presentation order was randomized for each subject separately. Accordingly, the menu choice task consisted of 8 semantically congruent trials (e.g., grape odor and fruity dishes), and 8 semantically incongruent trials (e.g., grape odor and sour dishes). The target dishes appeared on the computer screen until the response was registered by the click on the keyboard, with a maximum presentation time of 5000 milliseconds for each trial. The inter-trial interval (ITI) was always 15 seconds. At the end of the experiment, participants completed demographic measures.

6.4.4 Results

The total number of trials was of 1120 (16 stimuli of pictures X 70 respondents), considering both semantically congruent and semantically incongruent trials of menu dishes. Reaction times (RTs) that were more than three standard deviations above and below the participant's mean determined the exclusion of the observation to neutralize the influence of outliers. I excluded four observations (0.06% of the data). Only the correct trials (i.e., trials in which participants made the correct choice) were included in the analysis, for a total number of 1056 trials (% errors = 0.23). Response time to the overall questionnaire was between 106 and 398 seconds (M= 172.04, SD= 67.02). According to the results of experiment 2.1, in the odor priming condition participants rated the scent as positive (M= 5.73, SD= 2.06), significantly different from the scale midpoint of 5, $t\ (37) = 2.202$, $p = 0.034$; edible (M= 5.57, SD= 1.73), significantly different from the scale midpoint of 5, $t\ (37) = 2.058$, $p = 0.047$; and sweet (M= 6.00, SD= 2.09), significantly different from the scale midpoint of 5, $t\ (37) = 2.946$, $p = 0.006$. In the visual priming condition, participants rated the picture of the grape berries as very positive (M= 7.89, SD= 2.04), significantly different from the scale midpoint of 5, $t\ (27) = 7.49$, $p < 0.001$; very edible (M= 7.71, SD= 2.27), significantly different from the scale midpoint of 5, $t\ (27) = 6.31$, $p < 0.001$; and very sweet (M= 7.35, SD= 1.94) significantly different from the scale midpoint of 5, $t\ (27) = 6.404$, $p < 0.001$. Table 2.2 shows participants' means of reaction times and the percentage of errors. The analysis of RTs shows that participants selected faster the fruity dishes (M1= 1286.47, SD1= 271.04; M2= 1943.46; SD2 = 690.88) than sour dishes (M1= 1937.18, SD1= 661.31; M2= 2291.07, SD2 = 586.55), regardless of the prime modality (e.g., odor versus picture). These results confirm that there was a significant main effect of the semantic congruence between the prime and the target on response time scores overall $F\ (1, 64) = 47.756$, $p < 0.001$, $\eta 2 = 0.422$, meaning that response time scores are faster in the semantically congruent conditions (i.e., both the prime and the target were sweets) than in the semantically incongruent conditions (i.e., the prime was sweet, and the target was sour), regardless of the effects of other variables. Participants also selected faster the fruity dishes when primed with the sweet scent (M1= 1286.47, SD1= 271.04) than with the grape berries picture (M1=1943.46, SD1= 690.88). Thus, the interaction effect between the target congruence with the prime and whether the prime was in the olfactory or visual modality was also significant $F (1, 64) = 4.310$, $p = 0.042$, $\eta2 = 0.063$, meaning that the semantic priming effect is stronger in the odor priming condition than in the visual priming condition. These results find support for a stronger semantic odor priming effect than semantic visual priming effect during the menu (e.g., product) choice task, as suggested by the hypothesis H2b. I also found a significant main effect of the between-subjects factor, the prime modality (i.e., olfactory versus visual), $F (1, 64) = 17.525$, $p < 0.001$, $\eta2 = 0.038$. Thus, there was a significant main effect of the prime modality (e.g., olfactory versus visual) on product choice (H2b).

These findings confirm results of experiment 2.1 and show that the incidental exposure to an odor activates the related semantic knowledge and facilitates the cognitive processing of stimuli in other modalities. These findings give support to a semantic odor priming effect in such that odors activate semantic knowledge which, in turn, influences consumer choice of semantically congruent products (H2a).

Moreover, findings also suggest that the semantic priming effect is stronger in the semantic odor priming condition than in the semantic visual priming condition, such that odors are more likely than visual stimuli to activate semantic knowledge which, in turn, influences consumer choice of semantically congruent products (H2b).

Table 2.2 - Results of Experiment 2.2 – Menu Choice Task - Mean, Standard Deviation (in parenthesis), Percentage of Trial Errors, and Standard Error of the mean

	Reaction Times (Milliseconds)	% Trial Errors	Standard Error
Semantically Congruent – Scent - Picture Pairs	1286.47 (271.04)	0.37%	43.96
Semantically Incongruent – Scent - Picture Pairs	1937.18 (661.31)	0.22%	107.27
Semantically Congruent – Picture - Picture Pairs	1943.46 (690.88)	0.14%	130.56
Semantically Incongruent – Picture - Picture Pairs	2291.07 (586.55)	0.16%	110.84

6.5 Discussion

Experiment 2.1 and 2.2 provided evidence that the incidental exposure to odors may lead not only to affective evaluations but also to the mental activation of related concepts which, in turn, drive consumer behavior and product choices. First, the experiments show that odors are perceived primarily through their affective dimension (i.e., valence), but also through other dimensions, such as those of sweetness and edibility. In particular, edibility has been considered one of the most primitive and important dimensions through which odors are elaborated by humans (Mandel & Johnson, 2002), largely applied to empiric researches on the topic (Kermen et al., 2011). The aim of the experiments, here, was to demonstrate that specific properties of odors, such as sweetness and edibility, may facilitate the activation of a conceptual link with the related concepts of sweetness and edibility, improving consumer choices of semantically congruent products (e.g., the apple salad is not grape-based dish but is related to sweetness and fruit), but that share with that odor semantic features (e.g., sweetness and edibility). In other words, the experiments were designed to verify the existence of a semantic priming effect, that is a semantic, mental connection between odors and mental processing of semantically congruent stimuli. In experiments 2.1 and 2.2 I used a sweet odor of grape, which is a fruity, sweet, and edible odor. The manipulation checks confirmed that the odor of grape was perceived as highly pleasant, sweet and edible. The results demonstrated that those properties of the odor were transferred to the subsequent menu choice task, in which participants chose more often and more rapidly fruity dishes than sour dishes. In other words, participants chose more often and quickly those menu options which shared with the odor some semantic associations, such that, for example, the sweetness and the edibility. These findings demonstrate that the incidental exposure to an odor activates the related semantic knowledge and facilitate the cognitive processing of stimuli in other modalities (e.g., visual). These findings give support to a semantic odor priming effect in such that odors activate semantic knowledge which, in turn, influences consumer choice of semantically congruent products.

Moreover, these results show that participants selected faster the fruity dishes when primed with the sweet odor of grape than with the grape berries picture, despite participants have evaluated the grape berries picture as pleasant, sweet, and edible as much as they evaluated the grape odor. I speculate, here, that semantic odor priming is more likely to occur and more effective than semantic visual priming to positively affect consumer choice of semantically congruent products. These results highlight that odor elaboration may occur not only through the affective-based processing of odor information but also through an associative-based mechanism, according to which specific components of odors make the related concepts more accessible (e.g., sweetness), and those concepts are then used as a source of information for further decision making and product choices.

7. Experiment 2.3 and 2.4

7.1 Olfactory Stimuli Pretest

As the aim of experiment 2.3 and 2.4 is to test whether the exposure to an unpleasant odor induces congruent affective evaluations of semantically related products, the olfactory stimuli pretest was conducted to select the unpleasant scent used in the main study. The olfactory stimuli pretest was conducted to select the scent used in the main studies (experiments 2.3 and 2.4). The choice of the food domain for the main study was intended to follow previous attempts to demonstrate a semantic priming effect (Coelho et al., 2009; Fedoroff et al., 2003; Gaillet et al., 2013). In particular, the pretest had the aim of checking the affective, edibility and sweetness dimensions of scent (e.g., positive versus negative; edible versus not edible; sweet versus sour). Eighteen participants (12 men and 4 women), ranging in age from 17 to 22 (M= 18.27, SD= 1.40 years old), were asked to sniff fourteen different scents, representing all the main olfactory families (Spangenberg et al., 1996). All selected scents were common odors, which can be easily found in nature, divided into the following category: two woody, two floral, two spicy, two citrus, two water, and four food scents were tested. Scents from non-food categories were included in the pretest to ensure that food scents were perceived as more edible than non-food scents. Each scent was put on a paper string measuring 7 cm in length and 2 cm in height, and identified by an alphanumeric code. Scents and paper strings were developed in cooperation with a commercial aroma supplier from the local market in Brazil. On each paper string, two drops of each scent were put, to control for scent intensity. All scents were colorless, to neutralize the effect of color on scent evaluation (Zellner & Kautz, 1990). Before taking part in the pretest, participants read and signed an informed consent screening for allergies (e.g., see Spangenberg et al., 1996). Following Krishna and colleagues (2010) participants were asked to smell coffee beans contained in an opaque plastic box in front of them before starting the pretest and also between one test and another, to neutralize the effect of a previous scent on the next (Secundo & Sobel, 2006). Participants were asked to sniff the paper string as long as they wish and then rated each scent regarding liking (negative/positive), edibility (not edible/very edible), and sourness (very sour/very sweet). All questions were measured with a nine-point semantic differential scale. Respondents evaluated the tomato scent as negative (M= 3.22, SD= 2.39), significantly different from the scale midpoint of 5, $t(17) = -3.156$, $p = .006$; edible ($M = 5.88$, $SD = 1.74$), significantly different from the scale midpoint of 5, $t(17) = 2.161$, $p = .045$; and sour ($M = 3.27$, $SD = 3.04$), significantly different from the scale midpoint of 5, $t(17) = -2.4$, $p = .028$. Thus, I selected the tomato scent for the main study as the more negative (e.g., disliking), the more edible, and the sourer to arouse the concept of sourness in the participants.

7.2 Experiment 2.3

7.2.1 Participants

To test the hypotheses H2c, twenty-seven undergraduate and graduate business students (16 men and 11 women) from a business school of a large Brazilian metropolitan area, ranging in age from 19 to 31 ($M = 24.25$, $SD = 3.87$) took part in a simple within-subjects design in exchange of a course credit. I primed all participants with the sour scent of tomato and exposed to the same two target manipulations: semantically congruent products versus semantically incongruent products.

7.2.2 Materials

The experiment consisted of two phases: the acquisition phase and the object decision task (i.e., semantic priming phase). To test the hypothesis H2c, I used only tomato scent in the acquisition phase as a sour prime (e.g., arousing the concept of sourness), while I manipulated the object meaning as the target (e.g., sweet product versus sour product) in the subsequent product choice task. In particular, I selected object stimuli with different levels of semantic congruence with tomato scent. In the semantically congruent condition, I selected 8 dishes that were semantically congruent with tomato, while in the semantically incongruent condition I selected 8 dishes that were semantically incongruent with tomato, and were related to sweet food in general.

Menu Choice Task. I selected two sets of eight images of dishes for a total number of 16 dishes. Half of the images were showing fruity dishes (e.g., fruit salad, fruit cake, yogurt with fruits) and half were showing sour dishes (e.g., parmesan cheese, tomato, chicken salad), following the idea of implicit association test (Greenwald et al., 1998). All the dishes were presented in the same jpeg format (500x333 pixels) and size (10x15 cm) on a computer screen.

Figure 2.3 – Example of semantically congruent and semantically incongruent products

7.2.3 Procedure

The experiment was introduced as a study conducted by a restaurant that wanted to change its menu and was interested in the opinion of new potential clients. First, participants took part in the acquisition phase, in which they were given a paper string measuring 7 cm in length and 2 cm in height in which two drops of the colorless fragrance of tomato were put. According to the pretest, before taking part in the experiment, participants read and signed an informed consent screening for allergies (e.g., see Spangenberg et al., 1996). In the acquisition phase, participants were asked to smell the paper string for 15 seconds (the time of the task was measured and controlled by the experimenter), and then rated the scent regarding its valence (negative/positive), edibility (not edible/very edible), and sourness (very sour/very sweet). All three items were measured with a nine-point semantic differential scale. After the acquisition phase, participants were asked to sit in front of a computer screen at a distance of about 50 cm to complete the menu choice task. It was explained, as part of the instructions, that with an interval of 20 seconds a set of dishes selected from a restaurant menu would appear on the computer screen. Participants were also instructed to imagine being at this restaurant and choosing the dishes they would like to try as quickly as possible. The experiment was conducted immediately after breakfast/lunch, during a lecture period of about 100 minutes, to control the effect of hunger on the menu choice. Participants had to evaluate as quickly as possible whether they would choose the dish, by clicking the bottom "e" of the keyboard for the "not choose" responses and the bottom "i" for the "choose" responses. In total, the menu choice task consisted of 16 trials, 8 trials of congruent pairs (e.g., sour prime-sour target), and 8 trials of incongruent pairs (e.g., sour prime-sweet target). Each trial was presented once, and presentation order was randomized for each subject separately. Accordingly, the menu choice task consisted of 8 semantically congruent trials (e.g., tomato odor and sour dishes), and 8 semantically incongruent trials (e.g., tomato odor and sweet dishes). The target dishes appeared on the computer screen until the response was registered by the click on the keyboard, with a maximum presentation time of 5000 milliseconds for each trial. The inter-trial interval (ITI) was always 15 seconds. At the end of the experiment, participants completed demographic measures.

7.2.4 Results

The total number of trials was of 432 (16 stimuli of pictures X 27 respondents), considering both semantically congruent and semantically incongruent trials of scent-dishes pairs. I analyzed only the correct trials (i.e., trials in which participants made the correct choice), and I excluded from the analysis values over three standard deviations from the mean, for a total number of 244 trials (% errors = 0,43). Reaction times (RTs) that were more than three standard deviations above and below the participant's mean determined the exclusion of the observation to neutralize the influence of outliers. I did not exclude any observation from the original data collection. Response time to the overall questionnaire was between 122 and 322 seconds ($M= 195.70$ $SD= 53.11$). According to the results of the pretest, participants rated the scent as negative ($M= 2.33$, $SD= 2.05$), significantly different from the scale midpoint of 5, $t\ (26) = -6.737$, $p < 0.001$; not edible ($M= 3.59$, $SD= 2.57$), significantly different from the scale midpoint of 5, $t\ (26) = -2.838$, $p = 0.009$; and sour ($M= 2.96$, $SD= 1.28$), significantly different from the scale midpoint of 5, $t(26) = -8.234$, $p < 0.001$. Table 2.3 shows participants' means of reaction times and the percentage of errors. The analysis of RTs shows that participants responded faster to sweet dishes (M= 2061.91, SD= 1043.59) than to sour dishes (M= 2959.72, SD= 1851.34). This difference was statistically significant, $t(26) = 2.095$, $p = 0.046$. The results of this experiment show that tomato scent was not powerful to arouse a semantic priming effect since it was perceived as negative, not edible stimulus. Moreover, tomato scent slows down cognitive processing of semantically congruent products (e.g., sour) and speeds up processing of semantically incongruent (e.g., sweet) products. In other words, in the presence of unpleasant odor, participants avoid semantically congruent products (e.g., sour dishes) and choose semantically incongruent products (e.g., sweet dishes). Thus, the hypothesis H2c was confirmed.

Contrary to experiments 2.1 and 2.2, these findings suggest that the incidental exposure to an unpleasant odor does not activate the related semantic knowledge and makes difficult (e.g., slows down) the cognitive processing and choice of semantically congruent stimuli in other modalities (e.g., visual) (H2c).

Table 2.3 - Results of Experiment 2.3 - Menu Choice Task - Mean, Standard Deviation (in parenthesis), Percentage of Trial Errors, and Standard Error of the mean

	Reaction Times (Milliseconds)	% Trial Errors	Standard Error
Semantically Congruent – Scent – Picture Pairs	2959.72 (1851.34)	0.19%	356.29
Semantically Incongruent – Scent – Picture Pairs	2061.91 (1043.59)	0.71%	200.83

7.3 Experiment 2.4

7.3.1 Participants

To confirm hypotheses H2c, the experiment was replicated with eighty-three undergraduate and graduate business students (31 men and 32 women) from a business school of a large Brazilian metropolitan area, ranging in age from 18 to 37 (M= 25.34, SD= 5.44) took part in a 2 (prime: olfactory versus visual) X 2 (target congruence: congruent versus incongruent) mixed design in exchange of a course credit.

7.3.2 Materials

As experiment 2.3, experiment 2.4 consisted of two phases: the acquisition phase and the object decision task (i.e., semantic priming phase). To confirm the hypothesis H2c, I manipulated the prime as the between-subjects factor, and the target as the within-subjects factor, for a total number of four experimental conditions: sour odor prime- sour visual target; sour visual prime- sour visual target, for the semantically congruent conditions (e.g., both the prime and the target were sours); sour odor prime- sweet visual target; sour visual prime- sweet visual target, for the semantically incongruent conditions (e.g., the prime was sour, and the target was sweet). In particular, I used tomato scent in the olfactory priming condition and a picture of tomato salad in the visual priming condition during the acquisition phase as a sour prime (e.g., arousing the concept of sourness), while I manipulated the object meaning as a target (e.g., sweet dishes versus sour dishes) in the subsequent menu decision task.
In particular, I selected object stimuli with different levels of semantic congruence with tomato scent and with the picture of tomato salad. In the semantically congruent condition, I selected 8 dishes that were semantically congruent with tomato scent and tomato salad picture, while in the semantically incongruent condition I selected 8 dishes that were semantically incongruent with tomato, and were related to sweet food in general.

Menu Choice Task. I selected two sets of 8 images of dishes for a total number of 16 dishes. Half of the images (e.g., semantically incongruent condition) were showing fruity dishes (e.g., fruit salad, fruit cake, yogurt with fruits) and half (e.g., semantically congruent condition) were showing sour dishes (e.g., parmesan cheese, tomato, chicken salad), following the idea of implicit association test (Greenwald et al., 1998). All the dishes were presented in the same jpeg format (500x333 pixels) and size (10x15 cm) on a computer screen.

Figure 2.4 – Example of semantically congruent and semantically incongruent products

7.3.3 Procedure

The experiment was introduced as a study conducted by a restaurant that wanted to change its menu and was interested in the opinion of new potential clients. First, participants took part in the acquisition phase, in which they were primed with a sour odor (e.g., tomato scent), or with a picture of tomato salad (e.g., sour image), alternatively. In the odor priming condition, participants were given a paper string measuring 7 cm in length and 2 cm in height in which two drops of the colorless fragrance of tomato were put. According to the experiment 2.3, before taking part in the experiment, participants read and signed an informed consent screening for allergies (e.g., see Spangenberg et al., 1996). In the visual priming condition, participants were primed with a picture of tomato salad presented in jpeg format (500x333 pixels) and a 10x15 cm size, on a computer screen. In the acquisition phase, participants were asked to smell the paper string, or look at tomato salad picture for 15 seconds (the time of the task was measured and controlled by the experimenter), and then rated the scent or the picture regarding its valence (negative/positive), edibility (not edible/very edible), and sourness (very sour/very sweet). All three items were measured with a nine-point semantic differential scale. After the acquisition phase, participants were asked to sit in front of a computer screen at a distance of about 50 cm to complete the menu choice task. It was explained, as part of the instructions, that with an interval of 20 seconds a set of brand logos would appear on the computer screen. Participants were also instructed to imagine being at this restaurant and choosing the dishes they would like to try as quickly as possible. The experiment was conducted immediately after breakfast/lunch, during a lecture period of about 100 minutes, to control the effect of hunger on the menu choice. Participants had to evaluate as quickly as possible whether they would choose the dish, by clicking the bottom "e" of the keyboard for the "not choose" responses and the bottom "i" for the "choose" responses. In total, the menu choice task consisted of 16 trials, 8 trials of congruent pairs (e.g., sour prime-sour target), and 8 trials of incongruent pairs (e.g., sour prime-sweet target). Each trial was presented once, and presentation order was randomized for each subject separately. Accordingly, the menu choice task consisted of 8 semantically congruent trials (e.g., tomato odor and sour dishes), and 8 semantically incongruent trials (e.g., tomato odor and sweet dishes). The target dishes appeared on the computer screen until the response was registered by the click on the keyboard, with a maximum presentation time of 5000 milliseconds for each trial. The inter-trial interval (ITI) was always 15 seconds. At the end of the experiment, participants completed demographic measures.

7.3.4 Results

The total number of trials was of 1008 (16 stimuli of pictures X 63 respondents), considering both semantically congruent and semantically incongruent trials of menu dishes. Reaction times (RTs) that were more than three standard deviations above and below the participant's mean determined the exclusion of the observation to neutralize the influence of outliers. I excluded twenty observations (0.24% of the data). I analyzed only the correct trials (i.e., trials in which participants made the correct choice), for a total number of 641 trials (% errors = 0.36). Response time to the overall questionnaire was between 123 and 347 seconds (M= 199.77, SD= 58.97). According to the results of experiment 2.3, in the odor priming condition participants rated the scent as negative (M= 2.51, SD= 2.11), significantly different from the scale midpoint of 5, t (38) = -7.349, p < 0.001; not edible (M= 3.97, SD= 2.75), significantly different from the scale midpoint of 5, t (38) = -2.323, p = 0.026; and very sour (M= 3.71, SD= 2.82), significantly different from the scale midpoint of 5, t (38) = -2.831, p = 0.007. In the visual priming condition, participants rated the picture of the tomato salad as very positive (M= 7.25, SD= 2.09), significantly different from the scale midpoint of 5, t (23) = 5.273, p < 0.001; very edible (M= 7.37, SD= 2.35), significantly different from the scale midpoint of 5, t (23) = 4.939, p < 0.001; and very sour (M= 3.54, SD= 2.48) significantly different from the scale midpoint of 5, t (23) = -2.876, p = 0.009. Table 2.4 shows participants' means of reaction times and the percentage of errors. The analysis of RTs shows that participants selected faster the sweet dishes (M1= 1919.07, SD1= 1203.69; M2= 2705.36, SD2 = 765.35) than sour dishes (M1= 2579.00, SD1= 1619.92; M2= 3086.89, SD2 = 976.22), regardless of the prime modality (e.g., odor versus picture). These results confirm those of experiment 2.3 that tomato scent since it is perceived as unpleasant and not edible, was not powerful to activate the semantic knowledge of sour food. Thus, there was a significant main effect of the semantic congruence between the prime and the target on response time scores overall F (1, 61) = 4.005, p = 0.05, $\eta 2$ = 0.062. This effect was significant in the opposite direction compared with the experiment 2.2 due the perceived unpleasantness of the tomato scent, meaning that response time scores are faster in the semantically incongruent conditions (i.e., the prime was sour, and the target was sweet) than in the semantically congruent conditions (i.e., both the prime and the target were sour), regardless of the effects of other variables. This result is also confirmed by the analysis of trial errors (Table 2.4), showing that trial errors are larger in the semantically congruent condition (e.g., the prime and the target are both sour), than in the semantically incongruent condition (e.g., the prime was sour, and the target was sweet), meaning that tomato scent since it is perceived as unpleasant, slows down processing and leads participants to avoid semantically congruent products (H2c). These results partially confirm the hypothesis H2c according to which participants exposed to an unpleasant odor tend to avoid the stimulus. In other words, negative priming slows down processing of semantically congruent stimuli in other modalities and speeds up processing of semantically incongruent stimuli in other modalities. Participants also selected faster the sweet dishes when primed with the sour scent (M1= 1919.07, SD1= 1203.69) than with the tomato salad picture (M1=2705.36, SD1= 765.35). However, the interaction effect between the target congruence with the prime and whether the prime was in the olfactory or visual modality was not significant F (1, 61) = 0.286, p = 0.595, $\eta 2$ = 0.005, meaning that the interaction between the congruence between the prime and the target and the prime modality (e.g., olfactory versus visual priming) was not significant. However, I found a significant main effect of the between-subjects factor, the prime modality (i.e., olfactory versus visual), $F (1, 61) = 7.270$, $p = 0.009$, $\eta2 = 0.106$. Thus, there was a significant main effect of the prime modality (e.g., olfactory versus visual) on the reaction time scores overall (H2c).

The findings confirm results of experiment 2.3 and show that tomato scent was not powerful to arouse a semantic priming effect since it was perceived as negative, not edible stimulus. Accordingly, these results demonstrated that the incidental exposure to an odor that is perceived as unpleasant might not be powerful to activate the related semantic knowledge and may make processing of semantically congruent products more difficult (H2c). Moreover, these findings show that when the odor is perceived as unpleasant (e.g., negative), individuals tend to avoid that stimulus and semantically congruent products and choose faster semantically incongruent (e.g., opposite) products, such as sweet dishes. Thus, negative priming slows down processing of semantically congruent products and speeds up processing of semantically incongruent products (H2c).

Table 2.4 - Results of Experiment 2.4 – Menu Choice Task - Mean, Standard Deviation (in parenthesis), Percentage of Trial Errors, and Standard Error of the mean

	Reaction Times (Milliseconds)	% Trial Errors	Standard Error
Semantically Congruent – Scent - Picture Pairs	2579.00 (1619.92)	0.60%	244.21
Semantically Incongruent – Scent - Picture Pairs	1919.07 (1203.69)	0.21%	223.96
Semantically Congruent – Picture - Picture Pairs	3086.89 (976.22)	0.14%	181.46
Semantically Incongruent – Picture - Picture Pairs	2705.36 (765.35)	0.43%	175.58

7.4 Discussion

Experiment 2.3 and 2.4 provided evidence that the incidental exposure to odors leads to semantic priming effects only under a certain condition, that is the scent must be perceived as pleasant. The results of the experiments show that an unpleasantly perceived scent does not activate the related concept and make elaboration of further information more demanding, leading participants to avoid semantically congruent products and to choose semantically incongruent products. These results confirm the findings of experiment 1.1, 1.2, 2.1, and 2.2 that odors are perceived primarily through their affective dimension of valence (i.e., whether the scent is pleasant or unpleasant). The odor used in these experiments, the tomato scent, is not negative in nature (e.g., it is not related to threats or dangers), but it is perceived as strongly unpleasant, thus not edible. The manipulation checks confirmed that the odor of tomato was perceived as highly unpleasant, sour, and not edible. Accordingly, as odors are primarily perceived across the dimension of valence, the perception of the unpleasantness of the odor affects also the perception of other odor properties, such as edibility. Thus, this makes the activation of the concept of edible sour food more difficult.

These results demonstrate that unpleasant odors are processed heuristically, immediately avoided by individuals, making their evaluation across characteristics other than valence (e.g., edibility) more automatic and superficial. As a consequence, the concept of edible, sour food is not activated. As a result, the incidental exposure to unpleasant odors inhibits consumer choice of semantically congruent products (e.g., sour dishes), and improves consumer choice of semantically incongruent products (e.g., sweet dishes). In other words, the experiments were designed to clarify that semantic priming effects occur through an opposite mental process in the case of unpleasantly perceived odor, according to which mental processing and choice of semantically congruent products are inhibited but mental processing and choice of semantically incongruent products is improved.

These results demonstrated that the unpleasant perception of the odor was transferred to the subsequent menu choice task, in which participants chose more often and more rapidly fruity dishes than sour dishes. In other words, participants chose more often and quickly those menu options which do not share with the odor of tomato any semantic associations, such that, for example, the sourness and the edibility. These findings show that the incidental exposure to an unpleasant odor slows down the activation of the related semantic knowledge and make more effortful the cognitive processing of stimuli in other modalities (e.g., visual). Moreover, I found that participants selected faster the fruity dishes when primed with the sour odor of tomato (i.e., olfactory priming) than with the tomato salad picture (i.e., visual priming), despite participants have evaluated the tomato salad picture as more pleasant, sour, and edible than the tomato scent. I speculate, here, that semantic odor priming is more likely to occur and more effective than semantic visual priming to affect consumer choice of both, semantically congruent products (i.e., avoiding the choice of those products) and semantically incongruent products (i.e., speeding up the selection of those products). Results confirm those of the previous experiments 2.1 and 2.2 that odor elaboration occur not only through the affective-based processing of odor information but also through an associative-based mechanism, according to which specific components of odors make the related concepts more (i.e., pleasant odors) or less (i.e., unpleasant odors) accessible (e.g., sourness and edibility, in this case), and those concepts are then used as a source of information for further decision-making and product choices.

Study 2 confirmed that semantic odor priming effects only occur when the olfactory stimulus is perceived as particularly pleasant, whereas when the scent is perceived as unpleasant (e.g., tomato scent), the priming effect operates following the opposite path of improving processing of semantically unrelated stimuli (i.e., sweet dishes). The next study tests whether a semantic priming effect of a pleasant odor may induce associative-based brand choices and improve brand memory and recall.

8. Study 3

8.1 Overview of the Study

Study 3 consists of two experiments, 3.1 and 3.2, which were designed to test whether the incidental exposure to a pleasant odor induces semantic associations with unrelated stimuli in other modalities (e.g., pictures) which influence semantically related brand choices, brand memory, and brand recall.

8.2 Olfactory Stimuli Pretest

As the aim of the study 3 is to test whether the exposure to a pleasant odor induces congruent affective evaluations of semantically related brands and improves brand memory and brand recall, the olfactory stimuli pretest was conducted to select the pleasant scent used in the main study. The olfactory stimuli pretest was conducted to select the scent used in the main study (Study 3). The choice of the food domain for the main study was intended to follow previous attempts to demonstrate a semantic priming effect (Coelho et al., 2009; Fedoroff, Polivy, & Herman, 2003; Gaillet et al., 2013). In particular, the pretest had the aim of checking the affective, edibility and sweetness dimensions of scent (e.g., positive versus negative; edible versus not edible; sweet versus sour). Thirty-four participants (13 men and 21 women), ranging in age from 18 to 23 (M= 19.14 years old), were asked to sniff 14 different scents, representing all the main olfactory families (Spangenberg et al., 1996). All selected scents were common odors, which can be easily found in nature, divided into the following category: two woody, two floral, two spicy, two citrus, two water, and four food scents were tested. Scents from non-food categories were included in the pretest to ensure that food scents were perceived as more edible than non-food scents. Each scent was put on a paper string measuring 7 cm in length and 2 cm in height, and identified by an alphanumeric code. Scents and paper strings were developed in cooperation with a commercial aroma supplier from the local market in Brazil. On each paper string, two drops of each scent were put, to control for scent intensity. All scents were colorless to neutralize the effect of color on scent evaluation

(Zellner & Kautz, 1990). Before taking part in the pretest, participants read and signed an informed consent screening for allergies (e.g., see Spangenberg et al., 1996). Following Krishna and colleagues (2010) participants were asked to smell coffee beans contained in an opaque plastic box in front of them before starting the pretest and also between one test and another, to neutralize the effect of a previous scent on the next (Secundo & Sobel, 2006). Participants were asked to sniff the paper string as long as they wish and then rated each scent regarding liking (negative/positive), edibility (not edible/very edible), and sweetness (very sour/very sweet). All questions were measured with a nine-point semantic differential scale. Respondents evaluated the chocolate scent as positive ($M= 5.85$, $SD= 2.04$), significantly different from the scale midpoint of 5, $t(33) = 2.43$, $p = 0.021$; edible ($M= 5.79$, $SD= 2.23$), significantly different from the scale midpoint of 5, $t(33) = 2.067$, $p = 0.047$; and sweet ($M= 8.35$, $SD= 1.63$), significantly different from the scale midpoint of 5, $t(33) = 11.98$, $p < 0.001$. Thus, I selected chocolate scent for the main study as the more positive, the more edible, and the sweeter to arouse the concept of sweetness in the participants.

8.3 Experiment 3.1

8.3.1 Participants

To test the hypotheses H3a, H3c, and H3e, fifty-four undergraduate business students (24 men and 29 women) from a business school of a large Brazilian metropolitan area, ranging in age from 18 to 23 ($M= 19.13$, $SD= 1.056$) took part in a simple within-subjects design in exchange of a course credit. I primed all participants with the sweet scent of chocolate and exposed to the same two target manipulations: semantically congruent brands versus semantically incongruent brands.

8.3.2 Materials

The experiment consisted of two phases: the acquisition phase and the object decision task (i.e., semantic priming phase). To test the hypotheses H3a, H3c, and H3e, I used only chocolate scent in the acquisition phase as a sweet prime (e.g., arousing the concept of sweetness), while I manipulated the object meaning as the target (e.g., sweet brands versus sour brands) in the subsequent brand decision task. In particular, I selected object stimuli with different levels of semantic congruence with the chocolate scent. In the semantically congruent condition, I selected 8 brand logos that were semantically congruent with chocolate, while in the semantically incongruent condition, I selected 8 brand names that were semantically congruent with food in general but not to chocolate.

Brand Choice Task. I selected two sets of 8 images of brand logos that are very famous in the Brazilian market, for a total number of 16 brand logos. Half of the images were showing logos of chocolate brands (e.g., Nestlé, Milka, etc.) and half were showing logos of general, sour-food brands (e.g., Wickbold, Sadia, etc.), following the idea of implicit association test (Greenwald et al., 1998). All the brand logos were presented in the same jpeg format (500x333 pixels) and size (10x15 cm) on a computer screen.

Brand Recall task. Stimuli of the free recall task were the same as those of brand choice task, such that 8 logos of chocolate brands (e.g., Nestlé, Milka, etc.) and 8 logos of general, sour-food brands (e.g., Wickbold, Sadia, etc.). All the brand logos were presented in the same jpeg format (500x333 pixels) and size (10x15 cm) on a computer screen.

Figure 3.1 – Example of semantically congruent and semantically incongruent brands

8.3.3 Procedure

The experiment was introduced as a study intended to verify the existence of a relationship between odors and food brands. First, participants took part in the acquisition phase, in which they were given a paper string measuring 7 cm in length and 2 cm in height in which two drops of the colorless fragrance of chocolate were put. According to the pretest, before taking part in the experiment, participants read and signed an informed consent screening for allergies (e.g., see Spangenberg et al., 1996). In the acquisition phase, participants were asked to smell the paper string for 15 seconds (the time of the task was measured and controlled by the experimenter), and then rated the scent regarding its valence (negative/positive), edibility (not edible/very edible), and sweetness (very sour/very sweet). All three items were measured with a nine-point semantic differential scale. After the acquisition phase, participants were asked to sit in front of a computer screen at a distance of about 50 cm to complete the brand choice and the free recall tasks. It was explained, as part of the instructions, that with an interval of 20 seconds a set of brand logos would appear on the computer screen. Participants were also instructed to imagine wanting to buy a snack/something to eat and to choose as quickly as possible which brand they would like to try or buy among the presented brands. The experiment was conducted immediately after lunch, during a lecture period of about 100 minutes to control the effect of hunger on the brand choice. Participants had to evaluate as quickly as possible whether they would choose the brand or not, by clicking the bottom “e” of the keyboard for the “not choose” responses and the bottom “i” for the “choose” responses. In total, the brand choice task consisted of 16 trials, 8 trials of congruent pairs (e.g., sweet prime-sweet target), and 8 trials of incongruent pairs (e.g., sweet prime-sour target). Each trial was presented once, and presentation order was randomized for each subject separately. Accordingly, the brand choice task consisted of 8 semantically congruent trials (e.g., chocolate odor and chocolate brand logos), and 8 semantically incongruent trials (e.g., chocolate odor and sour-food brand logos). The target brand logos appeared on the computer screen until the response was registered by the click on the keyboard, with a maximum presentation time of 5000 milliseconds for each trial. The inter-trial interval (ITI) was always 15 seconds. After each trial, to proceed with the free recall task I introduced a time interval of 10 seconds after which was asked to participants to recall and write the name of the brand previously appeared on the computer screen. Response time to brand names recall and the perceived fluency of memory for the brand names were also recorded after each trial. At the end of the brand choice task and the free recall task, participants were asked to cite three brand names among the twelve brand names that were shown in the previous task, to verify the participants spontaneous brand recall. At the end of the experiment, participants completed demographic measures.

8.3.4 Results

The total number of trials was of 848 (16 stimuli of pictures X 53 respondents), considering both semantically congruent and semantically incongruent trials of brand logos. I analyzed only the correct trials (i.e., trials in which participants made the correct choice), and I excluded from the analysis values over three standard deviations from the mean, for a total number of 791 trials (% errors = 0.067). Reaction times (RTs) that were more than three standard deviations above and below the participant's mean determined the exclusion of the observation to neutralize the influence of outliers. One observation (0.018% of the data) was excluded from the sample. Response time to the overall questionnaire was between 274 and 720 seconds (M= 372.13, SD= 71.07). According to the results of the pretest, participants rated the scent as positive (M= 5.62, SD= 2.22), significantly different from the scale midpoint of 5, $t(52) = 2.033$, $p < 0.05$; very edible (M= 5.81, SD= 2.48), significantly different from the scale midpoint of 5, $t(52) = 2.373$, $p < 0.02$; and very sweet (M= 8.301, SD= 1.43), significantly different from the scale midpoint of 5, $t(52) = 16.74$, $p < 0.001$. 3.1a, 3.1b, and 3.1c show participants' means of reaction times and the percentage of errors. The analysis of RTs shows that participants responded faster to brand logos (M= 1342.42, SD= 258.89) in the semantically congruent condition than to brand logos (M= 1444.37, SD= 364.18) in the semantically incongruent condition. This difference was statistically significant, $t(52) = -1.994$, $p < 0.05$. The results of this experiment show that participants responded faster when prime (e.g., scent) and targets (e.g., brand logos) were semantically congruent (e.g., the scent and the brand were both sweets) than semantically incongruent (e.g., the scent was sweet, and the brand was sour), that is, there was a semantically priming effect during the brand choice task (H3a).

The analysis of RTs also shows that participants recalled faster brand logos (M= 1367.13, SD= 303.97) in the semantically congruent condition than brand logos (M= 1728.56, SD= 448.81) in the semantically incongruent condition. This difference was statistically significant, $t(52) = -6.232$, $p < 0.001$. The results of this experiment show that participants recalled faster brand names when the prime (e.g., scent) and the target (e.g., brand logos) were semantically congruent (e.g., the scent and the brand were both sweets) than semantically incongruent (e.g., the scent was sweet, and the brand was sour), that is, there was a semantically priming effect during the brand recall task (H3c). Moreover, these results also suggest that participants perceived sweet brands as easier to recall (M= 8.4270, SD= 0.7281) than sour brands (M= 8.1995, SD= 1.15); this difference was statistically significant $t(52) = 2.017$ $p < 0.05$. This result shows that sweet brands were perceived as easier to recall by participants (H3e). In support of this result, the analysis also shows that, in a free recall task, participants cited more sweet brands (N= 91) than sour brands (N=68).

These findings suggest that the incidental exposure to an odor activates the related semantic knowledge and facilitate the cognitive processing of stimuli in other modalities. These findings give support to a semantic odor priming effect in such that odors activate semantic knowledge which, in turn, influences consumer choice of semantically congruent brands (H3a), recall of semantically congruent brands (H3c), and perceived fluency of semantically congruent brands (H3e).

Table 3.1a Results of Experiment 3.1 - Brand Choice Task - Mean, Standard Deviation (in parenthesis), Percentage of Trial Errors, and Standard Error of the mean

	Reaction Times (Milliseconds)	% Trial Errors	Standard Error
Semantically Congruent – Scent - Brand Pairs	1342.42 (258.89)	0.02%	35.56
Semantically Incongruent – Scent - Brand Pairs	1444.37 (364.18)	0.05%	50.02

Table 3.1b Results of Experiment 3.1 - Brand Recall Task - Mean, Standard Deviation (in parenthesis), Percentage of Trial Errors, and Standard Error of the mean

	Brand Recall	% Trial Errors	Standard Error
Semantically Congruent – Scent - Brand Pairs	1367.13 (303.97)	0.06%	41.75
Semantically Incongruent – Scent - Brand Pairs	1728.56 (448.81)	0.12%	61.64

Table 3.1c Results of Experiment 3.1 – Perceived Fluency of Brand Recall Task - Mean, Standard Deviation (in parenthesis), and Standard Error of the mean

	Perceived Fluency	Standard Error
Semantically Congruent – Scent - Brand Pairs	8.4270 (0.7281)	0.10
Semantically Incongruent – Scent - Brand Pairs	8.1995 (1.15)	0.15

8.4 Experiment 3.2

8.4.1 Participants

To confirm the hypotheses H3a, H3c, and H3e, and to test the hypotheses H3b, H3d, and H3f, one hundred and fifty-seven undergraduate and graduate business students (52 men and 82 women) from a business school of a large Brazilian metropolitan area, ranging in age from 18 to 31 (M= 22.57, SD= 4.32) took part in a 2 (prime: olfactory versus visual) X 2(target congruence: congruent versus incongruent) mixed design in exchange of a course credit.

8.4.2 Materials

As in experiment 3.1, experiment 3.2 consisted of two phases: the acquisition phase and the object decision task (i.e., semantic priming phase). To confirm the hypotheses H3a, H3c, and H3e, and to find support to H3b, H3d, and H3f, I manipulated the prime as the between-subjects factor, and the target as the within-subjects factor, for a total number of four experimental conditions: sweet odor prime- sweet visual target; sweet visual prime- sweet visual target, for the semantically congruent conditions (e.g., both the prime and the target were sweets); sweet odor prime- sour visual target; sweet visual prime- sour visual target, for the semantically incongruent conditions (e.g., the prime was sweet, and the target was sour). In particular, I used chocolate scent in the olfactory priming condition and a picture of chocolate bar in the visual priming condition during the acquisition phase as a sweet prime (e.g., arousing the concept of sweetness), while I manipulated the object meaning as a target (e.g., sweet brand logos versus sour brand logos) in the subsequent object decision task. In particular, I selected object stimuli with different levels of semantic congruence with the chocolate scent. In the semantically congruent condition, I selected 8 brand logos that were semantically congruent with chocolate, while in the semantically incongruent condition I selected 8 brand names that were semantically congruent with food in general but not to chocolate.

Brand Choice Task. I selected two sets of 8 images of brand logos that are very famous in the Brazilian market, for a total number of 16 brand logos. Half of the images were showing logos of chocolate brands (e.g., Nestlé, Milka, etc.) and half were showing logos of general, sour-food brands (e.g., Wickbold, Sadia, etc.), following the idea of implicit association test (Greenwald et al., 1998). All the brand logos were presented in the same jpeg format (500x333 pixels) and size (10x15 cm) on a computer screen.

Brand Recall task. Stimuli of the free recall task were the same as those of brand choice task, that are eight logos of chocolate brands (e.g., Nestlé, Milka, etc.) and eight logos of general, sour-food brands (e.g., Wickbold, Sadia, etc.). All the brand logos were presented in the same jpeg format (500x333 pixels) and size (10x15 cm) on a computer screen.

Figure 3.2 – Example of semantically congruent and semantically incongruent brands

8.4.3 Procedure

The experiment was introduced as a study intended to verify the existence of a relationship between odors (i.e., odor condition) or pictures (i.e., visual condition) and food brands. First, participants took part in the acquisition phase, in which they were primed with a sweet odor (e.g., chocolate scent), or with a picture of a chocolate bar (e.g., sweet image), alternatively. In the odor priming condition, participants were given a paper string measuring 7 cm in length and 2 cm in height in which two drops of the colorless fragrance of chocolate were put. According to the experiment 1, before taking part in the experiment, participants read and signed an informed consent screening for allergies (e.g., see Spangenberg et al., 1996). In the visual priming condition, participants were primed with a picture of a chocolate bar presented in jpeg format (500x333 pixels) and a 10x15 cm size, on a computer screen. In the acquisition phase, participants were asked to smell the paper string, or look at chocolate bar picture for 15 seconds (the time of the task was measured and controlled by the experimenter), and then rated the scent or the picture regarding its valence (negative/positive), edibility (not edible/very edible), and sweetness (very sour/very sweet). All three items were measured with a nine-point semantic differential scale. After the acquisition phase, participants were asked to sit in front of a computer screen at a distance of about 50 cm to complete the brand choice and the free recall tasks. It was explained, as part of the instructions, that with an interval of 20 seconds a set of brand logos would appear on the computer screen. Participants were also instructed to imagine wanting to buy a snack/something to eat and to choose as quickly as possible which brand they would like to try or buy among the presented brands. The experiment was conducted immediately after lunch, during a lecture period of about 100 minutes to control the effect of hunger on the brand choice. Participants had to evaluate as quickly as possible whether they would choose the brand or not, by clicking the bottom “e” of the keyboard for the “not choose” responses and the bottom “i” for the “choose” responses. In total, the brand choice task consisted of 16 trials, 8 trials of congruent pairs (e.g., sweet prime-sweet target), and 8 trials of incongruent pairs (e.g., sweet prime-sour target). Each trial was presented once, and presentation order was randomized for each subject separately. Accordingly, the brand choice task consisted of 8 semantically congruent trials (e.g., chocolate odor and chocolate bar brands), and 8 semantically incongruent trials (e.g., chocolate odor and sour-food brands). The target brand names appeared on the computer screen until the response was registered by the click on the keyboard, with a maximum presentation time of 5000 milliseconds for each trial.

The inter-trial interval (ITI) was always 15 seconds. After each trial, to proceed with the free recall task, I introduced a time interval of 10 seconds after which was asked to participants to recall and write the name of the brand previously appeared on the computer screen. Response time to brand names recall and the perceived fluency of memory for the brand names were also recorded after each trial. At the end of the brand choice task and the free recall task, participants were asked to cite three brand names among the twelve brand names that were shown in the previous task, to verify the participants spontaneous brand recall. At the end of the experiment, participants completed demographic measures.

8.4.4 Results

The total number of trials was of 2304 (16 stimuli of pictures X 144 respondents), considering both semantically congruent and semantically incongruent trials of food brand logos. Reaction times (RTs) that were more than three standard deviations above and below the participant's mean determined the exclusion of the observation to neutralize the influence of outliers. I excluded thirteen observations (0.07% of the data). I analyzed only the correct trials (i.e., trials in which participants made the correct choice), for a total number of 2042 trials (% errors = 0.113). Response time to the overall questionnaire was between 216 and 942 seconds ($M= 396.58$, $SD= 123.92$). According to the results of experiment 1, in the odor priming condition participants rated the scent as positive ($M= 5.55$, $SD= 2.17$), significantly different from the scale midpoint of 5, $t\ (64) = 2.055$, $p < 0.05$; edible ($M= 6.04$, $SD= 2.46$), significantly different from the scale midpoint of 5, $t\ (64) = 3.422$, $p = 0.001$; and very sweet ($M= 8.23$, $SD= 1.65$), significantly different from the scale midpoint of 5, $t\ (64) = 15.728$, $P < 0.001$.

In the visual priming condition, participants rated the picture of the chocolate bar as very positive ($M= 8.1$, $SD= 1.87$), significantly different from the scale midpoint of 5, $t\ (74) = 14.37$, $P < 0.001$; very edible ($M= 8.89$, $SD= 0.45$), significantly different from the scale midpoint of 5, $t\ (74) = 74.526$, $p < 0.001$; and very sweet ($M= 8.08$, $SD= 1.38$), significantly different from the scale midpoint of 5, $t\ (74) = 19.288$, $p < 0.001$. Table 3.2a, 3.2b, and 3.2c show participants' means of reaction times and the percentage of errors. The analysis of RTs shows that participants selected faster the brand logos in the semantically congruent condition (M1= 1429.66, SD1= 348.66; M2= 1596,16, SD2= 531.89) than in the semantically incongruent condition (M1= 1444.50, SD1= 362.59; M2= 1782.46, SD2= 602.35), regardless of the prime modality (e.g., odor versus picture). These results confirm that there was a significant main effect of the semantic congruence between the prime and the target on response time scores overall $F(1, 134) = 6.984$, $p = 0.009$, $\eta 2 = 0.05$, meaning that response time scores are faster in the semantically congruent conditions (i.e., both the prime and the target were sweets) than in the semantically incongruent conditions (i.e., the prime was sweet, and the target was sour), regardless of the effects of other variables. Participants also selected faster the brand logos when primed with the sweet scent (M1= 1429.66, SD1= 348.66; M2= 1444.50, SD2= 363.59) than with the chocolate bar picture (M1= 1596.16, SD1= 531.89; M2= 1782.46, SD2= 602.35) in both, the semantically congruent and the semantically incongruent conditions. Thus, the interaction effect between the target congruence with the prime and whether the prime was in the olfactory or visual modality was also significant $F(1, 134) = 5.074$, $p = 0.026$, $\eta 2 = 0.036$, meaning that the semantic priming effect is stronger in the odor priming condition than in the visual priming condition. These results find support for a stronger semantic odor priming effect than semantic visual priming effect during the brand choice task, as suggested by the hypothesis H3b.

The analysis of RTs shows that participants recalled faster the brand names in the semantically congruent condition (M1= 1431.03, SD1= 360.33; M2= 1710.69, SD2= 545.53) than in the semantically incongruent condition (M1= 1748.66, SD1= 487.61; M2= 1786.91, SD2= 663.85), regardless of the prime modality (e.g., odor versus picture). These results confirm that there was a significant main effect of the semantic congruence between the prime and the target on recall time scores overall $F(1, 134) = 11.268$, $p = 0.001$, $\eta 2 = 0.078$, meaning that recall time scores are faster in the semantically congruent conditions (i.e., both the prime and the target were sweets) than in the semantically incongruent conditions (i.e., the prime was sweet, and the target was sour), regardless of the effects of other variables. Participants also recalled faster the brand names when primed with the sweet scent (M1= 1431.03, SD1= 360.33; M2= 1748.66, SD2= 487.61) than with the chocolate bar picture (M1= 1710.69, SD1= 545.53; M2= 1786.91, SD2= 663.85) in both, the semantically congruent and the semantically incongruent conditions. Thus, the interaction effect between the target congruence with the prime and whether the prime was in the olfactory or visual modality was also significant $F(1, 134) = 4.233$, $p = 0.042$, $\eta 2 = 0.031$, meaning that the semantic priming effect is stronger in the odor priming condition than in the visual priming condition. These results find support for a stronger semantic odor priming effect than semantic visual priming effect during a brand recall task, as suggested by the hypothesis H3d. I also found a significant main effect of the between-subjects factor, the prime modality (i.e., olfactory versus visual), $F (1, 134) = 5.233$, $p = 0.024$, $\eta 2 = 0.038$. Finally, the analysis of the perceived fluency of brand recall scores revealed that the perceived fluency of brand recall is higher in the olfactory priming (M1= 8.43, SD1= 0.69; M2= 8.28, SD2= 1.11) than in visual priming condition (M1= 7.73, SD1= 1.14; M2= 7.80, SD2= 1.06). However, the mixed ANOVA results have found no significant main effect of target congruence with the prime, neither of the interaction between the target congruence and whether the prime was in the olfactory or visual modality, $F (1,134) = 0.311$, $p = 0.578$, and $F (1,134) = 2.689$, $p = 0.103$, respectively. Only the between-subjects factor had a significant effect, $F (1,134) = 13.148$, $p < 0.001$. Thus, there was a significant main effect of the prime modality (e.g., olfactory versus visual) on the recall time scores (H3f).

In support of these results, the analysis also shows that, in a free recall task, participants cited more sweet brands (N= 119) than sour brands (N=76) when primed with the sweet scent of chocolate than with the picture of chocolate bar, in which participants cited more sour brand names (N= 120) than sweet (87).

These findings confirm results of experiment 3.1 and show that the incidental exposure to an odor activates the related semantic knowledge and facilitate the cognitive processing of stimuli in other modalities. These findings give support to a semantic odor priming effect in such that odors activate semantic knowledge which, in turn, influences consumer choice of semantically congruent brands (H3a), recall of semantically congruent brands (H3c), and perceived fluency of semantically congruent brands recall (H3e).

Moreover, these findings also suggest that the semantic priming effect is stronger in the semantic odor priming condition than in the semantic visual priming condition, such that odors are more likely than visual stimuli to activate semantic knowledge which, in turn, influences consumer choice of related brands (H3b), recall of semantically congruent brands (H3d), and perceived fluency of semantically congruent brands (H3f).

Table 3.2a Results of Experiment 3.2 – Brand Choice Task - Mean, Standard Deviation (in parenthesis), Percentage of Trial Errors, and Standard Error of the mean

	Reaction Times (Milliseconds)	% Trial Errors	Standard Error
Semantically Congruent – Scent - Brand Pairs	1429.66 (348.66)	0.05%	43.24
Semantically Incongruent – Scent - Brand Pairs	1444.50 (362.59)	0.036%	44.97
Semantically Congruent – Picture - Brand Pairs	1596.16 (531.89)	0.038%	63.12
Semantically Incongruent – Picture - Brand Pairs	1782.46 (602.35)	0.056%	71.48

Table 3.2b Results of Experiment 3.2 – Brand Recall Task - Mean, Standard Deviation (in parenthesis), Percentage of Trial Errors, and Standard Error of the mean

	Reaction Times (Milliseconds)	% Trial Errors	Standard Error
Semantically Congruent – Scent - Brand Pairs	1431.03 (360.33)	0.02%	44.69
Semantically Incongruent – Scent - Brand Pairs	1748.66 (487.61)	0.05%	60.48
Semantically Congruent – Picture - Brand Pairs	1710.69 (545.53)	0.06%	64.74
Semantically Incongruent – Picture - Brand Pairs	1786.91 (663.85)	0.061%	78.78

Table 3.2c Results of Experiment 3.2 – Perceived Fluency of Brand Recall Task (Mean, Standard Deviation in parenthesis, and Standard Error of the mean

	Reaction Times (Milliseconds)	Standard Error
Semantically Congruent – Scent - Brand Pairs	8.43 (0.69)	0.086
Semantically Incongruent – Scent - Brand Pairs	8.28 (1.11)	0.138
Semantically Congruent – Picture - Brand Pairs	7.73 (1.14)	0.136
Semantically Incongruent – Picture - Brand Pairs	7.80 (1.06)	0.126

8.5 Discussion

Experiment 3.1 and 3.2 confirmed results of experiments of 2.1 and 2.2 that the incidental exposure to odors may lead not only to affective evaluations but also to the mental activation of related concepts which, in turn, drive consumer behavior and decision-making. Moreover, results of these experiments extend the notion of semantic priming not only to the product but also to brand choice. The results of the experiments 3.1 and 3.2 show that odors are perceived primarily through their affective dimension (i.e., valence), but also through other dimensions, such as those of sweetness and edibility. As in the previous menu choice task (e.g., experiment 2.1 and 2.2), the pleasant odor of chocolate activated a conceptual link with related concepts of sweetness and edibility, improving consumer choices of semantically congruent brands (e.g., Milka, Ferrero), because the brand shares with the odor semantic features (e.g., sweetness and edibility). In other words, the experiments were designed to verify the existence of a semantic priming effect, that is a semantic, mental connection between odors and mental processing of semantically congruent stimuli. In experiments 3.1 and 3.2 I used a sweet odor of chocolate, which is a sweet and edible odor. The manipulation checks confirmed that the odor of chocolate was perceived as highly pleasant, sweet and edible. Accordingly, these results demonstrated that those properties of the odor were transferred to the subsequent brand choice task, in which participants chose more often and more rapidly chocolate-congruent brands than chocolate-incongruent brands. In other words, participants chose more often and quickly those brands which shared with the odor of chocolate some semantic associations, such that, for example, the sweetness and the edibility. The results of experiments 3.1 and 3.2 confirm findings of experiments 2.1 and 2.2 that the incidental exposure to an odor activates the related semantic knowledge and facilitate the cognitive processing of stimuli in other modalities (e.g., visual). Moreover, these findings extend the idea of a semantic odor priming to consumer choice of semantically congruent brands.

Accordingly, participants selected faster the chocolate-congruent brands when primed with the sweet odor of chocolate than with the chocolate bar picture, despite participants have evaluated the chocolate bar picture as pleasant, sweet, and edible as much as they evaluated the chocolate odor. I speculate, here, that semantic odor priming is more likely to occur and more effective than semantic visual priming to positively affect consumer choice of semantically congruent brands. Findings of these experiments also confirm that odor elaboration occurs not only through the affective-based processing of odor information but also through an associative-based mechanism, according to which specific components of odors make the related concepts more accessible (e.g., sweetness), and those concepts are then used as a source of information for further decision making and brand choices. Experiments 3.1 and 3.2 extend the notion of semantic priming not simply to brand choice, but also to brand recall, brand fluency, and free recall tasks. In both experiments, participants recalled faster semantically congruent brands than semantically incongruent brands, perceived sweet brands as easier to recall than sour brands, and remembered more semantically congruent brand names than semantically incongruent brand names during the free recall task. Finally, I demonstrated that this semantic priming effect on brand choice, brand recall, and brand perceived fluency is stronger in olfactory than visual priming. In conclusion, these results address that olfactory stimuli are more effective to arouse a semantic priming effect than visual stimuli.

9. Final Remarks

9.1 Theoretical Contributions

This research addresses several theoretical contributions to sensory marketing, olfactory cognition, and priming literature. First, this research contributes to priming literature and olfactory cognition demonstrating that the incidental exposure to an odor may non-consciously activate information which drive consumer's choice for products and brands (Holland et al., 2005). To investigate the effect of scent on decision-making and choice, I applied the concept of olfactory priming, intended as an implicit cognitive process which involves the unconscious perception of an olfactory stimulus (Herz & von Clef, 2001; Holland et al., 2005). In particular, this research examined two routes underlying priming effects, those of affective and semantic priming. The experiments 1.1 and 1.2 on affective priming effects showed that odors are primarily perceived through the dimension of their valence (i.e., pleasant or unpleasant), and that this process of odor perception and interpretation is an affective-based mechanism according to which the odor perceived pleasantness triggers more positive affective evaluations of pleasant stimuli in other modalities (e.g., visual and verbal). This result confirms the already established notion that pleasant odors have a positive effect on consumer responses and behaviors (Mattila & Wirtz, 2001; Spangenberg et al., 2005) but also extend the idea that odors may serve as affective primes and subconsciously guide information processing. Experiments 2.1, 2.2, 2.3, 2.4, 3.1, and 3.2 on semantic priming demonstrated that odors might also be suitable for semantic priming effects on product and brand choices, under certain conditions. Experiments 2.1, 2.2, 3.1, and 3.2 demonstrated that the incidental exposure to a sweet odor (e.g., grape, chocolate) that was perceived as highly pleasant, sweet, and otherwise edible, has a positive effect on consumer choice of semantically congruent products and brands. The non-conscious perception of the sweetness of the odor and its edibility activate, outside of awareness, the concept of sweetness which tended to induce more choices of semantically congruent products (e.g., fruity dessert) and brands (e.g., chocolate brands). However, experiments 2.3 and 2.4 showed that semantic priming effects strongly depends on how odors are affectively evaluated and interpreted by individuals. Atypical, not well-recognized scents, such as tomato scent I used in these experiments, were not effective as semantic primes (Gaillet et al., 2013).

Tomato scent was perceived as highly unpleasant and, thus, not edible odor, leading participants to avoid the choice of any semantically congruent products (e.g., tomato salad, pizza), and to select semantically incongruent products (e.g., chocolate cake). The research also extends the idea of semantic priming via odors to brand recall and perceived brand fluency since the participants recalled more brands and perceived those brands as more fluent to be processed when primed with a pleasant odor. Results address important contribution to the priming literature, especially in the field of olfactory priming. First, this research demonstrated that effective odor primes are a real phenomenon. However, the underlying psychological and physiological process why odor priming occurs is one of affective-based versus associative-based mechanism. In other words, the incidental exposure to odors influences information processing and choices primarily via affective rather than semantic priming. According to the results, which demonstrated that pleasant odors (e.g., gape and chocolate) arouse the concept of sweetness and the tomato odor does not arouse the concept of sourness, semantic priming effects are possible, but also difficult to take place. Semantic odor associations depend on how the odor is perceived across the valence dimension (e.g., pleasant or unpleasant), and thus, semantic priming effects are not always accurately predictable, compared with affective priming effects. Moreover, the experiments also showed that olfactory cues might be more effective than other modalities stimuli as primes to drive consumer decision-making and choice. Participants selected faster semantically congruent products and brands in the olfactory priming condition than in the visual priming condition. Those results contradict the traditional notion that olfactory stimuli are more effortful to be mentally processed than visual stimuli (Olofsson, Rogalski, Harrison, Mesulam, & Gottfried, 2013). Moreover, olfactory prime makes more abstract stimuli (e.g., words) easier to be processed than more concrete stimuli (e.g., pictures) (Paivio et al., 1968; Vigliocco et al., 2009). This research also contributes to sensory marketing more in general in several ways. First, the research moves beyond the traditional approach of Stimulus-Organism-Response Model (Donovan & Rossiter, 1982), largely applied in olfaction research, and show that the effect of pleasant scent on consumer behavior is not merely a consequence of an unconscious, emotion-driven reaction to olfactory stimuli which consumers cannot avoid; the results of the studies clarified that scent effects on consumer behavior, decision-making and choice occur through a more complex affective-based underlying mechanism based on odor mental representation, interpretation, and elaboration that, in turn, influences behavior and choice. Moreover, priming effects aroused by odors and not previously explored by the literature may also explain why prior studies have not always observed a positive effect of scent on consumer approach and avoidance behaviors (Cirrincione, Estes, & Carù, 2014; Morrison et al., 2011).

The research also contributes to sensory marketing research confirming that odors are especially powerful to influence information processing of stimuli in other sensory modalities (e.g., visual and verbal) (Seo, Roidl, Müller, & Negoias, 2010). The notion of olfactory priming may also find a meaningful application in the studies on synesthesia, the condition in which the stimulation of one sense arouses a congruent, perceptual experience in another sensory modality (Auvray & Spence, 2008; Calvert, Spence, & Stein, 2004).

9.2 Methodological Contributions

From the methodological perspective, these studies contribute to olfactory research addressing that odors may also be encoded in isolation (Smeets & Dijksterhuis, 2014; Zucco, 2003) and that a mental representation of odors, even if difficult and more abstract, is possible (Shiffrin & Schneider, 1977). The intentional odor manipulation demonstrated that laboratory settings are also suitable to reliably predict scent effects on information processing and decision-making (Smeets & Dijksterhuis, 2014). I also believe that intentional (i.e., cue-based) odor manipulation, better fits the purpose of investigating odor priming effects than unintentional (i.e., ambient-based) odor manipulation, for two reasons: i) in complex environments individuals tend to focus their attention on different, more accessible stimuli (e.g., visual, auditory elements), which may inhibits the perception of the target stimuli, the scent (Smeets & Dijksterhuis, 2014); and ii) odors are subject to rapid adaptation (Dalton, 2000), which means that ambient odors are perceived more strongly when individuals enter the environment, but later the same olfactory experience of ambient odor is not intense as before since our olfactory system gets used with the smell (Dalton, 2000).

9.3 Managerial Implications

The present research also has managerial implications since it opens the way for managers and retailers to better understand how different categories of scent work in specific environments and situations. The results on affective and semantic odor priming may serve to design specific guidelines for sale and retail strategies, encouraging managers and retailers to apply olfactory stimuli more carefully and selecting scents with characteristics that are more coherent with their specific goals. For example, managers and retailers may use a certain scent that suits the overall store environments to improve consumer global shopping experience; or they may apply a scent that better fits specific products or brands in a store, with the aim of improving sales of those products or brands, or promoting new ones. A successful example of the application of specific scent marketing strategy is Starbucks, which creates seasonal drinks available at the stores only in specific periods of the year, such as the Pumpkin Spice Latte, which is sold only during the Halloween, since the taste of pumpkin is highly evocative and emotionally connected to Halloween, holidays, and family times.

Companies may also benefit from odor priming researches for what concerns the development of a holistic consumer experience (Holbrook & Hirschman, 1982). These results, in fact, have shown that odors are crossmodally correlated with other senses, anticipating and influencing sensory experience in other modalities (Demattè, Sanabria, Sugarman, & Spence, 2006). Since then, companies may use scent to develop a positive affective evaluation of certain products in the store for which scent is a nondiagnostic attribute, anticipating more diagnostic attribute of those products. For example, a scented packaging of chocolate, or a scented print advertising may anticipate the flavor of chocolate of a snack, and thus increases interest in the product before sale.

Starbucks, for example, creates seasonal products, new drinks that are available at the stores only in a specific period of the year such as the Pumpkin Spice Latte, which is sold only during the Halloween. Black Friday, Back-to-school shopping season, and Christmas campaigns are all examples of the notion that every season offers managers the opportunity to better plan their marketing strategies. The taste of spicy pumpkin is highly evocative and emotionally connected to Halloween, holidays, and family times. Similarly, odors may represent an easy-to-develop, and low-cost tool to connect consumers with products and stores, as well as to create a thematic, season-congruent holistic environment.

9.4 Limitations and Future Research

However, this research is not without limitations. First, I used only scent belonging to the food category since they are more familiar to most individuals (Gaillet et al., 2013; Stevenson, 2009). I suggest that further studies could investigate the affective and semantic priming effects applying odors belonging to different, may be more complex categories, to validate the results in other specific domains of consumer behavior interest. For example, future studies may explore how odor priming work with luxury or high-involvement products since scent represents a relevant attribute for those products (e.g., perfumes, luxury cars, fashion brands). Second, this research did not clarify whether semantic odor priming effectively occurs because the scent is congruent with the more general category (e.g., food) or the more specific category (e.g., sweet food, sour food). When comparing the grape and the chocolate scents applied in this research, the two odors belong both to the same, more general category (e.g., sweet food) since they are matched for valence (e.g., both are perceived as pleasant), edibility (e.g., both are perceived as edible), and sweetness (e.g., both are perceived as sweet); however, they belong to different specific categories (e.g., grape is fruity, chocolate is not fruity). The findings show that odors that match on the valence dimension are equally effective as a semantic prime, suggesting that semantic effects of odors may include other types of odors than the one which is hypothesized to have a certain semantic meaning. Third, the scent manipulation, as not involved diffusing the scent in the environment, was not subliminal as in other studies on odor priming (Doucé et al., 2013; Gaillet et al., 2013). Thus, participants of these experiments were not completely unaware of the olfactory stimulus they were primed with. Further researches should address to what extent the awareness of the odor interferes with affective and semantic priming effects. Finally, these studies did not include the exploration of moderating effects of other relevant variables. I suggest that future studies should also investigate the possible moderating effects of individuals' olfactory sensibility, individual differences in encoding olfactory stimuli, odor recognition, and motivation to process. Moreover, I only focused on how odor priming affects processing of visual, unrelated stimuli. The extent to which odor affective and semantic priming influences processing of stimuli in other sensory modalities (e.g., auditory, gustatory), needs to be further investigated.

10. Conclusions

These eight experiments have explored the underlying cognitive mechanism through which odors may successfully act as a prime in a decision-making context and, thus, affects consumer information processing and product and brand choice and demonstrated that the incidental exposure to odors seem to have an impact on affective evaluations of unrelated visual and verbal stimuli (i.e., affective priming), and on product and brand choices of semantically related foods, inducing participants to choose more sweet dishes/snacks than sour when primed with the sweet odors of grape and chocolate. I conclude that the exposure the odor of grape and chocolate activated together the concepts of sweetness and edibility. Oppositely, when the odor is perceived as unpleasant (e.g., tomato scent) the concept of sourness and edibility is not activated in such that participants tended to avoid the semantically related foods and directed their choice toward sweet products and brans faster. Thus, the research confirmed that consumer choices and decision-making are significantly driven by unconscious and implicit cognitive mechanism, (Bargh & Ferguson, 2000) and that odors can indirectly act as affective and semantic primes regulating consumer product and brand choices.

CHAPTER 4

ARTICLE 3 - When Smelling Triggers Liking: the two routes of Processing Dynamics of Aesthetic Preferences

Abstract. Why do we choose a scented candle over an unscented one? Why do we evaluate a scented tissue as softer than an unscented tissue? Many things in the physical world are naturally scented, and many others may potentially be scented with a smell on which people rely to make their decisions. Accordingly, many companies are selling products artificially scented, even when the scent is not the central attribute being considered for evaluation and choice, since odors not only affect how people feel, they also regulate thinking and doing. Scent marketing research has successfully demonstrated that pleasant scents drive consumer choices toward certain products, brands, and stores. Previous studies on olfaction have found a positive effect of pleasantly perceived scent on evaluations, feelings, and behaviors. However, previous research has not clarified the underlying mechanism through which scents contribute to shaping aesthetic liking and choices. This research aims to investigate how olfactory information is cognitively processed and, thus, directly affects consumer aesthetic preferences. In particular, this article explores how product scent determines the positive affective responses of pleasure and interest in the product depending on the processing dynamics with which consumers interact with the product (i.e., automatic and controlled processing). For this reason, instead of focusing the attention on general product evaluations, these four studies explore how product scents contribute to improving consumer aesthetic liking for the product which, in turn, regulates product evaluations and product choices.

Keywords: product scent, processing dynamics, pleasure, interest, aesthetic preferences.

1. Introduction

According to the world's largest market research agency, the Research and Markets (2016), the global market for scented products increases approximately 30% annually. In particular, the global market for scented candles is likely to grow around 5.88% between 2017 and 2021. The NPD Group also refers that scented candles market increased about 18% in dollar sales and 15% in unit sales in the twelve months ending April 2016. The growth of the scented candles market is estimated around over $11 million in the past two years. Similarly, fragrance diffusers sales also grew by 36% in dollar sales and 27% in units during the same period. P&G estimates that scent beads are the fastest product category to grow, increasing at a 20% rate. The statistics portal, Statista, estimated that the size of the global fragrance market from 2012 to 2024 would be around USD 92 billion.

According to the growth of the market for scented products, many companies of traditionally unscented products are scenting their products to improve consumer experiences. The British furniture company Contour Mobel has sold the “aroma” sofas, which emitted the fragrances of rose, lavender, and vanilla to improve the consumers’ experience with their products. A study conducted by the Smell & Taste Research Foundation reported that consumers are willing to pay 10$ more for Nike sneakers placed in a scented room, than for those placed in an unscented room. A Net Cost supermarket in Brooklyn that installed ScentAir machines on the walls to infuse chocolate aroma in the candy aisle increased sales of candies of about 7% after the installation of the diffusers.

Pleasant scents influence not only the way consumers feel but also the way they think and behave, shifting their focus to positive attributes of the environment and products. This is the reason why consumers seem to choose scented products over the unscented ones and to assign to those products unique and positive attributes based solely on their scents.

Academic research has devoted more attention to the study of the effect of scent on product evaluations and consumer behaviors over the last thirty years. A recent study has shown that the degree of similarity between the color and the fragrance of the paper strips with which odors are commonly presented significantly impact consumer processing and product choices, guiding participants to always prefer the first product in a sequence of more products (Biswas, Labrecque, Lehmann, & Markos, 2014).

Krishna and colleagues (2010) demonstrated that gender-congruent scents might bias haptic perceptions of paper, regarding the paper texture (Krishna, Elder, & Caldara, 2010). Mitchell and colleagues demonstrated that scents might also influence information processing, decision-making, and choices of product semantically related or unrelated to the scent. In particular, their research suggested that between a candy assortment and a floral arrangement, participants processed product information more slowly in the presence of a congruent scent (i.e., chocolate for candies and floral for flowers) and also made more various choices across all the presented options (Mitchell, Kahn, & Knasko, 1995), meaning that when the scent is congruent with the product category consumers make more meaningful product choices.

Most of the research on olfaction in the fields of marketing and consumer behavior has focused the attention on consumer general evaluations and judgments. However, little attention has been turned to the investigation of how smells contribute to the formation of consumers' aesthetic preferences for the products and on the underlying cognitive mechanism through which odor perceptions regulate information processing, choice, and decision-making. In particular, it is still unclear from previous studies how cognitive responses to smells, such that evaluations and preferences for specific products occur as a consequence of individuals' processing dynamics on the two routes for persuasion, the automatic and the controlled processing routes (Petty & Cacioppo, 1986).

Current research on aesthetic preferences identifies two distinct aesthetic responses to sensory stimuli which both contribute to shaping general aesthetic liking for a product, such as pleasure and interest (Berlyne, 1971). However, most of the studies have investigated general responses to products, such as product judgments (Herr, Kardes, & Kim, 1991), product quality (Acharya & Elliott 2003), and product attractiveness (Workman & Caldwell, 2007), to explore consumers' aesthetic preferences. More recently Graf and Landwehr (2015) introduced the Pleasure-Interest Model of Aesthetic Liking (PIA Model) which conceptualize the general construct of aesthetic liking as consisting of pleasure-based (Krishna & Morrin, 2007) and interest-based liking, which alternatively results from automatic and controlled processing of information. This model integrates the two distinct affective responses of pleasure and interest and helps to explore how the processing dynamics operate on consumer aesthetic preferences depending on whether the attribute being evaluated is more likely to be processed on the central or on the peripherical route (Cacioppo, Petty, Kao, & Rodriguez, 1986; Graf & Landwehr, 2015).

With the attempt of applying the PIA model to research on olfaction, this article has general and specific purposes. First, the current research has the specific aim of clarifying the reason why people choose scented products over other, unscented alternatives, focusing on the process through which aesthetic responses occur instead on the very general consumer preferences and judgments, which represent only the outcome of the process of aesthetic preference formation.

Second, the application of the PIA model for Aesthetic Liking to olfaction aims to explore how odors added to naturally unscented products contribute to shaping their preferences for the product. Third, this research clarifies the underlying processing dynamics under which odors are processed by individuals providing empirical evidence that pleasure and interest in the product are enhanced simultaneously but are driven by different processing experiences, the automatic and the controlled processing of olfactory stimuli.

Moreover, this article extends the application of the PIA Model to olfactory cues demonstrating the close connection between scent and cognition and the impact of pleasure and interest on general aesthetic liking.

This article also reaches more generic goals, according to the general purposes of this dissertation, such those of i) exploring and empirically testing the potential of a cognitive-based approach (i.e., odor priming) to be applied to scent studies in marketing and consumer behavior; ii) investigating the underlying mechanism through which odors regulate behavior and decision-making through cognition; and iii) extending the notion that odors are multisensory and complex experiences that are not only emotionally perceived but processed through their meanings.

This research focuses on the role of cognition in determining consumer aesthetic responses to scents and contribute to the literature of scent marketing in several ways.

Theoretically, results of these four studies confirm that aesthetic liking may be triggered by the two distinct aesthetic responses of pleasure and interest in the product, depending on the underlying processing dynamics through which people process the stimulus being encoded, the automatic and the controlled processing. In particular, this research demonstrates that pleasure and interest are different aesthetic responses from a more general product attractiveness and liking, as they are directly triggered by the underlying processing dynamics of automatic and controlled processing style, while product attractiveness results from the increased pleasure and interest but is independent of the processing dynamics. Finally, the present findings also find support for the notion that aesthetic preferences differ depending on the degree of perceived typicality of the product in such that atypical products are preferred over typical products.

This research also addresses methodological issues relative to scent marketing studies by demonstrating that odors may be encoded in isolation and that processing dynamics can be successfully manipulated in laboratory settings

Finally, these findings provide managers and retailers interesting insights regarding how develop stronger aesthetic liking for products through product scent.

2. Theoretical Background

Every day consumers make decisions among a huge set of alternatives. However, consumers do not always buy the products with which they are used to, the more familiar, nor the products which provide them the highest value and benefit. In many cases, consumers prefer new products and new consumption experiences than typical ones.

It is well established that consumers are no longer considered as logical thinkers who buy products to solve problems and satisfy needs (Holbrook & Hirschman, 1982), and that their choices are sometimes contradictory and driven mostly by their subjective aesthetic evaluations of experiential products and services. Therefore, the classical theory of processing dynamics (Bettman, 1979) is no longer sufficient to capture the aesthetic enjoyment of consumption, due to the more complex cognitive processes underlying aesthetic consumer responses.

Cognition does not operate only through the traditional cognitive processing of encoding, learning, and memory (Olson, 1980) but it works through more subconscious cognitive processing dynamics (Evans, 2006; 2008; Faerber, Leder, Gerger, & Carbon, 2010).

For this reason, the study of aesthetic preferences has received the greater attention of academics (Berlyne, 1971; Hekkert, Snelders, & Wieringen, 2003; Veryzer & Hutchinson, 1998).

Current approaches to aesthetic liking and its determinants have established that aesthetic preferences result from two distinct processing stages, the automatic and the controlled processing (Chaiken, 1980; Carbon & Leder, 2005; Reber, Schwarz & Winkielman, 2004). Most of the theories of cognitive processing agree that processing dynamics might occur at both, the unconscious/automatic and the conscious/deliberative levels (Evans, 2006; 2008). Accordingly, the two distinct approaches to the study of the cognitive processes underlying the formation of aesthetic liking have focused on the automatic (i.e., heuristic) and the controlled (i.e., systematic) elaboration, alternatively (Carbon & Leder, 2005; Reber, Schwarz, & Winkielman, 2004).

The first body of research investigates how the aesthetic appreciation emerges as the result of the automatic processing which contributes to shaping the first total impression of an object (Reber et al., 2004). This model, also known as the Fluency Framework, assumes that the aesthetic liking of an object is stimulus-driven, and directly depends on the fluency with which the object is elaborated by individuals, in such that the more fluent the object is perceived, the higher the aesthetic preference for the object (Reber et al., 2004).

Despite the great application of the fluency model to the investigation of aesthetic preferences (Im, Lennon, & Stoel, 2010; Petrova & Cialdini, 2005; Van Rompay & Pruyn, 2011), empirical evidence and marketing practice have shown that consumers are also attracted by novel (Hekkers et al., 2003), complex, and disfluent products (Cox & Cox, 2002; Landwehr, Labroo, & Herrmann, 2011). In contrast with the fluency approach, other researchers have turned the academic attention to how aesthetic liking emerges from a more effortful elaboration of the objects (Carbon & Leder, 2005; Graf & Landwehr, 2017). For instance, many studies have demonstrated that elaboration can enhance aesthetic liking (Faerber et al., 2010; Landwehr, Wentzel, & Herrmann, 2013).

Due to the complex mechanism through which the subconscious elaboration affects judgments, some researchers have integrated the duality of processing dynamics in a class of theories also known as the Dual-Process Theories to investigate the two routes through which persuasion occurs (Chaiken & Trope, 1999; Petty & Cacioppo, 1986). This body of dual-process theories highlights the distinction between social cognitive processes which are unintentional, automatic, and unconscious, and those which are more deliberative and reflective, which are both at the basis for the understanding of a variety of consumption and social phenomena (Bargh, 1992; Bargh, Chaiken, Govender, & Pratto, 1992; Chaiken, 1987; Strack & Deutsch, 2004).

Accordingly, the literature of aesthetic preferences has maintained the dualistic character of aesthetic liking by conceptualizing consumer preferences as the result of two distinct affective responses, the pleasure and the interest in the product, which emerge from the two distinct processing dynamics of automatic and controlled processing (Berlyne, 1971; Graf & Landwehr, 2017).

More recently, Graf and Landwehr (2015) have introduced the Pleasure-Interest Model of Aesthetic Liking (PIA Model) that integrate the basic assumption of the dual-process perspectives by assuming that pleasure-based liking is triggered by automatic, unconscious processing, whereas interest-based liking is triggered by a more active perceiver’s elaboration (Graf & Landwehr, 2017). Consequently, pleasure-based liking is stimulus-driven, meaning that at the time of encoding the stimulus is processed with an immediate affective reaction of pleasure or displeasure (Bargh et al., 1992; Zajonc, 1980); oppositely, interest-based liking is a function of the controlled processing, which involves the attribution of meaning to the stimulus being processed (Leder, Belke, Oeberst, & Augustin, 2004). While pleasure arises quietly automatically, interest is a motivation-oriented aesthetic response, since evidence demonstrated that interest occurs when individuals feel motivated to proceed in complex elaboration tasks (Silvia, 2005b) of disfluent stimuli (Silvia, 2005a).

This approach to cognitive dynamics might explain why in many situations consumers prefer less fluent, more complex, and less familiar products. Moreover, a dual-process approach might also explain why consumers prefer, in many cases, scented products over than unscented products, even when the scent is not a central attribute for the evaluation, such as a scented sofa.

Research on olfaction in the field of marketing and consumer behavior have found a positive effect of pleasant scent on consumer decision-making and choices (Biswas, Labrecque, Lehmann, & Markos, 2014; Krishna et al., 2010; Mitchell et al., 1995), perception of product quality (Chebat & Michon, 2003), product preferences (Bone & Jantrania, 1992), purchase intentions for certain products (Spangenberg, Sprott, Grohmann, & Tracy, 2006), as well as a significant impact of smells in regulating consumer cognition and memory (Krishna, Lwin, & Morrin, 2010; Morrin, Krishna, & Lwin, 2011b).

However, previous research has not explored the cognitive dynamics through which olfactory cues shape consumer aesthetic preferences for products. Accordingly, this article theoretically and practically contributes to both, the literature on processing dynamics and to scent marketing research by providing empirical evidence that, similarly to attributes in other modalities (i.e., descriptive information) odors are also cognitively processed through two distinct processing dynamics and that, depending on which processing style is followed by consumers, scents contribute to enhance pleasure and interest which, in turn, shape aesthetic liking.

2.1 The PIA Model

The PIA Model represents a recent advance in the literature of aesthetic preferences and its determinants (Graf & Landwehr, 2015). This model has been developed with the aim of investigating the consumer's aesthetic appreciation of an object which not necessarily involve the need or the desire for that object. Accordingly, the PIA Model combines the two approaches to the study of aesthetics, the fluency-based theories, and the dual-process theories, to the investigation of the "disinterested" aesthetic preferences and the processing dynamics underlying consumer aesthetic judgments.

In many situations consumers express contradictory preferences for stimuli in the market, preferring atypical objects over the more familiar and fluent ones (Carbon & Leder, 2005; Landwehr et al., 2013), which contradicts the basic assumptions of fluency theories according to which consumers tend to maintain a psychological consistency in their choices and prefer clear and more fluent stimuli (Reber, Winkielman, & Schwarz, 1998).

In contrast with the fluency-based approach, the PIA model integrates the idea of dual-process theories that aesthetic judgments may arouse in consequence of two distinct and hierarchical processes through which individual elaborate the stimulus being encoded, the automatic and the controlled processing (Chaiken, 1987; Petty & Cacioppo, 1986). The automatic processing occurs immediately when the individual encounters a stimulus and happens quite unconsciously (Bargh et al., 1992; Bargh, Chaiken, Raymond, & Hymes, 1996). This stimulus-driven processing does not activate any active elaboration nor mental processing of the stimulus itself but has been associated with significant affective reactions (Winkielman & Cacioppo, 2001). According to the idea endorsed by previous theories in social psychology that 'preferences need no inference' (Zajonc, 1980), those affective responses are more spontaneous and not necessarily imply a deliberate cognitive elaboration (Murphy & Zajonc, 1993; Zajonc, 1980).

The controlled processing, instead, occurs when people actively engage in a more deliberate interpretation of the stimulus which receives greater attention and cognitive efforts from the perceiver (Evans, 2006; 2008). A study on aesthetic preference for artworks has demonstrated that presenting titles of the paintings strongly affect the way in which the paintings are understood (Leder, Carbon, & Ripsas, 2006). In particular, the study demonstrated that presenting titles together with the artworks does not affect aesthetic perceptions of the painting during the short presentation (i.e., automatic processing) but after the long presentation (i.e., controlled processing), resulting in a higher value of the understanding of the painting (Leder et al., 2006).

To the controlled processing occur, individuals need both, the ability and the motivation to engage in a more complex and demanding elaboration task (Alter, Oppenheimer, Epley, & Eyre, 2007).

The automatic and controlled processing routes lead to two distinct affective responses, pleasure and interest (Berlyne, 1971). In particular, the PIA model proposes that stimuli are processed only automatically or first automatically and then through the controlled processing depending on whether they have the ability and the motivation to process toward a cognitive enrichment (Graf & Landwehr, 2017). When the stimulus is processed automatically, the affective response of pleasure arises, since affective evaluations of an object occur automatically and outside of the individual conscious awareness (Bargh et al., 1996). Oppositely, the affective response of interest is associated with the motivation to interact with the stimulus (Silvia, 2005b) and arises as a consequence of a more deliberate interaction with the object of the evaluation.

To explain the phenomenon of consumers contradictory preferences for less typical and fluent objects, the PIA model proposes that aesthetic pleasure arouses for more fluent stimuli, for which people do not feel the motivation to engage in a more effortful processing, while the aesthetic interest occurs for more disfluent stimuli, since individuals might feel the need of a cognitive enrichment (Graf & Landwehr, 2015). Thus, the more general aesthetic liking might result from both qualitative different aesthetic responses, the pleasure-based liking, and the interest-based liking, depending on the distinct underlying processing dynamics through which the stimulus is elaborated.

2.2 Processing Fluency

Empirical evidence has shown a close connection between fluency and affective experiences (Losch & Cacioppo, 1990; Winkielman & Cacioppo, 2001). Cognitive Consistency Theory (Heider, 1946, 1958) suggests that individuals tend to preserve a psychological consistency with their beliefs and avoid inconsistencies. Accordingly, it is well established that performing mental tasks experienced at a low level of consistency (i.e., cognitive dissonance) triggers negative affect (Harmon-Jones, 2000; Losch & Cacioppo, 1990). Whether the relation between fluency and affect is positive or negative depends on the difference between the expected fluency of the task and the fluency effectively experienced (Carver & Scheier, 1990).

According to fluency-based theories (Reber et al., 2004), the aesthetic appreciations of an object is positively linked to the degree of fluency with which the object is mentally processed, in such that the greater the perceived fluency of the stimulus, the higher the aesthetic judgment of that stimulus. However, the fluency approach does not explain why, in many situations, people are attracted by atypical, and disfluent stimuli (Cox & Cox, 2002;

Landwehr et al., 2011) and why mental elaboration results in higher aesthetic liking (Faerber et al., 2010; Landwehr t al., 2013).

Studies on aesthetic emotions aroused by visual arts have demonstrated that art experts find the more complex (Silvia, 2005c) and abstract (Hekkert & Van Wieringen, 1996) forms of art more interesting.

The PIA Model proposes that the perceived fluency of a stimulus is a function of the type of mental processing through which elaboration occurs (Graf & Landwehr, 2015). Accordingly, the informative value of the perceived fluency differs between the two distinct processing dynamics of automatic and controlled processing. More specifically, in the condition of a stimulus-driven (i.e., automatic) processing, the perceived fluency is merely informative about the object, meaning that the perceived fluency of processing is attributed to the visual and physical characteristic of the object itself; oppositely, in the condition of a perceiver-driven (i.e., controlled) processing, the perceived fluency of processing concerns not simply the physical appearance of the object but also the quality of the individuals' interaction and their ability to process the stimulus (Graf & Landwehr, 2015).

According to the distinction between the two stages of processing fluency, the automatic processing occurs unconsciously and results in a higher perceived fluency of the stimulus. The higher perceived fluency of processing the stimulus automatically triggers, in turn, the pleasure-based aesthetic liking.

In contrast, as controlled processing is more deliberate and requires the motivation to process and to rise a cognitive enrichment (Kruglanski, Orehek, Dechesne, & Pierro, 2010), people assign their positive experienced affect to the effectiveness of their efforts in mentally processing the stimulus, and this lower perceived-fluency (i.e., or disfluency reduction) of their processing triggers the interest-based aesthetic liking for the stimulus.

The notion that elaboration is positively related with aesthetic liking is supported by empirical studies which have demonstrated that the greater the effort devoted to performing a task, the greater the interest in the task (Efklides & Petkaki, 2005; Muth & Carbon, 2013). Taking into account that the perceived processing fluency represents a significant aspect of the relationship between processing dynamics and aesthetic liking, the understanding of the optimal level (i.e., not too simple, not too complex) of complexity of an object (e.g., products, slogans, brands) may add a relevant contribution to how engage people in a more elaborated processing of aesthetic stimuli with a direct positive effect on their interest in the object.

3. Hypotheses

The power of odors in influencing consumers responses and behaviors toward products, brands, and stores is well established in the literature on sensory marketing (Krishna, 2012), and also supported by empirical evidence (Krishna et al., 2010; Mitchell et al., 1995; Spangenberg et al., 2006). In particular, findings of previous studies have demonstrated that scents have a significant effect on consumer evaluations of the store environment (Mattila & Wirtz, 2001), brand evaluations (Morrin & Ratneshwar, 2000), purchase intentions (Mitchell et al., 1995), behaviors toward the store (Spangenberg, Crowley, & Henderson, 1996), purchase-related behaviors (Doucé, Poels, Janssens, & De Backer, 2013), and consumer memory (Krishna et al., 2010).

While most of the studies have focused on the role of emotions elicited by odors in the field of consumer behavior (Lehrner, Eckersberger, Walla, Poetsch, & Deecke, 2000; Lehrner, Marwinski, Lehr, Johren, & Deecke, 2005; Mattila & Wirtz, 2001), great attention has been turned by researchers to the effect of scent on cognition. More specifically, field and laboratory experiments have found that scent-based retrieval cues contribute to restoring lost information (Morrin et al., 2011), increase the number of product attributes recalled (Lwin, Morrin, & Krishna, 2010), improve not only olfactory but also visual imagery (Lwin et al., 2010), enhance memory for product information (Krishna et al., 2010), improve recall of product information when the scent is congruent with the product category (Mitchell et al., 1995), increase subjects' ability to recall unfamiliar (versusfamiliar) brands (Morrin & Ratneshwar, 2000), and increase advertising recall more than pictorial and visual cues in the context of movie theatre commercials (Lwin & Morrin, 2012).

These studies show that pleasant scents influence not only the way consumers feel but also their thinking and behavioral tendencies demonstrating that consumers assign to products, brands, and environments stimuli certain positive properties due solely to the scent. Despite the great advance that all these results have provided to scent marketing literature and consumer behavior, previous research has focused the attention more to the investigation of the effect of scent on consumers' general evaluation of products, brands, and stores.

However, little attention has been turned to the aesthetic experience that odors provide consumers. In other words, previous studies have not investigated how odors shape consumers' aesthetic preferences for the products, which are regulated by distinct underlying processing dynamics (Graf & Landwehr, 2015).

For this reason, I believe that the application of the PIA model to empirical studies on olfaction might address significant contributions to how the aesthetic liking arises depending on which cognitive processing consumers are engaged with.

The PIA model proposes that the two distinct affective responses of pleasure and interest are triggered by distinct processing dynamics, depending on the style of processing of the object being evaluated (Graf & Landwehr, 2015). The model also proposes that fluency plays an important role in shaping aesthetic preferences, since consumers often prefer less typical and less fluent products, as demonstrated from the empirical applications to the PIA model to the context of product design typicality (Graf & Landwehr, 2017; Landwehr et al., 2013).

Studies on social psychology have demonstrated that olfactory cues, as stimuli in other modalities, are effective in influencing whether individuals process information more automatically or in a more controlled way leading to affective judgments and behaviors that are congruent with the perceived pleasantness of the scent (Baron, 1981).

Due to the connection between olfactory stimuli and affective reactions, I propose that odors might also trigger aesthetic liking, shaped by both, pleasure and interest, and be processed through both, the automatic and controlled processing dynamics. Moreover, I believe that odors added to a naturally unscented product may change the perceived typicality (i.e., perceived fluency) of the product itself, especially when odors are not congruent with the product category. This notion is supported by some empirical evidence which demonstrated that scent congruence with the product category, store, and other cues in the shopping environment increases the ease and the fluency of the processing of information and, thus, leads to better choices (Biswas et al., 2014; Bone & Jantrania, 1992; Krishna et al., 2010; Mitchell et al., 1995; Morrin & Ratneshwar, 2000). In particular, I propose that:

H1: Atypical (versus typical) product scent increases pleasure-based liking when processed automatically;

H2: Atypical (versus typical) product scent increases interest-based liking when processed systematically (i.e., controlled processing).

The PIA model has discussed the connection between processing dynamics and individuals' perceived affect (Leder et al., 2006) resulting from a more deliberate elaboration of a stimulus. Olfactory cues also are directly linked to consumer affective responses. However, several studies have produced mixed results on the role of emotions as mediators of the relation between odors and consumer behaviors and demonstrated the positively perceived scents do not influence mood changes (Cirrincione, Estes, & Carù, 2014; Morrin & Ratneshwar, 2000; Spangenberg, Crowley, & Henderson 1996). For this reason, I hypothesize that pleasant odors are more effective to enhance positive affective responses toward the product than enhance individuals' perceived moods. Therefore, I propose that:

H3: Atypical (versus typical) product scent increases aesthetic liking (i.e., pleasure and interest) toward the product but does not change individuals' perceived moods.

According to the PIA model, while pleasure-based liking is automatic (Graf & Landwehr, 2015) and unconscious (Bargh et al., 1992) because triggered by automatic processing, interest-based liking arises after controlled processing and thinking about the object. Moreover, the interest-based liking involves a more conscious attribution of meaning to the stimulus being encoded (Leder et al., 2004) and is motivation-oriented since individuals need both, the ability and the motivation to process the object (Silvia, 2005ab). Therefore, I believe that interest-based liking is more effective than pleasure-based liking to shaping more stable aesthetic preferences which, in turn, improve general evaluations of the object. Thus, I propose that:

H4: The interest-based liking, compared with pleasure-based liking, mediates the relation between pleasant product scent and product evaluations.

Previous studies have also demonstrated that cognitive elaboration leads to increased aesthetic liking only in the case of very innovative and atypical products (Carbon & Leder, 2005; Ferber et al., 2010). To show that aesthetic liking benefits from elaboration, other studies have manipulated product typicality by providing participants with other attributes of the stimulus, such as titles of artworks (Leder et al., 2006) or descriptive information (Russel, 2003). Previous research on olfaction in consumer behavior demonstrated that olfactory cues are more likely than stimuli in other modalities to influencing consumer responses (Lwin & Morrin, 2012; Lwin, Morrin, Chong, & Goh, 2016; Willander & Larsson, 2006). Accordingly, I propose that odors are more effective than verbal information (i.e., description of a product attribute) to enhance aesthetic liking. Thus, I hypothesize that:

H5: Atypicality of olfactory information is more likely than atypicality of verbal information to enhance aesthetic liking (i.e., pleasure and interest).

To test the hypotheses, I conducted four laboratory experiments which address important contribution to how odors added to an unscented product, shape consumer aesthetic preferences for that product depending on the type of the processing dynamics that are used for the elaboration. Moreover, I demonstrated that odors, as well as stimuli in other modalities, are likely to be processed on both, the automatic and the controlled processing, making the consumer's elaboration more meaningful and, thus, enhancing aesthetic experience of the products.

4. Pilot Study

4.1 Overview of the Study

First, the pilot study was designed to investigate the main effect of product typicality on aesthetic liking and to confirm the theoretical robustness of the predictions of the hypotheses. Product typicality was manipulated through two distinct attributes: the scent of the product (e.g., atypical versus typical), and the descriptive information about the product (e.g., atypical versus typical). The pilot study does not include any manipulation of processing dynamics (e.g., automatic versus controlled) since the aim is to validate the theoretical assumptions about the main effect of product typicality on aesthetic preferences.

4.2 Product Stimuli Pretest

Pretest 1. To select the product to be used in the main studies, two product stimuli pretests were conducted. In the first pretest, thirty-seven participants (19 men and 18 women), ranged in age from 17 to 22 (M= 18.70, SD= 1.0505) received an online questionnaire. First, participants were asked to mention three products they commonly use daily. The most mentioned products belonged to both categories of scented products (e.g., shampoo, perfume, body lotion) and unscented products (e.g., smartphone, tv, car). To ensure a greater application of the conclusions, I focused only on products for which scent is not a central attribute for evaluations (e.g., unscented products) (Krishna, Lwin, & Morrin, 201). Accordingly, the most mentioned products were the smartphone (13 citations, 21.6% of the sample), computer (7 citations, 18.91% of the sample), and pencil (5 citations, 13.5% of the sample). In the second part of the pretest, participants were asked to rate the importance of all the five sensory attributes (on a scale of 1= very unimportant to 5= very important) for each of the three mentioned products. Participants rated the importance of the attributes of scent, touch, taste, vision, and audition for each of the three products they mentioned earlier; moreover, I add five products to be also evaluated, which were the candle, pencil, tissue, sunscreen lotion, and book. I add a scented product (e.g., sunscreen lotion) only to ensure a difference in importance ratings of each sensory attribute. Respondents evaluated the attribute of the scent very unimportant for pencil (M= 1.29, SD= 0.61), significantly different from the scale midpoint of 2.5, t (36) = -11.846, p< 0.001, and significantly different from importance ratings of the scented product (sunscreen lotion: M= 3.59, SD= 1.11), t (36) = -13.302, p< 0.001. Thus, the pencil was selected as the product stimulus since it satisfied all the characteristics I aim to include in the main studies: unscented, low involvement, and highly familiar (e.g., participants use pencil daily) product.

Pretest 2. To select the scents to be used in the olfactory stimuli pretest, another product pretest was performed in which participants were asked to associate scents to several product stimuli selected from the pretest 1. In particular, participants received an online questionnaire and were presented with a picture of the five products selected from the first pretest (e.g., candle, pencil, tissue, sunscreen lotion, and book) and with a set of 12 names of fragrances for each product. All selected scent names were the names of common odors, which can be easily found in nature, divided into the following category: two woody, two floral, two spicy, two citrus, two water, and two food scents were tested. Sixty-nine participants (35 men and 34 women), ranged in age from 17 to 21 (M= 17.91, SD= 1.01), selected two out of twelve scents that they considered as most representative for each product presented. The wood (66 citations) and the blue chamomile (52 citations) fragrances were selected for the pencil, among other mentioned fragrances (e.g., rosemary, mint). Based on the pretest 2, the selected fragrances were tested in the olfactory stimuli pretest.

4.3 Olfactory Stimuli Pretest

The olfactory stimuli pretest was conducted to select the scent used in the main study. In particular, the pretest had the aim of checking the affective dimension of scent. Other dimensions, such as familiarity, liking, and arousal were also included in the analysis according to a previous study (Spangenberg et al., 2005). Forty participants (25 men and 15 women), ranged in age from 18 to 46 (M= 23.12, SD= 1.16), were asked to sniff twelve different scents, representing all the main olfactory families (Spangenberg et al., 1996). All selected scents were common odors, which can be easily found in nature, divided into the following category: two woody, two floral, two spicy, two citrus, two water, and two fruity scents were tested. Each scent was put on a paper string measuring 7 cm in length and 2 cm in height, and identified by an alphanumeric code. Scents and paper strings were developed in cooperation with a commercial aroma supplier from the local market in Brazil. On each paper string, two drops of each scent were put, to control for scent intensity. All scents were colorless to neutralize the effect of color on scent evaluation (Zellner & Kautz, 1990). Before taking part in the pretest, participants read and signed an informed consent screening for allergies (e.g., see Spangenberg et al., 1996). Following Krishna and colleagues (2010) participants were asked to smell coffee beans contained in an opaque plastic box in front of them before starting the pretest and between one test and another, to neutralize the effect of a previous scent on the next (Secundo & Sobel, 2006). Moreover, the presentation order of the scents was randomized among participants, to control for the effect of the order presentation on scent ratings. Participants were asked to sniff the paper string as long as they wish and then rated each scent regarding pleasantness (bad/good) and familiarity (very unfamiliar/very familiar). After the evaluation, participants were presented with four pictures of different products (e.g., tissue, pencil, shampoo, and candle) in random order, and asked to sniff the paper string containing two drops of the fragrance while looking at each product in the picture. Participants, then, rated each scent regarding appropriateness (very inappropriate/very appropriate) for each of the product presented in the picture. All questions were measured with a seven-point semantic differential scale. Respondents found the mixed fragrance of amber and musk scent as more pleasant ($M= 5.42$, $SD= 1.16$), significantly different from the scale midpoint of 3.5, $t(18) = 7.158$, $p < 0.001$, and more familiar ($M= 5.05$, $SD= 1.26$), significantly different from the scale midpoint of 3.5, $t(18) = 5.337$, $p < 0.001$, but also as the less appropriate for the pencil ($M= 2.84$, $SD= 2.11$). The wood scent was also rated as pleasant ($M= 4.57$, $SD= 1.86$), significantly different from the scale midpoint of 3.5, $t(13) = 2.145$, $p < 0.05$, not very familiar ($M= 3,79$, $SD= 2.00$), and more appropriate ($M= 4,07$, $SD= 1.63$) for pencil. Despite the ratings of familiarity and appropriateness of wood scent were not statistically significant from the scale midpoint of 3.5, they were significantly different from the ratings of familiarity and appropriateness of amber and musk scent, $t(13) = 2.876$, $p < 0.05$ and $t(13) = -2.453$, $p < 0.05$ respectively. Thus, the amber and musk scent was selected as the pleasant but not appropriate fragrance and the wood scent as the pleasant and appropriate fragrance for the pencil in the main studies.

4.4 Sample and Design

One hundred and fourteen undergraduate and graduate students from a business school of a large Brazilian metropolitan area participated in the experiment in return for course credit (60 men and 54 women). The participants, ranged in age from 17 to 47 (M= 22.61, SD= 7.75, SE= 0.7299), took part in a 2 (product scent: typical versus atypical) X 2(verbal information: typical versus atypical) full factorial design. One observation was excluded from the analysis since it exceeds for more than three standard deviations the mean duration of the questionnaire, which was of 432,68 seconds on average. In the typical product scent condition, the pencil was imbued with a wood scent, whereas in the atypical product scent condition the pencil was imbued with an amber scent. Similarly, in the typical verbal information condition, participants were told that the pencil was a very common pencil available in the market, whereas, in the atypical verbal information condition, participants received the instruction that the pencil differed from other similar pencils available in the market because ecological and unique on touch, smell, and design performance. I opted for a slight manipulation of verbal information typicality to explore whether participants were sufficiently sensitive to this type of manipulations. In the main studies, I adopt a more significant manipulation of verbal information about the product.

Figure 1a – Product Stimulus: Happy Time pencil

4.5 Procedure

The experiment was performed in a laboratory and was presented as a study intended to understand the participants' evaluations of a new product to be introduced in the market.
After entering the laboratory, participants were asked to sit in front of a computer screen at an approximate distance of 50 cm and to start the questionnaire. In the first phase, participants were asked to complete the six items related to their moods, which were those of stimulated-relaxed, excited-calm, frenzied-sluggish, jittery-dull, wide awake-sleepy, and aroused-unaroused (Mehrabian & Russell, 1974), on a 7-point Likert scale. Measures of feelings were introduced at the beginning of the questionnaire to collect participants' previous moods that I use later as the control variables and to explore potential mood changes after the experience of the products. In the first phase of the questionnaire, participants were also asked to complete the OAS scale (Odor Awareness Scale) (Cronbach's $\alpha = 0.714$), which originally consists of a set of 11 items, of which only the 9 positive items were used, accessing general individual differences in their attention to odors in the environment (Smeets, Schifferstein, Boelema, & Lensvelt-Mulders, 2008). During the first phase of the questionnaire, participants were asked to provide ratings of their smoking frequency and allergy frequency which were included as the covariates.
The second phase of the experiment consisted of an incidental learning phase in which participants received the instruction that a new pencil is ready to be launched into the market and that the producer would like to understand the students' opinion about the product. Participants were also told that a sample of the product was available on the left side of the computer. Participants were randomly assigned to one of the four experimental conditions. In the typical verbal information condition, participants were told that the pencil was a common pencil with no particular specific characteristic and that they test the product on the sheet of paper provided them, whereas in the atypical verbal information condition, participants were told that the pencil was ecological and special on the attributes of touch, smell, and design performance and that they could test, smell, touch, and view to evaluate it.
To the left side of the computer, participants were provided with a sheet of paper measuring 14 cm in length and 7 cm in height and with a sample of the product. The pencil was an unbranded common black pencil easy to find in any stationery store. The pencil was an unbranded pencil to control for potential brand effects on product evaluations. In the first phase, participants received the instruction that they were evaluating a new pencil to be

introduced on the market. In the typical product scent condition, the pencil was scented with two drops of wood fragrance, while in the atypical product scent condition, the pencil was scented with two drops of amber and musk fragrance. Both scents were dripped into the wood of the pencil, which was then placed in airtight bags for 48 hours, as suggested by Krishna and colleagues (2010). After the exposure to the product, the third phase of the experiment consisted of the evaluation task, in which participants were asked to complete several dependent measures. Aesthetic preferences for the product were measured across the two dimensions of pleasure and interest. The dimension of pleasure was measured with the two items taken from Turner and Silvia (2006) and was, "I perceive the product to be … (1) displeasing/pleasing, (2) unenjoyable/enjoyable." Interest was measured with two items adapted from Silvia (Silvia, 2005 a, b), which was, "I perceive the product to be … (1) disinteresting/interesting, (2) boring/exciting." As dependent measures, participants evaluated the pencil based on the perceived value, performance, attractiveness, perceived quality, and valence with a single item 7-point Likert scale for each variable. Moreover, participants were asked to evaluate the scent of the pencil across its appropriateness for the pencil and pleasantness with a single item 7-point Likert scale for each measure.

As manipulation checks, the degree of perceived typicality of the scent and the degree of the perceived typicality of the product were included. More specifically, the degree of perceived typicality of the scent was measured with the question "The scent of the pencil was very different from the scent of a common pencil" (1= strongly agree, 7= strongly disagree), and the degree of perceived typicality of the product was measured with the question "The pencil is very common/typical in the market" (1= strongly agree, 7= strongly disagree), both on a 7-point Likert scale.

Consumer moods after the exposure to the product were also measured, which were those of stimulated-relaxed, excited-calm, frenzied-sluggish, jittery-dull, wide awake-sleepy, and aroused-unaroused (Mehrabian & Russell, 1974), on a 7-point Likert scale, as the aim was to compare measurement of incidental affect (i.e., moods measured after the exposure to the product) with previous moods (i.e., moods measured before the exposure to the product). At the end of the questionnaire, participants answered questions regarding their age and gender.

4.6 Results

Manipulation Checks. First, an independent sample *t*-test was conducted to compare participants' ratings of scent typicality for the product category (e.g., 1= very typical, 7= very atypical) between the two scent conditions. The difference in the mean scores of the scent perceived typicality was significant between the two conditions, and are shown in Table 1a. In particular, the amber and musk scent was perceived as less typical (M = 6.1522, SD = 1.5487, SE = 0.2283) than the wood scent (M = 4.6119, SD = 2.2016, SE = 0.2689), $t(111) = 4.097$, $p < 0.001$, as predicted by the olfactory stimuli pretest.

Then, an independent sample *t*-test was performed to compare participants' ratings of product typicality (e.g., 1= very typical, 7= very atypical) between the two verbal information conditions. The difference in the mean scores of the product typicality was significant between the two conditions, and are shown in Table 2a. In particular, the atypical (e.g., special on touch, scent, and design performance) pencil was perceived as less typical (M = 5.1765, SD = 1.5710, SE = 0.2199) than the common pencil (M = 4.4194, SD = 2.2510, SE = 0.2858), $t(111) = -2.029$, $p < 0.05$.

Table 1a - Results of Pilot Study – Manipulations Check – Scent Typicality (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

	Mean Score	Standard Error
Atypical Product Scent	6.1522 (1.5487)	0.2283
Typical Product Scent	4.6119 (2.2016)	0.2689

Table 2a - Results of Pilot Study – Manipulations Check – Verbal Information Typicality (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

	Mean Score	Standard Error
Atypical Verbal information	5.1765 (1.5710)	0.2199
Typical Verbal information	4.4194 (2.2510)	0.2858

Moods. The ratings of the perceived arousal were analyzed as a function of the experimental conditions. We, first, computed the six items of arousal measured twice, at the beginning and the end of the questionnaire, in an index (Cronbach's α= 0.851, Cronbach's α= 0.888). As the ratings of arousal were measured twice to explore the effect of the incidental moods (e.g., moods induced by the experience with the product) and control for previous moods (e.g., moods not induced by a particular stimulus), before and after the experience with the product, a Repeated Measure ANOVA was performed with the arousal ratings as the dependent variable, product scent typicality and product verbal information typicality as the independent between-subject factors. The ratings of arousal across the experimental conditions are shown in Table 3a. The results show that arousal ratings diminish after the experience with the product in all experimental conditions. In particular, in the atypical product scent condition, the arousal diminishes more strongly from the atypical (Matprevious = 4.767, SDat = 0.8539, SEat =0.281; Matincidental = 3.883, SDat = 0.9613, SEat =0.274) to the typical verbal information (Mtprevious = 4.1603, SDt = 1.3051, SEt =0.247; Mtincidental = 3.686, SDt = 1.3176, SEt =0.240), than in the typical scent condition, in which the decrease of arousal ratings is lower from the atypical (Matprevious = 4.306, SDat = 1.3109, SEat =0.226; Matincidental = 4.237, SDat = 1.2894, SEat =0.22) to the typical verbal information (Mtprevious = 4.374, SDt = 1.3963, SEt =0.209; Mtincidental = 4.311, SDt = 1.1871, SEt =0.199). The results of the (RM)-ANOVA show that there was a significant main effect of the self-perceived moods on the mood ratings, F (1, 110) = 4,753, $p < 0.05$, η2 = 0.041. However, the effect of the product typicality based on verbal information, F (1, 110) = 3,209, $p > 0.05$, product scent typicality, F (1, 110) < 1, $p > 0.05$, and the interaction of the between-subject factors, were not significant, (F (1, 110) < 1, p > 0.05. These results show that arousal ratings decrease from atypical to typical products in all the experimental conditions and that this difference is not statistically significant based on the product typicality manipulations. For this reason, I excluded the analysis of mood changes from the next three studies since nor the verbal information, nor the product scent affect individuals' perceived moods (H3).

Table 3a - Results of Pilot Study – Arousal Ratings (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

			Mean Score	Standard Error
Atypical Scent	Atypical Attribute	Previous Moods	4.767 (0.8539)	0.281
		Incidental Moods	3.883 (0.9613)	0.274
	Typical Attribute	Previous Moods	4.1603 (1.3051)	0.247
		Incidental Moods	3.686 (1.3176)	0.240
Typical Scent	Atypical Attribute	Previous Moods	4.306 (1.3109)	0.226
		Incidental Moods	4.237 (1.2894)	0.22
	Typical Attribute	Previous Moods	4.374 (1.3963)	0.209
		Incidental Moods	4.311 (1.1871)	0.199

Pleasure. I have hypothesized that atypical products (e.g., atypicality based on verbal information and product scent) enhance product perceived pleasure. An ANCOVA on pleasure ratings was performed including the incidental arousal ratings as the covariate in the analysis (Cronbach's $\alpha = 0.888$). As the effect of the arousal was not significant ($F < 1$) $p > 0.05$, the covariate was excluded from the analysis. A one-way ANOVA on product perceived pleasure demonstrated that in the atypical product scent condition (e.g., amber and musk scent) the product with the atypical verbal description (e.g., special on the attributes of touch, scent, and performance) was perceived as more pleasant (Mat = 5.50, SDat = 1.1920, SEat = 0.295) than the product with typical verbal description (Mt = 5.28, SDt = 1.3699, SEt = 0.264). However, in the typical product scent condition (e.g., wood scent) the product with atypical verbal description (e.g., special on the attributes of touch, scent, and performance) was perceived as less pleasant (Mat = 4.8387, SDat = 1.2674, SEat = 0.237) than the product with the typical verbal description (Mt = 4.8919, SDt = 1.3901, SEt = 0.217), even if the difference was very small, as shown in Table 4a below. As hypothesized, the effect of product scent typicality was significant on product perceived pleasure, $F(1,112) = 4.236$, $p < 0.05$, $\eta 2 = 0.037$. However, the effect of the typicality of verbal information and the interaction of the two between-subject factors on product perceived pleasure were not significant, $F(1, 112) < 1$.

Table 4a - Results of Pilot Study – Product Perceived Pleasure (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

		Mean Score	Standard Error
Atypical Scent	Atypical Attribute	5.50 (1.1920)	0.295
	Typical Attribute	5.28 (1.3699)	0.264
Typical Scent	Atypical Attribute	4.8387 (1.2674)	0.237
	Typical Attribute	4.8919 (1.3901)	0.217

Interest. I have hypothesized that atypical products (e.g., atypicality based on verbal information and product scent) enhance interest in the product. An ANCOVA on interest ratings was performed including the incidental arousal ratings as the covariate in the analysis (Cronbach's $\alpha= 0.888$). The effect of the arousal was significant $F (1, 112) = 4.761$, $p < 0.05$, $\eta2 = 0.042$. Moreover, the ANCOVA on interest in the product has demonstrated that in the atypical product scent condition (e.g., amber and musk scent) the product with the atypical verbal description (e.g., special on the attributes of touch, scent, and performance) was perceived as more interesting (Mat = 4.4250, SDat = 1.3106, SEat = 0.293) than the product with the typical verbal description (Mt = 4.3, SDt = 1.6137, SEt = 0.264). However, in the typical product scent condition (e.g., wood scent) the product with the atypical verbal description (e.g., special on the attributes of touch, scent, and performance) was perceived as less interesting (Mat = 3.371, SDat = 1.2108, SEat = 0.236) than the product with the typical verbal description (Mt = 4.0135, SDt = 1.2275, SEt = 0.216), even if the difference was very small, as shown in Table 5a below. Moreover, the ANCOVA has shown a significant main effect of product scent typicality on interest ratings, $F (1, 112) = 5.112$ $p < 0.05$, $\eta2 = 0.045$. However, the typicality of verbal information and the interaction of the two between-subject factors on interest ratings were not significant, $F (1, 112) < 1$. A one-way ANOVA was conducted with the exclusion of the arousal score as the covariate, to check whether the covariate significantly affects the interest ratings and the significance of the effect on the independent variables. The results demonstrated that, excluding the arousal ratings from the analysis, the effect of product scent typicality is still significant on interest in the product, $F (1, 112) = 6,785$, $p < 0.05$, $\eta2 = 0.059$, while the effect of the typicality of verbal information and their interaction are not significant ($F < 1$), $p > 0.05$. Therefore, the difference of interest ratings between the two product scent conditions remains statistically significant when controlling for the incidental moods.

Table 5a - Results of Pilot Study – Interest in the product (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

		Mean Score	Standard Error
Atypical Scent	Atypical Attribute	4.4250 (1.3106)	0.293
	Typical Attribute	4.3 (1.6137)	0.264
Typical Scent	Atypical Attribute	3.371 (1.2108)	0.236
	Typical Attribute	4.0135 (1.2275)	0.216

Product Evaluations. I have hypothesized that atypical products (e.g., atypicality based on descriptive information and product scent) enhance product evaluations. I conducted a MANCOVA on all the dependent variables: purchase intentions, product perceived quality, product liking, product attractiveness, haptic perceptions, and product perceived value. Moreover, the incidental induced arousal was included as the covariate in the analysis (Cronbach's $\alpha = 0.888$). As the effect of the moods was not significant on all dependent variables ($F < 1$), $p > 0.05$, the covariate was excluded from the analysis. A MANOVA on the dependent variables demonstrated that the atypical (versus typical) products (i.e., products which have both atypical attributes of scent and descriptive information) are associated to higher purchase intentions (Mat = 5.1, SDat = 1.7441), product perceived quality (Mat = 5.65, SDat = 0.988), product liking (Mat = 5.3, SDat = 1.1742), product attractiveness (Mat = 4.45, SDat = 1.6693) but are associated with lower haptic perceptions (Mat = 2.9, SDat = 1.7137), and lower product perceived value (Mat = 3.45, SDat = 1.3168). The results of descriptive statistics of the dependent measures are summarized in Table 6a.

However, the MANOVA on the dependent variables has shown no significant effect of the typicality of verbal information, $F (1, 112) < 1$, $p = 0.109$, the typicality of product scent, $F (1, 112) < 1$, $p = 0.159$, nor the interaction of the typicality of verbal information and the typicality of product scent, $F (1, 112) < 1$, $p = 0.335$. Only the effect of product scent typicality was significant on product attractiveness, $F (1, 112) = 6.361$, $p < 0.05$, $\eta 2 = 0.055$, and product perceived quality, $F (1, 112) = 4.096$, $p < 0.05$, $\eta 2 = 0.036$.

Table 6a - Results of Pilot Study – Dependent Measures (Mean, and Standard Deviation in parenthesis).

Purchase Intentions		Mean Score	Standard Error
Atypical Scent	Atypical Attribute	5.1 (1.7441)	0.39
	Typical Attribute	4.76 (1.6901)	0.349
Typical Scent	Atypical Attribute	4.9355 (1.7876)	0.314
	Typical Attribute	5.00 (1.748)	0.287
Product Perceived Quality		Mean Score	Standard Error
Atypical Scent	Atypical Attribute	5.65 (0.988)	0.324
	Typical Attribute	5.12 (1.0924)	0.290
Typical Scent	Atypical Attribute	4.9677 (1.1967)	0.260
	Typical Attribute	4.8919 (1.2645)	0.238
Product Liking		Mean Score	Standard Error
Atypical Scent	Atypical Attribute	5.3 (1.1742)	0.302
	Typical Attribute	5.32 (1.4352)	0.270
Typical Scent	Atypical Attribute	5.2258 (1.203)	0.243
	Typical Attribute	5.00 (1.4907)	0.222
Product Attractiveness		Mean Score	Standard Error
Atypical Scent	Atypical Attribute	4.45 (1.6693)	0.367
	Typical Attribute	4.2 (1.979)	0.328
Typical Scent	Atypical Attribute	3.3226 (1.3)	0.294
	Typical Attribute	3.7297 (1.627)	0.270
Haptic Perceptions		Mean Score	Standard Error
Atypical Scent	Atypical Attribute	2.9 (1.7137)	0.353
	Typical Attribute	3.32 (1.6258)	0.316
Typical Scent	Atypical Attribute	2.8065 (1.5366)	0.284
	Typical Attribute	3.0541 (1.5082)	0.260
Product Perceived Value		Mean Score	Standard Error
Atypical Scent	Atypical Attribute	3.45 (1.3168)	0.338
	Typical Attribute	4.32 (1.7729)	0.302
Typical Scent	Atypical Attribute	3.1935 (1.3764)	0.271
	Typical Attribute	3.4595 (1.5201)	0.248

Mediation Analysis. The mediation analysis using pleasure and interest ratings as mediators of the effect of product typicality on dependent measures was conducted. All the mediation analyses were executed on the 2015 version of SPSS utilizing the macro PROCESS (model 4) provided by Hayes (2013). The two items of the interest scale were computed in an index (Cronbach's α= 0.814), while only the first item of the pleasure scale was used since when the two items were computed in an index the Cronbach's α was below the minimum acceptable value of 0.5 (Cronbach's α= 0.4). The mediation of pleasure was not significant for all dependent variables ($F < 1$, Sobel's test $p > 0.05$) in both conditions of typicality of verbal information and typicality of product scent. Pleasure mediates only the effect of the typicality of product scent on product liking, since the Sobel's test was statistically significant, $p < 0.01$. The mediation of interest was not significant on all dependent variables in the condition of typicality of verbal information. However, interest in the product fully mediates the effect of product scent typicality on all dependent variables, except purchase intentions. I first regressed the mediator, interest in the product, on the independent variable, product scent typicality (e.g., atypical scent versus typical scent), and the effect of product scent typicality was significant, $F (1, 111) = 6.0443$, $p < 0.015$. Then, I regressed the dependent variables, purchase intentions, product perceived value, product attractiveness, product perceived quality, haptic perceptions, and product liking on the independent variable, product scent typicality, and the mediator, interest in the product. In particular, the effect of the mediator was significant on product perceived value, $F (2, 110) = 34.3466$, $p < 0.001$, product attractiveness, $F (2, 110) = 42.5662$, $p < 0.001$, product perceived quality, $F (2, 110) = 15.1695$, $p < 0.001$, haptic perceptions, $F (2, 110) = 7.6047$, $p < 0.001$, and product liking, $F (2, 110) = 19.7036$, $p < 0.001$. The value of Sobel's test was also significant for all dependent variables, indicating a full mediation of the interest in the product. Results are summarized in Tables 7a and 8a and graphically represented in figures 2a, 3a, 4a, and 5a.

Table 7a - Results of Pilot Study – Mediation Analysis – Product Typicality based on product scent with Pleasure as the mediator (F, p-value, and Sobel's Test).

Product Liking	**F**	**P-value**	**Sobel's Test**
Product Typicality on Pleasure	$F (1, 111) = 4.1086$	$p < 0.05$	
Pleasure on Product Liking	$F (2, 110) = 90.6423$	$p < 0.01$	
Product Typicality on Product Liking	$F (1, 111) < 1$	$p > 0.05$	$p < 0.05$

Table 8a - Results of Pilot Study – Mediation Analysis – Product Typicality based on product scent with Interest as the mediator (F, p-value, and Sobel's Test).

Product Perceived Value	**F**	**P-value**	**Sobel's Test**
Product Typicality on Interest	F (1, 111) = 6.0443	p < 0.015	
Interest on Product Value	F (2, 110) = 34.3466	p < 0.001	
Product Typicality on Product Value	F (1, 111) = 5.9955	p = 0.015	p < 0.05
Product Attractiveness			
Product Typicality on Interest	F (1, 111) = 6.0443	p < 0.015	
Interest on Product Attractiveness	F (2, 110) = 42.5662	p < 0.001	
Product Typicality on Product Attractiveness	F (1, 111) = 5.9636	p < 0.016	p < 0.05
Product Perceived Quality			
Product Typicality on Interest	F (1, 111) = 6.0443	p < 0.015	
Interest on Product Quality	F (2, 110) = 15.1685	p < 0.001	
Product Typicality on Product Quality	F (1, 111) = 3.9229	p < 0.05	p < 0.05
Product Haptic Perceptions			
Product Typicality on Interest	F (1, 111) = 6.0443	p < 0.015	
Interest on Haptic Perceptions	F (2, 110) = 7.6047	p < 0.001	
Product Typicality on Haptic Perceptions	F (1, 111) < 1	p = 0.526	p < 0.05
Product Liking			
Product Typicality on Interest	F (1, 111) = 6.0443	p < 0.015	
Interest on Product Liking	F (2, 110) = 19.7036	p < 0.001	
Product Typicality on Product Liking	F (1, 111) < 1	p = 0.421	p < 0.05
Product Performance			
Product Typicality on Interest	F (1, 111) = 5.848	p < 0.0001	
Interest on Product Performance	F (2, 110) = 12.443	p < 0.0001	
Product Typicality on Product Performance	F (1, 111) = 8.392	p = 0.004	p < 0.05

Figure 2a – Results of Pilot Study – Mediation Analysis - Product Typicality based on verbal information with Pleasure as the mediator (Standardized Regression Coefficients and p-value in parentheses).

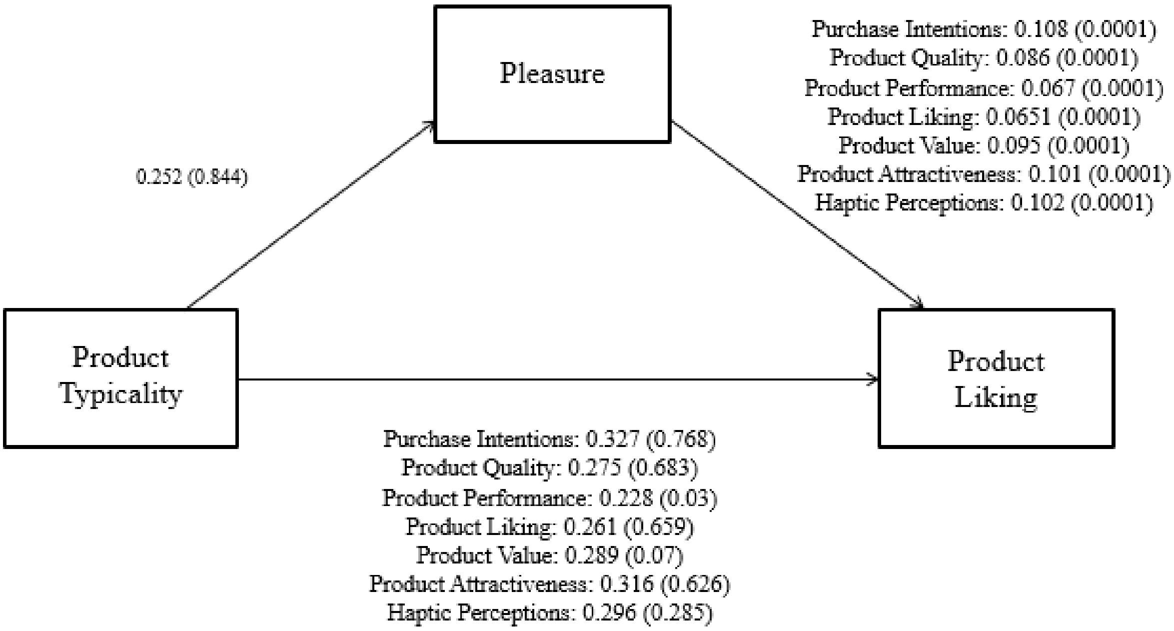


Figure 3a – Results of Pilot Study – Mediation Analysis - Product Typicality based on product scent with Pleasure as the mediator (Standardized Regression Coefficients and p-value in parentheses).

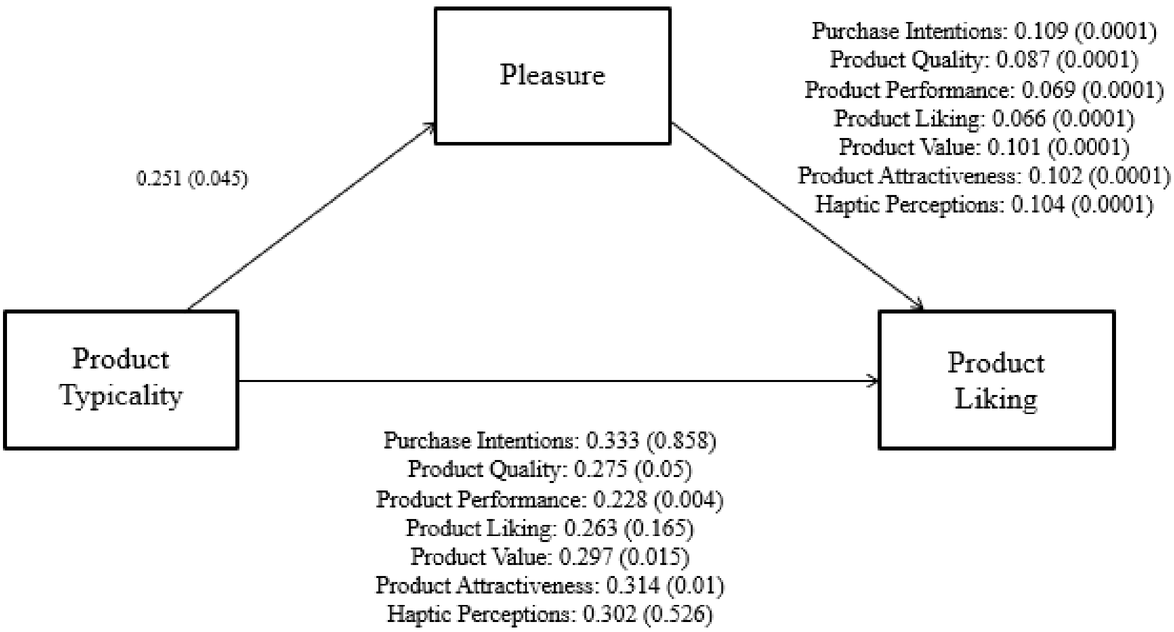


Figure 4a – Results of Pilot Study – Mediation Analysis - Product Typicality based on verbal information with Interest as the mediator (Standardized Regression Coefficients and p-value in parentheses).

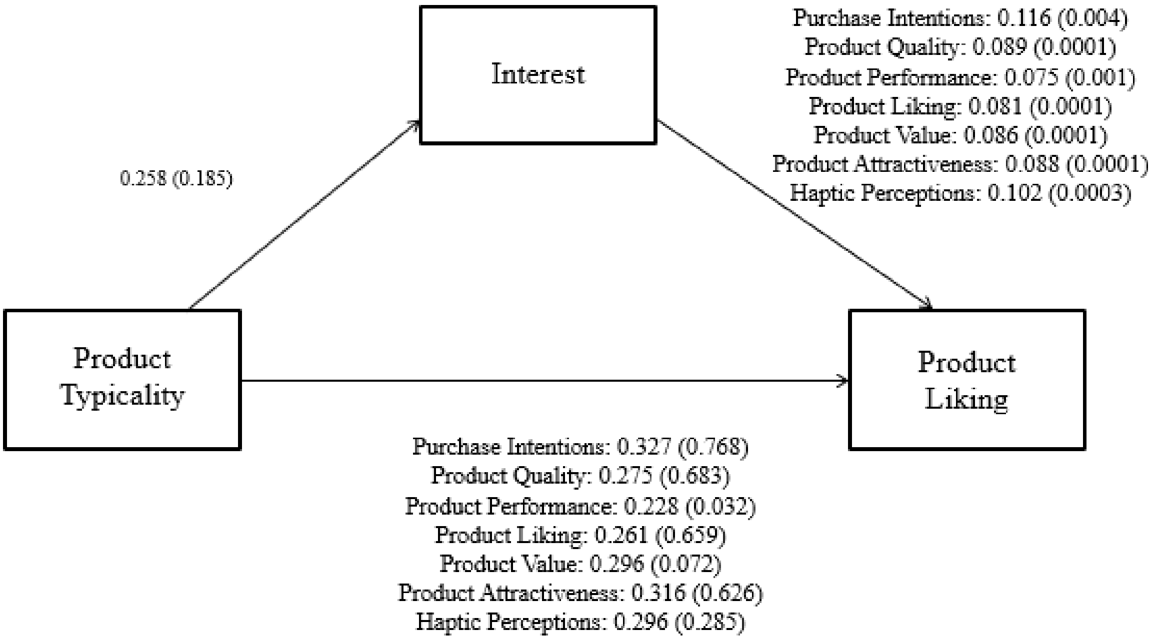
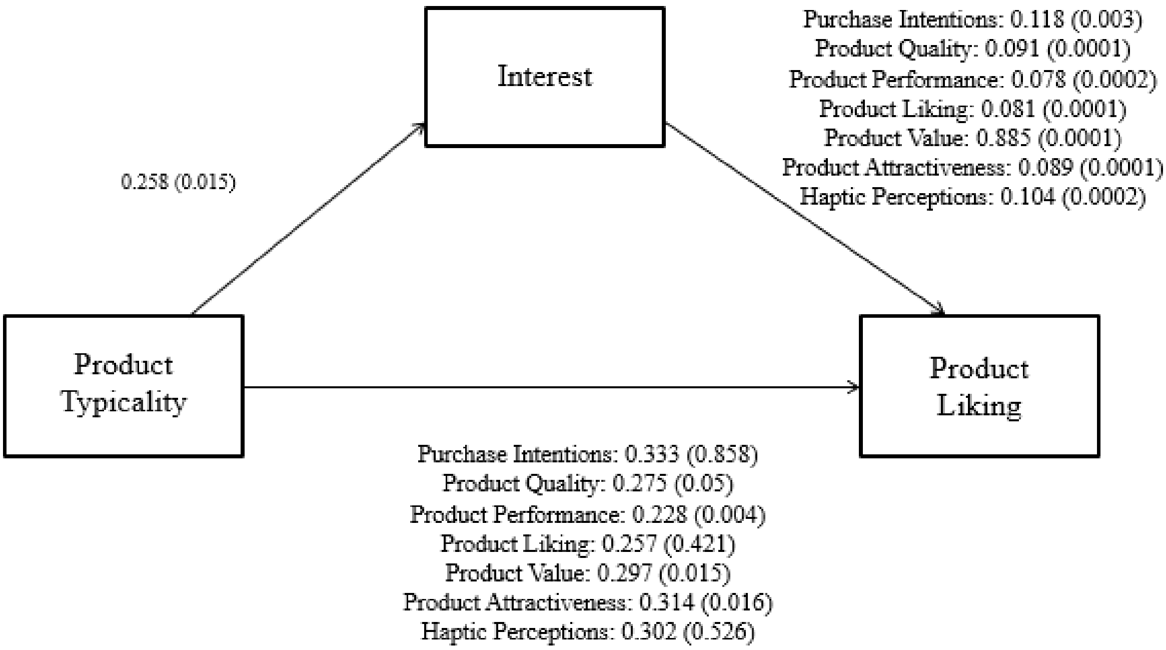


Figure 5a – Results of Pilot Study – Mediation Analysis - Product Typicality based on product scent with Interest as the mediator (Standardized Regression Coefficients and p-value in parentheses).



4.7 Discussion

The Pilot Study had the aim of exploring the effect of product typicality on aesthetic liking and find the empirical support of the predictions of the hypotheses. Product typicality was manipulated through two distinct product attributes, the scent of the product (e.g., atypical versus typical), and the descriptive information about the product (e.g., atypical versus typical). The results of the pilot study show that, contrary to the prediction of the S-O-R model (Mehrabian & Russell, 1974), the incidental exposure to a pleasantly scented product does not necessarily imply significant mood changes (H3). More specifically, these results show that arousal ratings tend to diminish after participants had experienced the product, especially when they are exposed to atypical (e.g., versus typical) products in both conditions of typicality manipulations (e.g., verbal information and product scent). For this reason, I excluded further investigations of moods in studies 1, 2 and 3.

The analyses of pleasure ratings find preliminary support for the predictions of the PIA model (Graf & Landwehr, 2015) that atypical products are more likely to increase product pleasure than typical products (H1). Moreover, the two scents of amber and musk and wood were almost equally effective to enhance product perceived pleasure.

The analyses of interest in the product ratings show that in the condition of atypical product information the atypical product was perceived as more interesting than typical product (H2), whereas in the condition of atypicality of product scent the differently scented products, similarly to analyses of pleasure ratings, were perceived as almost equally interesting (H5).

As predicted by PIA model (Graf & Landwehr, 2015), results emerged from the pilot study provide preliminary evidence that pleasure and interest are two distinct aesthetic responses which contribute to the formation of aesthetic preference for the product. Study 1, 2, and 3 will confirm these predictions by exploring the processing dynamics through which pleasure and interest arouse.

The analyses of the effect of product typicality (e.g., aroused by the manipulation of verbal information typicality and product scent typicality, alternatively) demonstrated that nor the product scent neither the descriptive information about the product have contributed to increasing general evaluations of the product (i.e., product perceived value, product liking, product perceived quality, etc.). However, the mediation analysis shows that interest in the product fully mediates the effect of product typicality based on olfactory information (e.g., product scent) on all the dependent variables (H4). These results also provide preliminary evidence that interest (e.g., instead of pleasure) is more effective to shaping more stable aesthetic preferences for the product, consistently with the predictions (H4).

Next studies have the aim of finding support to the theoretical predictions and these preliminary results as well as addressing the extent to which distinct processing dynamics are involved in the consumers' aesthetic preference formation processes, and how these preferences influence general aesthetic liking.

5. Study 1

5.1 Overview of the Study

Study 1 investigates the effect of product typicality based on the manipulation of descriptive information about the product on aesthetic liking. Product typicality was manipulated by varying the typicality of the descriptive information provided participants about the product (e.g., atypical versus typical). The manipulation of the product typicality does not include the manipulation of product scent since the aim is to explore how descriptive information is processed across the two distinct processing dynamics, which have also been manipulated (e.g., the automatic and the controlled processing).

5.2 Stimuli

Product stimulus was the same used in the pilot study. The pencil was selected as the unscented product since the respondents evaluated the attribute of the scent very unimportant for pencil ($M= 1.29$, $SD= 0.61$), significantly different from the scale midpoint of 2.5, $t(36) = -11.846$, $p< 0.001$, and significantly different from importance ratings of the scented product (sunscreen lotion: $M= 3.59$, $SD= 1.11$), $t(36) = -13.302$, $p< 0.001$.
As, in this study, the aim is to test the effect of the typicality (versus atypicality) of verbal information in isolation (e.g., regardless the effect of the product scent), only the unscented pencil was used in Study 1, while I manipulated only the verbal information provided participants about the product.

5.3 Sample and Design

Fifty-six undergraduate students from a business school of a large Brazilian metropolitan area participated in the experiment in return for course credit (39 men and 17 women).

Participants, ranged in age from 17 to 21 (M= 19.05, SD= 0.9029, SE= 0.1206), took part in a 2 (verbal information: typical versus atypical) X 2(processing dynamics: automatic versus controlled) mixed design. The duration of the study was controlled by the experimenter and was between 12 and 18 minutes on average. Five observations were excluded from the sample since they took more than 18 minutes to complete the questionnaire. Additionally, the sample includes only undergraduate students to control potential effects of age and culture on the olfactory sensitivity (Fleck & Maille, 2010).

I manipulated product typicality through the verbal information as the between-subject factor (e.g., typical versus atypical), and the processing dynamics as the within-subject factor (e.g., automatic versus controlled). Participants were randomly assigned to one of the two between-subject conditions, while the automatic and controlled processing dynamics task was the same for all participants. In the typical verbal information condition, participants were told that the pencil was a common pencil with no particular specific characteristic and that they might test the product on the sheet of paper that was provided them, whereas, in the atypical verbal information condition, participants were told that the pencil contained a special seed capsule, and once it becomes too small to write or design, it can be plantable and delicious, fresh, and edible herbs, vegetables, or flowers, grow out of the pencil (Figure 2a).

Following Graf and Landwehr (2017) the automatic processing dynamics manipulation consisted of asking participants to give a speed, gut-level evaluation of the pencil, whereas in the controlled processing manipulation participants were asked to deeply think about the product and to develop an appropriate slogan for the pencil. The slogan should be between three and ten words and contained a minimum of fifteen and a maximum of sixty characters. All participants evaluate the same common, unbranded, and unscented black pencil to control for the effect of scent on product evaluations.

Figure 6a – Example of a plantable pencil

5.4 Procedure

The experiment was performed in a laboratory and was presented as a study intended to understand the participants' evaluations of a new product to be introduced in the market.

After entering the laboratory, participants were asked to sit in front of a computer screen at an approximate distance of 50 cm and to start the questionnaire. In the first phase, participants were asked to complete the eighteen items of the Need for Cognition Scale (Cacioppo et al, 1986), which was used as the control variable since it accesses the degree to which individuals are inclined towards effortful cognitive activities, on a 7-point Likert scale. As the control variable, only the 9 positive items of the NFC Scale (Cronbach's α= 0.696) were included, while the reverse coded items were excluded to simplify the analyses. The second phase of the experiment consisted of an incidental learning phase in which participants received the instruction that a new pencil is ready to be launched into the market and that the producer would like to understand the students' opinion about the product. Participants were also told that a sample of the product was available on the left side of the computer. Participants were randomly assigned to one of the two between-subject conditions, while the automatic and controlled processing dynamics task was the same for all participants. In the typical verbal information condition, participants were told that the pencil was a common pencil with no particular specific, whereas in the atypical verbal information condition, participants were told that the pencil contained a special seed capsule, and once it becomes too small to write or design, it can be plantable and delicious, fresh, and edible herbs, vegetables, or flowers, grow out of the pencil. The instruction included the example of the plantable pencil since it is already available in the Brazilian market but is still a very novel product.

To the left side of the computer, participants were provided with a sheet of paper measuring 14 cm in length and 7 cm in height and with a sample of the product. The pencil was an unbranded common black pencil easy to find in any stationery store. The pencil was an unbranded pencil to control for potential brand effects on product evaluations. The pencil was also unscented, to control for potential scent bias on product evaluations.

After the exposure to the product, participants were exposed first to an automatic processing task, which consisted of providing a gut-level evaluation of the pencil, and then to a controlled processing task, in which participants were asked to create an appropriate slogan for the pencil. As dependent measures, aesthetic preferences for the product were collected as repeated measures after the automatic and the controlled tasks, across the two dimensions of pleasure and interest. The dimension of pleasure was measured with the two items taken from Turner and Silvia (2006) and was, "I perceive the product to be … (1) displeasing/pleasing, (2) unenjoyable/enjoyable." Interest was measured with two items adapted from Silvia (Silvia, 2005 a, b), which was, "I perceive the product to be … (1) disinteresting/interesting, (2) boring/exciting."

The third phase of the experiment consisted of the general evaluation task, in which participants were asked to complete several dependent measures.

As dependent measures, participants evaluated the pencil based on the perceived value, performance, attractiveness, perceived quality, and valence, on a single item 7-point Likert scale for each variable. As manipulation checks, participants evaluated the degree of perceived typicality of the product on a 7-point Likert scale, with the question "The pencil is very common/typical in the market" (1= strongly agree, 7= strongly disagree), and the degree of perceived effort of information processing during the evaluation task, with the question "I perceived the process of evaluation of the pencil as (1) difficult – easy, (2) intense – bland, (3) stressful – natural", both on a 7-point Likert scale, as previously measured by Graf and Landwehr, 2017. The perceived processing fluency (e.g., ease of processing) was measured twice, after the automatic and after controlled processing. As additional manipulation check of cognitive processing, the behavioral measures of the response time in milliseconds necessary to participants to complete both, the automatic and the controlled processing tasks were also measured, since the aim was to measure the time participants spent during their interaction with the product. At the end of the questionnaire, participants answered questions regarding their age and gender.

5.5 Results

Manipulation Checks. First, an independent sample *t*-test was conducted to compare participants' ratings of product typicality (e.g., 1= very typical, 7= very atypical) between verbal information conditions. The difference in the mean scores of the product perceived typicality was significant between the two conditions, and are shown in Table 1b. In particular, the product was perceived as less typical in the atypical verbal information condition (M = 5.4, SD = 1.5275, SE = 0.3055) than in the typical verbal information condition (M = 2.1154, SD = 1.2752, SE = 0.25), $t(49) = 8.349$, $p < 0.001$.

To check the difference in cognitive processing elaboration, a paired sample *t*-test was conducted to compare whether response time ratings (RTs) varied across processing dynamics tasks. The analysis of milliseconds of RTs shows that there was a significant difference between the automatic and controlled processing styles. In particular, RTs in the automatic processing condition (M = 16933.45, SD = 7787.50, SE = 1090.46) were smaller than RTs in the controlled processing condition (M = 87612.98, SD= 45909.63, SE = 6428.63), and this difference was statistically significant, $t(50) = -11.147$, $p < 0.001$. This result, shown in Table 2b, demonstrates that the instruction to create an appropriate slogan for the pencil has effectively influenced the time and the effort participants needed to process and to evaluate the product.

Table 1b - Results of Study 1 – Manipulations Check - Product Typicality (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

	Mean Score	Standard Error
Atypical Verbal information	5.4 (1.5275)	0.3055
Typical Verbal information	2.1154 (1.2752)	0.25

Table 2b - Results of Study 1 – Manipulations Check – Processing Style (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

	Mean Score	Standard Error
Automatic Processing	16933.45 (7787.50)	1090.46
Controlled Processing	87612.98 (45909.63)	6428.63

Pleasure. The ratings of the perceived product pleasure were analyzed as a function of the experimental conditions. The two items of pleasure measured before and after the controlled processing task were computed in two indices (Cronbach's $\alpha = 0.805$, Cronbach's $\alpha = 0.482$). As the ratings of pleasure were measured twice, after the automatic and the controlled processing tasks, a Repeated Measure ANOVA was performed with the pleasure ratings as the dependent variable, product typicality as the independent between-subject factor, and processing dynamics as the within-subject factor. The ratings of pleasure across the experimental conditions are shown in Table 3b. The results show that product perceived pleasure is higher after the automatic processing in both conditions of typical versus atypical verbal information (Mt = 5.36, SDt = 1.10, SEt = 0.197; Mat = 5.68, SDat = 0.8765, SEat =0.2), and that diminishes after the controlled processing in both conditions of product typicality (Mt = 4.71, SDt = 0.826, SEt = 0.165; Mat = 5.62, SDat = 0.857, SEat =0.168). The results of the (RM)-ANOVA show that there was a significant main effect of the processing style factor on the pleasure ratings, $F\ (1, 49) = 10.592, p < 0.01$, $\eta 2 = 0.178$, a significant main effect of the product typicality, $F\ (1, 49) = 6.777, p < 0.01$, $\eta 2 = 0.122$, and a significant effect of the interaction of processing style and product typicality, $F\ (1, 49) = 7.330, p < 0.01$, $\eta 2 = 0.130$. The results show that pleasure ratings decrease from atypical to typical products and are different across automatic and controlled processing conditions.

Table 3b - Results of Study 1 – Pleasure Ratings (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

		Mean Score	Standard Error
Automatic Processing	Atypical	5.68 (0.8765)	0.2
	Typical	5.36 (1.10)	0.197
Controlled Processing	Atypical	5.62 (0.857)	0.168
	Typical	4.71 (0.826)	0.165

Interest. The ratings of perceived interest in the product were analyzed as a function of the experimental conditions. The two items of interest measured before and after the controlled processing task were computed in two indices (Cronbach's α= 0.873, Cronbach's α= 0.888). As the ratings of interest were also measured twice, after the automatic and the controlled processing tasks, a Repeated Measure ANOVA was conducted with interest ratings as the dependent variable, product typicality as the independent between-subject factor, and processing dynamics as the within-subject factor. The ratings of interest in the product across the experimental conditions are shown in Table 4b. The results show that the interest in the product is lower after the automatic processing in both conditions of typical versus atypical verbal information (Mt = 3.8846, SDt = 1.43, SEt = 0.259; Mat = 5.36, SDat = 1.1947, SEat = 0.264), and that increases after the controlled processing in both conditions of product typicality (Mt = 4.0192, SDt = 1.3302, SEt = 0.241; Mat = 5.76, SDat = 1.1191, SEat = 0.246). The results of the (RM)-ANOVA show that there was a significant main effect of the processing style factor on the interest ratings, F (1, 49) = 5.060, $p < 0.05$, η2 = 0.094, and a significant main effect of the product typicality, F (1, 49) = 22.733, $p < 0.001$, η2 = 0.317. However, the interaction of processing style and product typicality was not significant, F (1, 49) = 1.247, $p = 0.270$, η2 = 0.025. The results show that interest ratings increase from typical to atypical products and are different across automatic and controlled processing conditions.

Table 4b - Results of Study 1 – Interest Ratings (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

		Mean Score	Standard Error
Automatic Processing	Atypical	5.36 (1.1947)	0.264
	Typical	3.8846 (1.43)	0.259
Controlled Processing	Atypical	5.76 (1.1191)	0.246
	Typical	4.0192 (1.3302)	0.241

Perceived Processing Fluency. The ratings of perceived processing fluency were analyzed as a function of the experimental conditions. The three items of perceived fluency measured before and after the controlled processing task were computed in two indices (Cronbach's α= 0.742, Cronbach's α= 0.830). As the ratings of perceived fluency were also measured twice, after the automatic and the controlled processing tasks, a Repeated Measure ANOVA was performed with fluency ratings as the dependent variable, product typicality as the independent between-subject factor, and processing dynamics as the within-subject factor. The ratings of perceived fluency across the experimental conditions are shown in Table 5b. The results show that perceived processing fluency is higher after the automatic processing in both conditions of typical versus atypical verbal information (Mt = 5.5897, SDt = 1.42, SEt = 0.263; Mat = 5.8667, SDat = 1.24, SEat = 0.268), and that is subject to a little decrease in the controlled processing in both conditions of product typicality (Mt = 5.3718, SDt = 1.30, SEt = 0.263; Mat = 5.5733, SDat = 1.38, SEat = 0.268). However, the results of the (RM)-ANOVA show that there was non-significant effect of the processing style and the product typicality factors, and the interaction of both was also not significant, F (1, 49) = 3,163, $p = 0.08$, η2 = 0.061, F (1, 49) = 0.476, $p = 0.494$, η2 = 0.010, F (1, 49) = 0.069, $p = 0.794$, η2 = 0.001.

Table 5b - Results of Study 1 – Fluency of Processing (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

		Mean Score	Standard Error
Automatic Processing	Atypical	5.8667 (1.24)	0.268
	Typical	5.5897 (1.42)	0.263
Controlled Processing	Atypical	5.5733 (1.38)	0.268
	Typical	5.3718 (1.30)	0.263

Product Attractiveness. The ratings of product attractiveness were analyzed as a function of the experimental conditions. As the ratings of product attractiveness were also measured twice, after the automatic and the controlled processing tasks, a Repeated Measure ANOVA was performed with attractiveness ratings as the dependent variable, product typicality as the independent between-subject factor, and processing dynamics as the within-subject factor. The ratings of product attractiveness across the experimental conditions are shown in Table 6b. The results show that the product attractiveness is lower after the automatic processing for atypical verbal information (Mat = 3.88, SDat = 1.4525, SEat = 0.291) and increases after the controlled processing for the atypical products (Mat = 4,64, SDat = 1.3503, SEat = 0.268). For the typical product, the product attractiveness decreases from automatic (Mt = 3.962, SDt = 1.4554, SEt = 0.285) to controlled processing style (Mt = 3.50, SDt = 1.3341, SEt = 0.263). The results of the (RM)-ANOVA show that the effect of processing style and product typicality on attractiveness ratings was not significant F (1, 49) = 0.687, $p = 0.411$, η2 =

0.014, and F (1, 49) = 2.31, $p = 0.135$, η2 = 0.045. However, the interaction of processing style and product typicality was significant, F (1, 49) = 11.501, $p < 0.001$, η2 = 0.135.

Table 6b - Results of Study 1 – Product Attractiveness (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

		Mean Score	Standard Error
Automatic Processing	Atypical	3.88 (1.4525)	0.291
	Typical	3.962 (1.4554)	0.285
Controlled Processing	Atypical	4,64 (1.3503)	0.268
	Typical	3.50 (1.3341)	0.263

Product Evaluations. I have hypothesized that atypical products (e.g., atypicality based on verbal information) enhance product evaluations. I conducted a MANCOVA on the dependent variables: purchase intentions, product perceived quality, product performance, product liking, product attractiveness, and product perceived value. Moreover, the Need for Cognition (NFC) Scale (Cacioppo et al., 1986) was introduced as the covariate in the analysis (Cronbach's α= 0.696). As the effect of the NFC was not significant on all dependent variables (F < 1), p > 0.05, the covariate has been excluded from the analysis. A MANOVA on dependent variables demonstrated that the atypical (versus typical) verbal information about the product enhanced purchase intentions (Mat = 6.16, SDat = 1.0677; Mt = 5.3463, SDt = 1.4951), product perceived quality (Mat = 5.00, SDat = 1.9148; Mt = 4.6923, SDt = 0.9281), product liking (Mat = 5.36, SDat = 0.9073; Mt = 4.7692, SDt = 1.1066), product attractiveness (Mat = 4.64, SDat = 1.3503; Mt = 3.50, SDt = 1.3341), and product perceived value (Mat = 4.88, SDat = 1.4236; Mt = 3.6154, SDt = 1.4987), except product performance, which was not enhanced by product typicality (Mat = 4.8, SDat = 1.1547; Mt = 5.00, SDt = 1.0954). Results are summarized in Table 7b. As hypothesized, the effect of product typicality was significant on product purchase intentions, F (1,48) = 6.551, p = 0.014, η2 = 0.120, product liking, F (1, 48) = 6.318, p = 0.015, η2 = 0.116, product attractiveness, F (1, 48) = 7.735, p = 0.008, η2 = 0.139, and product perceived value, F (1, 48) = 9.533, p = 0.003, η2 = 0.166. However, the effect of product typicality on product quality and product performance was not significant, F (1, 48) < 1, p > 0.05.

Table 7b - Results of Study 1 – Dependent Measures (Mean, and Standard Deviation in parenthesis).

	Atypical Product	**Typical Product**
Purchase Intentions	6.16 (1.0677)	5.3463 (1.4951)
Product Quality	5.00 (1.9148)	4.6923 (0.9281)
Product Performance	4.8 (1.1547)	4.7692 (1.1066)
Product Liking	5.36 (0.9073)	4.7692 (1.1066)
Product Attractiveness	4.64 (1.3503)	3.50 (1.3341)
Product Value	4.88 (1.4236)	5.00 (1.0954)

Mediation Analysis. A mediation analysis using pleasure and interest ratings as mediators of the effect of product typicality on dependent measures was performed. All the mediation analyses were executed on the 2015 version of SPSS utilizing the macro PROCESS (model 4) provided by Hayes (2013). The mediation of pleasure was not significant for all dependent variables ($F < 1$, Sobel's test $p > 0.05$). The mediation of interest was, instead, significant for all dependent variables. I first regressed the mediator, interest in the product, on the independent variable, product typicality, and the effect of product typicality was significant, $F (1, 49) = 25.4701$, $p < 0.001$. Then, I regressed the dependent variables, purchase intentions, product perceived quality, product liking, product value, product performance, and product attractiveness for the pencil on the independent variable, product typicality, and the mediator, interest in the product. In particular, the effect of the mediator was significant on purchase intentions, $F (2, 48) = 7.0368$, $p < 0.001$, on product quality, $F(2, 48) = 5.3831$, $p < 0.01$, on product liking, $F(2, 48) = 12.1919$, $p < 0.001$, on product value, $F(2, 48) = 15.6719$, $p < 0.001$, on product attractiveness, $F(2, 48) = 7.3992$, $p < 0.001$, and on product performance $F(2, 48) = 2.2081$, $p < 0.05$. Moreover, the effect of product typicality was not significant of all dependent variables ($F < 1$, $p > 0.05$). The value of Sobel's test was also significant for all dependent variables, except for product performance, indicating a full mediation of the interest in the product. Results are summarized in Table 8b and graphically represented in figures 7a and 8a.

Table 8b - Results of Study 1 – Mediation Analysis – Interest in the product (F, p-value, and Sobel's Test).

Purchase Intentions	**F**	**P-value**	**Sobel's Test**
Product Typicality on Interest	F (1, 49) = 25.4701	p < 0.001	
Interest on Purchase Intentions	F (2, 48) = 7.0368	p < 0.01	
Product Typicality on Purchase Intentions	F (1, 49) < 1	p = 0.8049	p < 0.05
Product Quality			
Product Typicality on Interest	F (1, 49) = 25.4701	p < 0.001	
Interest on Product Quality	F (2, 48) = 5.3831	p < 0.01	
Product Typicality on Product Quality	F (1, 49) < 1	p = 0.466	p < 0.05
Product Liking			
Product Typicality on Interest	F (1, 49) = 25.4701	p < 0.001	
Interest on Product Liking	F (2, 48) = 12.1919	p < 0.001	
Product Typicality on Product Liking	F (1, 49) < 1	p = 0.584	p < 0.05
Product Value			
Product Typicality on Interest	F (1, 49) = 25.4701	p < 0.001	
Interest on Product Value	F (2, 48) = 15.6719	p < 0.001	
Product Typicality on Product Value	F (1, 49) < 1	p = 0.687	p < 0.05
Product Attractiveness			
Product Typicality on Interest	F (1, 49) = 25.4701	p < 0.001	
Interest on Product Attractiveness	F (2, 48) = 7.3992	p < 0.001	
Product Typicality on Product Attractiveness	F (1, 49) < 1	p = 0.212	p < 0.05
Product Performance			
Product Typicality on Interest	F (1, 49) = 25.4701	p < 0.001	
Interest on Product Performance	F (2, 48) = 2.2081	p < 0.05	
Product Typicality on Product Performance	F (1, 49) < 1	p = 0.528	p < 0.06

Figure 7a – Results of Study 1 – Mediation Analysis - Product Pleasure (Standardized Regression Coefficients and p-value in parentheses).

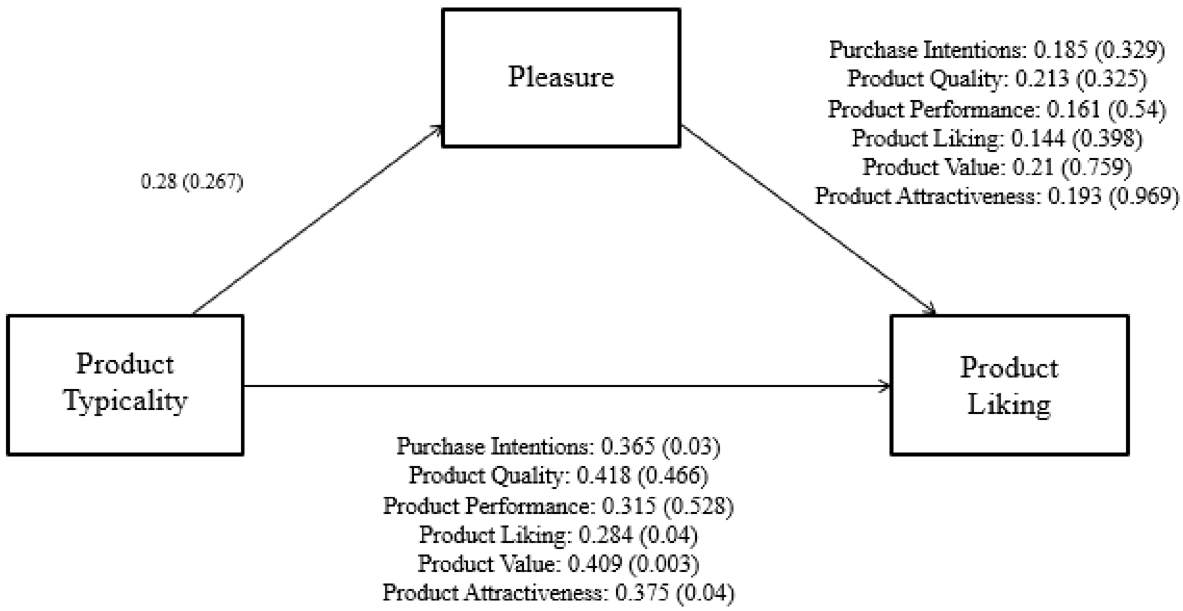
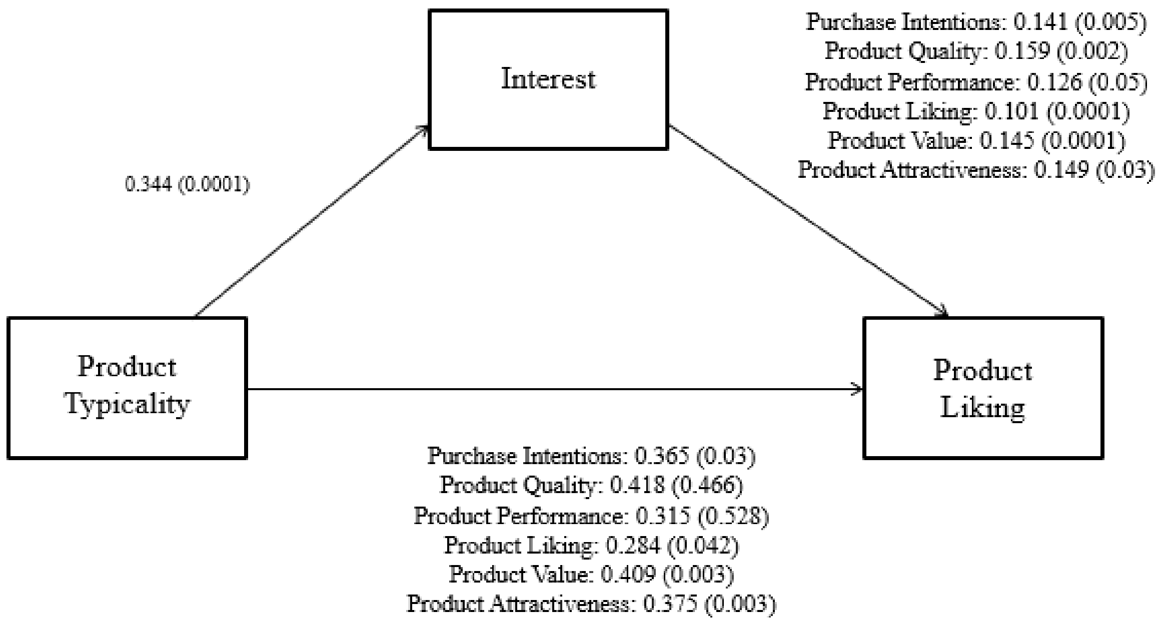


Figure 8a – Results of Study 1 – Mediation Analysis - Interest in the product (Standardized Regression Coefficients and p-value in parentheses).



Time spent on processing. A one-way ANOVA on response time scores as a function of product typicality conditions was performed. There was no significant main effect of product typicality on response time in the automatic processing condition, $F (1, 51) < 1$, $p > 0.05$. However, the effect of product typicality was significant on response time during the controlled processing task, which was higher for atypical (versus typical) products (M_{at} = 99529.36, SD_{at} = 51095.85, SE_{at} = 8863.095; M_t = 74805.61, SD_t = 36644.41, SE_t = 8690.98), $F (1, 51) = 3.967$, $p < 0.05$. This result demonstrates that atypical products stimulate a more controlled processing which, in turn, increases interest in the product.

5.6 Discussion

Study 1 provides evidence that pleasure and interest are two distinct aesthetic responses which contribute to the formation of aesthetic preference for the product. According to previous results emerged from studies applying the PIA Model (Graf & Landwehr, 2017), the results of this study show that pleasure and interest are triggered by different processing dynamics, which are those of automatic and controlled processing.

In particular, the results of study 1 show that the ratings of product perceived pleasure are higher after the automatic processing and that decrease in the controlled processing in both conditions of product typicality (e.g., atypical versus typical). Specifically, ratings of product perceived pleasure differ between the two experimental conditions of product typicality, in such that atypical products are perceived as equally pleasant before and after the controlled processing dynamics, whereas typical products are perceived as more pleasant only after being processed automatically. In other words, pleasant ratings for atypical products, based on the processing of verbal information typicality, do not decrease in the controlled processing, in contrast with the predictions of the PIA model (Graf & Landwehr, 2017). The findings of study 1 suggest that product perceived pleasure is determined by the typicality of the verbal information about the product, such that pleasure ratings are a little lower for typical products (e.g., common pencil) than for atypical products (e.g., plantable pencil). Therefore, the affective response of pleasure is a function of the interaction of the processing dynamics and the product perceived typicality.

Similarly, the results show that the ratings of interest in the product are lower after the automatic processing and that increase after the controlled processing in both conditions of product typicality (e.g., atypical versus typical). Specifically, ratings of interest in the product differ between the two experimental conditions of product typicality, in such that atypical products are perceived as more interesting before and after the controlled processing dynamics than typical products. Moreover, interest ratings for both products (e.g., atypical versus typical) increase after the controlled processing as predicted by the PIA model (Graf & Landwehr, 2017). More importantly, the interest in atypical products increases much more than for typical products after the controlled processing of information. Therefore, interest in the product is a function of the processing style of processing and the product perceived typicality.

The PIA model also discusses the importance of the perceived processing fluency. According to the predictions, the perceived processing fluency is higher after the automatic processing in both conditions of atypical versus typical verbal information, and that is subject to a little decrease in the controlled processing, even if the difference is not statistically significant. Thus, participants experienced a little decrease in the perceived fluency of the task which they evaluated as meaningful since their interest in the product increased.

More importantly, these results show a significant effect of product typicality on processing time scores during the controlled processing task (e.g., create a slogan for the product). Specifically, atypical products are processed more slowly than typical products, meaning that disfluent products are more likely to stimulate deliberate processing, and higher interaction of participants with the object, which results in increased interest in the product.

Study 1 also provides interesting results regarding general aesthetic liking. In particular, product attractiveness follows different dynamics depending on the degree of product perceived typicality. More specifically, product attractiveness for typical products decreases from automatic to the controlled processing dynamics, while product attractiveness for atypical products increases, meaning that the interaction of participants with the atypical product was meaningful since the interest in the product increased. This result is congruent with the results emerged from the analysis of the effect of product typicality and processing of information on the more general evaluations of the product used as dependent variables. In particular, atypical products are more likely to increase purchase intentions, product liking, product attractiveness, and product perceived value.

Finally, the mediation analysis with pleasure and interest as mediators of the relationship between product typicality and the dependent variables shows that interest in the product fully mediates the effect of the product typicality on purchase intentions, product quality, product liking, product value, and product attractiveness.

In conclusion, pleasure and interest are distinct affective responses which contribute to shaping aesthetic liking. The two affective responses of pleasure and interest arouse depending on the distinct affective dynamics with which deliberative information about the product are processed. Once pleasure and interest arise, positive general evaluations of the product are increased, especially for atypical (e.g., versus typical) products. Moreover, while pleasure is effective to increase an initial positive aesthetic experience with the product, interest is more likely to create stronger and more stable preferences for the product.

6. Study 2

6.1 Overview of the Study

Study 2 investigates the effect of product typicality based on the manipulation of product scent on aesthetic liking. Product typicality was manipulated by varying the typicality of the scent with which the product was scented (e.g., atypical versus typical). The manipulation of the product typicality does not include the manipulation of the verbal information about the product since the aim is to explore how odors are processed across the two distinct processing dynamics, which have also been manipulated (e.g., the automatic and the controlled processing).

6.2 Stimuli

Product and olfactory stimuli were the same used in the pilot study. The pencil was selected as the unscented product since the respondents evaluated the attribute of the scent very unimportant for the pencil (M= 1.29, SD= 0.61), significantly different from the scale midpoint of 2.5, $t(36) = -11.846$, $p < 0.001$, and significantly different from importance ratings of the scented product (sunscreen lotion: M= 3.59, SD= 1.11), $t(36) = -13.302$, $p < 0.001$.

As, in this study, the aim is to test the effect of the product typicality (versus atypicality) of the product scent in isolation (e.g., regardless the effect of verbal information), all the participants were exposed to the same verbal information about the pencil, while only the scent of the pencil (e.g., amber and musk versus wood) was manipulated.

The fragrance of amber and musk was evaluated as the more pleasant (M= 5.42, SD= 1.16), significantly different from the scale midpoint of 3.5, $t(18) = 7.158$, $p < 0.001$, and more familiar (M= 5.05, SD= 1.26), significantly different from the scale midpoint of 3.5, $t(18) = 5.337$, $p < 0.001$, but also as the less appropriate for the pencil (M= 2.84, SD= 2.11). The wood scent was also rated as pleasant (M= 4.57, SD= 1.86), significantly different from the scale midpoint of 3.5, $t(13) = 2.145$, $p < 0.05$, not very familiar (M= 3,79, SD= 2.00), and more appropriate (M= 4,07, SD= 1.63) for pencil. The amber and musk scent was selected as the pleasant but not appropriate fragrance and the wood scent as the pleasant and appropriate fragrance for the pencil in study 2 and 3.

6.3 Sample and Design

Fifty-three undergraduate students from a business school of a large Brazilian metropolitan area participated in the experiment in return for course credit (32 men and 21 women). Participants, ranged in age from 17 to 23 (M= 19.15, SD= 1.3501, SE= 0.1854), took part in a 2 (product scent: typical versus atypical) X 2(processing dynamics: automatic versus controlled) mixed design. The duration of the study was controlled by the experimenter and was between 12 and 20 minutes on average. No observations were excluded from the sample based on the duration of the experiment. Additionally, the sample includes only undergraduate students to control potential effects of age and culture on the olfactory sensitivity (Fleck & Maille, 2010).

I manipulated product typicality through the attribute of the scent as the between-subject factor (e.g., typical versus atypical), and the processing dynamics as the within-subject factor (e.g., automatic versus controlled). Participants were randomly assigned to one of the two between-subject conditions, while the automatic and controlled processing dynamics task was the same for all participants.

In the typical product scent condition, the pencil was imbued with the wood scent, whereas in the atypical product scent condition the pencil was imbued with the amber and musk scent. Following Graf and Landwehr (2017) the automatic processing dynamics manipulation consisted of asking participants to give a speed, gut-level evaluation of the pencil, whereas in the controlled processing manipulation participants were asked to deeply think about the product and to develop an appropriate slogan for the pencil. The slogan should be between three and ten words and contain a minimum of fifteen and a maximum of sixty characters.

All participants received the instruction that the pencil differed from other similar pencils available in the market because ecological and unique on touch, smell, and design performance.

6.4 Procedure

The experiment was performed in a laboratory and was presented as a study intended to understand the participants' evaluations of a new product to be introduced in the market.

After entering the laboratory, participants were asked to sit in front of a computer screen at an approximate distance of 50 cm and to start the questionnaire. In the first phase, participants were asked to complete the eighteen items of the Need for Cognition Scale (Cacioppo et al., 1986), which was used as the control variable since it accesses the degree to which individuals are inclined toward effortful cognitive activities, on a 7-point Likert scale. As the control variable, only the 9 positive items of the NFC Scale (Cronbach's α= 0.64) were included, while the reverse coded items were excluded to simplify the analyses. Participants were also asked to complete the OAS (Odor Awareness Scale) (Cronbach's α= 0.744), which originally consisted of a set of 11 items, of which only the 9 positive items were included in the analysis, accessing general individual differences in their attention to odors in the environment (Smeets et al., 2008). During the first section of the questionnaire, participants provided ratings of their smoking frequency and allergy frequency which were included as the covariates.

The second phase of the experiment consisted of an incidental learning phase in which participants received the instruction that a new pencil is ready to be launched into the market and that the producer would like to understand the students' opinion about the product. Participants were also told that a sample of the product was available on the left side of the computer. Participants were told that the pencil was ecological and special on the attributes of touch, smell, and design performance and that they could test, smell, touch, and view to evaluate it. To the left side of the computer, participants were provided with a sheet of paper measuring 14 cm in length and 7 cm in height and with a sample of the product. The pencil was an unbranded common black pencil easy to find in any stationery store. The pencil was an unbranded pencil to control for potential brand effects on product evaluations.

In the first phase, participants received the instruction that they were evaluating a new pencil to be introduced on the market. In the typical product scent condition, the pencil was scented with two drops of wood fragrance, while in the atypical product scent condition, the pencil was scented with two drops of amber and musk fragrance. Both scents were dripped into the wood of the pencil, which was then placed in airtight bags for 48 hours, as suggested by Krishna and colleagues (2010). After the exposure to the product, participants were exposed first to an automatic processing task, which consisted of providing a gut-level evaluation of the pencil, and then to a controlled processing task, in which participants were asked to create an appropriate slogan for the pencil.

As dependent measures, aesthetic preferences for the product were collected as repeated measures after the automatic and the controlled tasks, across the two dimensions of pleasure and interest. The dimension of pleasure was measured with the two items taken from Turner and Silvia (2006) and was, "I perceive the product to be … (1) displeasing/pleasing, (2) unenjoyable/enjoyable." Interest was measured with two items adapted from Silvia (Silvia, 2005a,b), which was, "I perceive the product to be … (1) disinteresting/interesting, (2) boring/exciting." The third phase of the experiment consisted of the general evaluation task, in which participants were asked to complete several dependent measures.

As dependent measures, participants evaluated the pencil based on the perceived value, performance, attractiveness, perceived quality, and valence with a single item 7-point Likert scale for each variable. Moreover, participants were asked to evaluate the scent of the pencil across its appropriateness for the pencil and pleasantness with a single item 7-point Likert scale for each measure.

As manipulation checks, I included, using a 7-point Likert scale, the degree of perceived typicality of the product, with the question "The pencil is very common/typical in the market" (1= strongly agree, 7= strongly disagree), and the degree of perceived effort of information processing during the evaluation task, with the question "I perceived the process of evaluation of the pencil as (1) difficult – easy, (2) intense – bland, (3) stressful – natural" on a 7-point Likert scale, as previously measured by Graf and Landwehr, 2017. The perceived processing fluency (e.g., ease of processing) was measured twice, after the automatic and after controlled processing. As additional manipulation check of cognitive processing, the behavioral measures of the response time in milliseconds necessary to participants to complete both, the automatic and the controlled processing tasks were also measured, since the aim was to measure the time participants spent during their interaction with the product. At the end of the questionnaire, participants answered questions regarding their age and gender.

6.5 Results

Manipulation Checks. First, an independent sample *t*-test was conducted to compare participants' ratings of product typicality (e.g., 1= very typical, 7= very atypical) between the product scent conditions. The difference in the mean scores of the product perceived typicality was significant between the two conditions and are shown in Table 1c. In particular, the product was perceived as less typical in the atypical scent condition (M = 4.2308, SD = 1.7042, SE = 0.3342) than in the typical scent condition (M = 3.2222, SD = 1.9282, SE = 0.3710), $t\ (51) = 2.015$, $p < 0.05$.

To check the difference in cognitive processing elaboration, a paired sample *t*-test was performed to compare whether response time ratings (RTs) varied across processing dynamics tasks. The analysis of milliseconds of RTs shows that there was a significant difference between the automatic and controlled processing dynamics. In particular, RTs in the automatic processing condition (M = 15280.4717, SD = 914.6430, SE = 6658.7019) were smaller than RTs in the controlled processing condition (M = 113547.47, SD= 9618.9501, SE = 70027.0138), and this difference was statistically significant, $t\ (52) = -10.111$, $p < 0.001$. This result, shown in Table 2c, demonstrates that the instruction to create an appropriate slogan for the pencil has effectively influenced the time and the effort participants needed to process and to evaluate the product.

Table 1c - Results of Study 2 – Manipulations Check - Product Typicality (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

	Mean Score	Standard Error
Atypical Product Scent (amber scent)	4.2308 (1.7042)	0.3342
Typical Verbal Information (wood scent)	3.2222 (1.9282)	0.3710

Table 2c - Results of Study 2 – Manipulations Check – Processing Style (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

	Mean Score	Standard Error
Automatic Processing	15280.4717 (914.6430)	6658.7019
Controlled Processing	113547.47 (9618.9501)	70027.0138

Pleasure. The ratings of the perceived product pleasure were analyzed as a function of the experimental conditions. The two items of pleasure measured before and after the controlled processing task were computed in two indices (Cronbach's α= 0.822, Cronbach's α= 0.890). As the ratings of pleasure were measured twice, after the automatic and the controlled processing tasks, a Repeated Measure ANOVA was performed with the pleasure ratings as the dependent variable, product typicality as the independent between-subject factor, and processing dynamics as the within-subject factor. The ratings of pleasure across the experimental conditions are shown in Table 3c. The results show that product perceived pleasure is higher after the automatic processing in both conditions of typical versus atypical product scent (Mt = 4.9821, SDt = 1.4303, SEt = 0.39; Mat = 5.14, SDat = 1.1772, SEat = 0.263), and that diminishes after the controlled processing in both conditions of product typicality (Mt = 4.1429, SDt = 1.8701, SEt = 0.320; Mat = 4.28, SDat = 1.4725, SEat = 0.249). The results of the (RM)-ANOVA show that there was a significant main effect of the processing style factor on the pleasure ratings, F (1, 51) = 21.784, $p < 0.001$, η2 = 0.299. However, the effect of product typicality based on product scent (e.g., atypical = amber, typical = wood) was not significant, F (1, 51) = 0.154, $p = 0.696$, as was not significant the interaction of processing style and product typicality, F (1, 51) = 0.003, $p = 0.955$. The results show that pleasure ratings decrease from automatic to the controlled processing style but do not differ across typical or atypical scent conditions.

Table 3c - Results of Study 2 – Pleasure Ratings (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

		Mean Score	Standard Error
Automatic Processing	Atypical	5.14 (1.1772)	0.263
	Typical	4.9821 (1.4303)	0.39
Controlled Processing	Atypical	4.28 (1.4725)	0.249
	Typical	4.1429 (1.8701)	0.320

Interest. The ratings of perceived interest in the product were analyzed as a function of the experimental conditions. The two items of interest measured before and after the controlled processing task were computed in two indices (Cronbach's α= 0.779, Cronbach's α= 0.800). As the ratings of interest were measured twice, after the automatic and the controlled processing tasks, a Repeated Measure ANOVA was conducted with interest ratings as the dependent variable, product typicality as the independent between-subject factor, and processing dynamics as the within-subject factor. The ratings of interest across the experimental conditions are shown in Table 4c. The results show that the interest in the product is lower after the automatic processing in both conditions of typical versus atypical product scent (Mt = 3.5, SDt = 1.4871, SEt = 0.256; Mat = 4.3654, SDat = 1.4937, SEat = 0.292), and that increases after the controlled processing in both conditions of product typicality (Mt = 3.7222, SDt = 1.5275, SEt = 0.252; Mat = 4.8077, SDat = 1.0303, SEat = 0.287). The results of the (RM)-ANOVA show that there was a significant main effect of the processing style factor on the interest ratings, F (1, 51) = 4.068, $p < 0.05$, $\eta 2 = 0.074$, and a significant main effect of the product typicality, F (1, 51) = 7.847, $p < 0.01$, $\eta 2 = 0.133$. However, the interaction of processing style and product typicality was not significant, F (1, 51) < 1, $p = 0.507$. The results show that interest ratings increase from automatic to the controlled processing and are different across typical and atypical product scent conditions.

Table 4c - Results of Study 2 – Interest Ratings (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

		Mean Score	Standard Error
Automatic Processing	Atypical	4.3654 (1.4937)	0.292
	Typical	3.5 (1.4871)	0.256
Controlled Processing	Atypical	4.8077 (1.0303)	0.287
	Typical	3.7222 (1.5275)	0.252

Perceived Processing Fluency. The ratings of perceived processing fluency were analyzed as a function of the experimental conditions. The three items of perceived fluency measured before and after the controlled processing task were computed in two indices (Cronbach's α= 0.727, Cronbach's α= 0.767). As the ratings of perceived fluency were also measured twice, after the automatic and the controlled processing tasks, a Repeated Measure ANOVA was performed with fluency ratings as the dependent variable, product typicality as the independent between-subject factor, and processing dynamics as the within-subject factor. The ratings of perceived fluency across the experimental conditions are shown in Table 5c. The results show that the perceived processing fluency is higher after the automatic processing in both conditions of typical versus atypical product scent (Mt = 5.6420, SDt = 1.5104, SEt = 0.240; Mat = 5.5128, SDat = 1.2516, SEat = 0.273), and that decreases after the controlled processing in both conditions of product typicality (Mt = 4.8025, SDt = 1.1812, SEt = 0.236; Mat = 4.5, SDat = 1.2693, SEat = 0.267). The results of the (RM)-ANOVA show that there was a significant main effect of the processing style factor on the interest ratings, F (1, 51) = 17.712, $p < 0.001$, η2 = 0.258. However, the results of the (RM)-ANOVA show that there was a non-significant effect of the product typicality factor, F (1, 51) < 1, p = 0.452, and the interaction of both factors was also not significant, F (1, 51) < 1, p = 0.695.

Table 5c - Results of Study 2 – Fluency of Processing (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

		Mean Score	Standard Error
Automatic Processing	Atypical	5.5128 (1.2516)	0.273
	Typical	5.6420 (1.5104)	0.240
Controlled Processing	Atypical	4.5 (1.2693)	0.267
	Typical	4.8025 (1.1812)	0.236

Product Attractiveness. The ratings of product attractiveness were analyzed as a function of the experimental conditions. As the ratings of product attractiveness were measured twice, after the automatic and the controlled processing tasks, a Repeated Measure ANOVA was performed with attractiveness ratings as the dependent variable, product typicality as the independent between-subject factor, and processing dynamics as the within-subject factor. The ratings of product attractiveness across the experimental conditions are shown in Table 6c. The results show that the product attractiveness is lower after the automatic processing (Mat = 3.9231, SDat = 1.44, SEat = 0.329) and increases after the controlled processing for the atypically scented product (Mat = 4.6154, SDat = 1.2985, SEat = 0.323). For the typically scented product, the product attractiveness decreases from automatic (Mt = 3.667, SDt = 1.8810, SEt = 0.281) to controlled processing style (Mt = 3.37, SDt = 1.5479, SEt = 0.275). The results of the (RM)-ANOVA show that the effect of product typicality on attractiveness ratings was significant F (1, 51) = 4.383, $p < 0.05$, η2 = 0.079, and the effect of interaction of product typicality and processing style was also significant, F (1, 51) = 6.473, $p < 0.05$, η2 = 0.080. However, the effect of processing style on attractiveness ratings was not significant, F (1, 51) < 1, p = 0.403.

Table 6c - Results of Study 2 – Product Attractiveness (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

		Mean Score	Standard Error
Automatic Processing	Atypical	3.9231 (1.44)	0.329
	Typical	3.66 (1.881)	0.281
Controlled Processing	Atypical	4.6154 (1.2985)	0.363
	Typical	3.37 (1.5479)	0.275

Scent Evaluations. The ratings of scent appropriateness for the pencil and scent pleasantness were analyzed as a function of the experimental conditions. A one-way ANOVA shows that the scent appropriateness for the pencil was perceived as lower in the atypically scented product condition (Mat = 3.7692, SDat = 1.9454, SEat = 0.3815) than in the typically scented product condition (Mt = 4.1481, SDat = 1.7910, SEat = 0.3446); the scent pleasantness was also a little lower in the atypically (versus typically) scented product condition (Mat = 4.5385, SDat = 1.9022, SEat = 0.3442; Mt = 4.7407, SDat = 1.7887, SEat = 0.3442). However, the effect of product typicality based on the scent manipulation was not significant on both, scent appropriateness for the pencil, $F (1, 51) = 0.934$, $p > 0.05$, and scent pleasantness, $F (1, 51) = 0.263$, $p > 0.05$, indicating that, although the product was perceived as more typical in the typically scented product condition than in the atypically scented product condition, as confirmed by the manipulation checks, the two scents were perceived as equally appropriate for the pencil, and equally pleasant.

Product Evaluations. I have hypothesized that the atypically scented product (versus typicality scented product) enhances product evaluations. I conducted a MANCOVA on the dependent variables: purchase intentions, product perceived quality, product performance, product liking, product attractiveness, and product perceived value. Moreover, the Need for Cognition (NFC) Scale (Cronbach's α= 0.64), the OAS (Odor Awareness Scale) (Cronbach's α= 0.744), smoking frequency, and allergy frequency were included as the covariate in the analysis. As the effect of the NFC, OAS, smoking frequency, and allergy frequency were not significant on all dependent variables ($F < 1$), $p > 0.05$, the covariates were excluded from the analysis. A MANOVA on dependent variables demonstrated that the atypically scented (versus typically scented) pencil leads to a little increase of purchase intentions (Mat = 4.5485, SDat = 1.2403; Mt = 4.3333, SDt = 2.00), product liking (Mat = 4.3462, SDat = 1.0174; Mt = 4.1481, SDt = 1.5115), product attractiveness (Mat = 4.6154, SDat = 1.2985; Mt = 3.3704, SDt = 1.5479), product perceived value (Mat = 3.9615, SDat = 1.5094; Mt = 3.4815, SDt = 1.3407), product performance (Mat = 4.3846, SDat = 1.0228; Mt = 4.0741, SDt = 1.2987), and haptic perceptions (Mat = 4.5385, SDat = 1.2403; Mt = 4.2963, SDt = 1.8358), except product perceived quality, which was not enhanced by product typicality (Mat = 4.00, SDat = 1.2328; Mt = 4.1852, SDt = 1.4685). Results are summarized in Table 7c. However, the effect of product typicality was not significant on product purchase intentions, $F(1,51) < 1$, $p = 0.621$, product liking, $F(1,51) < 1$, $p = 0.552$, product quality, $F(1,51) < 1$, $p = 0.672$, product perceived value, $F(1,51) < 1$, $p = 0.171$, product performance, $F(1,51) < 1$, $p = 0.338$, and haptic perceptions, $F(1,51) < 1$, $p = 0.579$, except on product attractiveness, for which the effect of product typicality was significant, $F(1, 51) = 10.390$, $p < 0.05$, $\eta 2 = 0.181$.

Table 7c - Results of Study 2 – Dependent Measures (Mean, and Standard Deviation in parenthesis).

	Atypical Product	**Typical Product**
Purchase Intentions	4.5485 (1.2403)	4.3333 (2.0)
Product Quality	4.00 (1.2328)	4.1852 (1.4685)
Product Performance	4.3846 (1.0228)	4.0741 (1.2987)
Product Liking	4.3462 (1.0174)	4.1481 (1.5115)
Product Attractiveness	4.6154 (1.2985)	3.3704 (1.5479)
Product Value	3.9615 (1.5094)	3.4815 (1.3407)
Haptic Perceptions	4.5385 (1.2403)	4.2963 (1.8358)

Mediation Analysis. A mediation analysis using pleasure and interest ratings as mediators of the effect of product typicality on dependent measures was performed. All the mediation analyses were executed on the 2015 version of SPSS utilizing the macro PROCESS (model 4) provided by Hayes (2013). The mediation of pleasure was not significant for all dependent variables ($F < 1$, Sobel's test $p > 0.05$), except for purchase intentions ($F > 1$, $p < 0.05$). The mediation of interest was, instead, significant for all dependent variables. I first regressed the mediator, interest in the product, on the independent variable, product typicality, and the effect of product typicality was significant, $F(1, 51) = 9{,}1269$, $p < 0.01$. Then, I regressed the dependent variables, purchase intentions, product perceived quality, product liking, product value, product attractiveness, product performance, and haptic perceptions on the independent variable, product typicality, and the mediator, interest in the product. In particular, the effect of the mediator was significant on product quality, $F(2, 50) = 7.3813$, $p < 0.01$, on product liking, $F(2, 50) = 7.8951$, $p < 0.01$, on product value, $F(2, 50) = 6.0752$, $p < 0.01$, on product attractiveness, $F(2, 50) = 9.9913$, $p < 0.01$, on product performance $F(2, 50) = 5.0249$, $p < 0.05$, and haptic perceptions, $F(2, 50) = 3.7142$, $p < 0.05$. The effect of the mediator was not significant on purchase intentions, $F(2, 50) = 1.0858$, $p > 0.05$.

Moreover, the effect of product typicality was not directly significant on all dependent variables ($F < 1$, $p > 0.05$), except on product attractiveness, $F(1, 51) = 10.0247$, $p < 0.05$. The value of Sobel's test was also significant for all dependent variables, except for purchase intentions, indicating a full mediation of the interest in the product. Results are summarized in Table 8c and graphically represented in figures 9a and 10a.

Table 8c - Results of Study 2 – Mediation Analysis – Interest in the product (F, p-value, and Sobel's Test).

Purchase Intentions	**F**	**P-value**	**Sobel's Test**
Product Typicality on Interest	F (1,51) = 9.1269	p < 0.001	
Interest on Purchase Intentions	F (2, 50) = 1.0858	p = 0.166	
Product Typicality on Purchase Intentions	F (1,51) = 0.199	p = 0.657	p < 0.05
Product Quality			
Product Typicality on Interest	F (1,51) = 9.1269	p < 0.001	
Interest on Product Quality	F (2, 50) = 7.3813	p < 0.01	
Product Typicality on Product Quality	F (1,51) = 0.2462	p = 0.621	p < 0.05
Product Liking			
Product Typicality on Interest	F (1,51) = 9.1269	p < 0.001	
Interest on Product Liking	F (2, 50) = 7.8951	p < 0.01	
Product Typicality on Product Liking	F (1,51) = 0.3105	p = 0.584	p < 0.05
Product Value			
Product Typicality on Interest	F (1,51) = 9.1269	p < 0.001	
Interest on Product Value	F (2, 50) = 6.0752	p < 0.01	
Product Typicality on Product Value	F (1,51) = 1.5012	p = 0.226	p < 0.05
Product Attractiveness			
Product Typicality on Interest	F (1,51) = 9.1269	p < 0.001	
Interest on Product Attractiveness	F (2, 50) = 9.9913	p < 0.01	
Product Typicality on Product Attractiveness	F (1,51) = 10.0247	p < 0.05	p < 0.05
Product Performance			
Product Typicality on Interest	F (1,51) = 9.1269	p < 0.001	
Interest on Product Performance	F (2, 50) = 5.0249	p < 0.05	
Product Typicality on Product Performance	F (1,51) = 0.9305	p = 0.339	p < 0.05

Figure 9a – Results of Study 2 – Mediation Analysis - Product Pleasure (Standardized Regression Coefficients and p-value in parentheses).

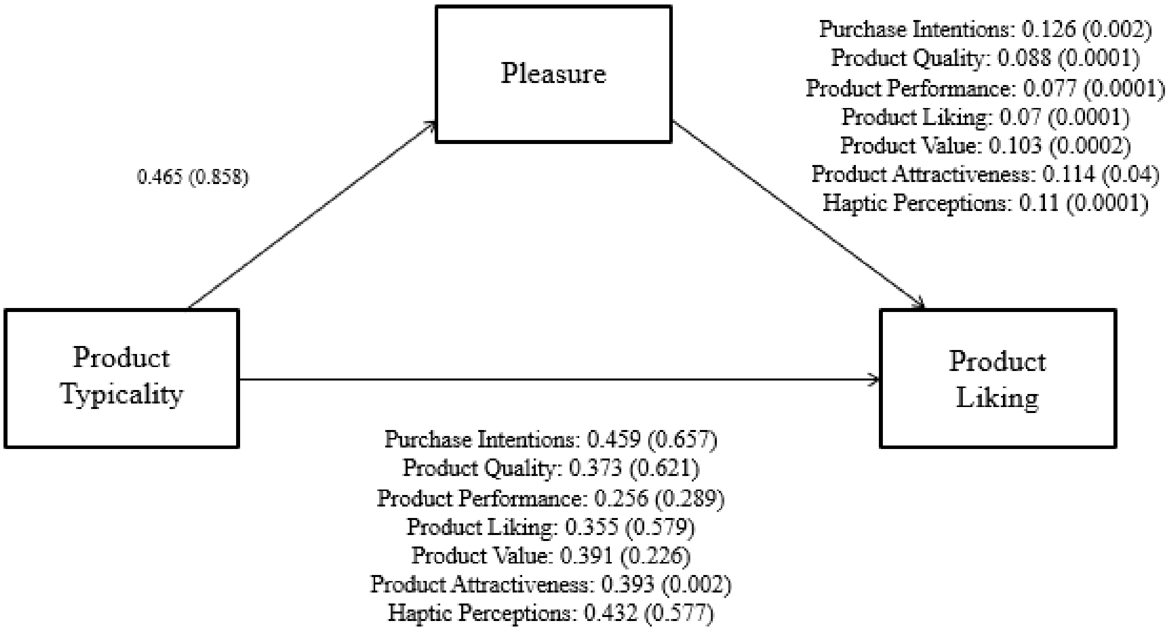
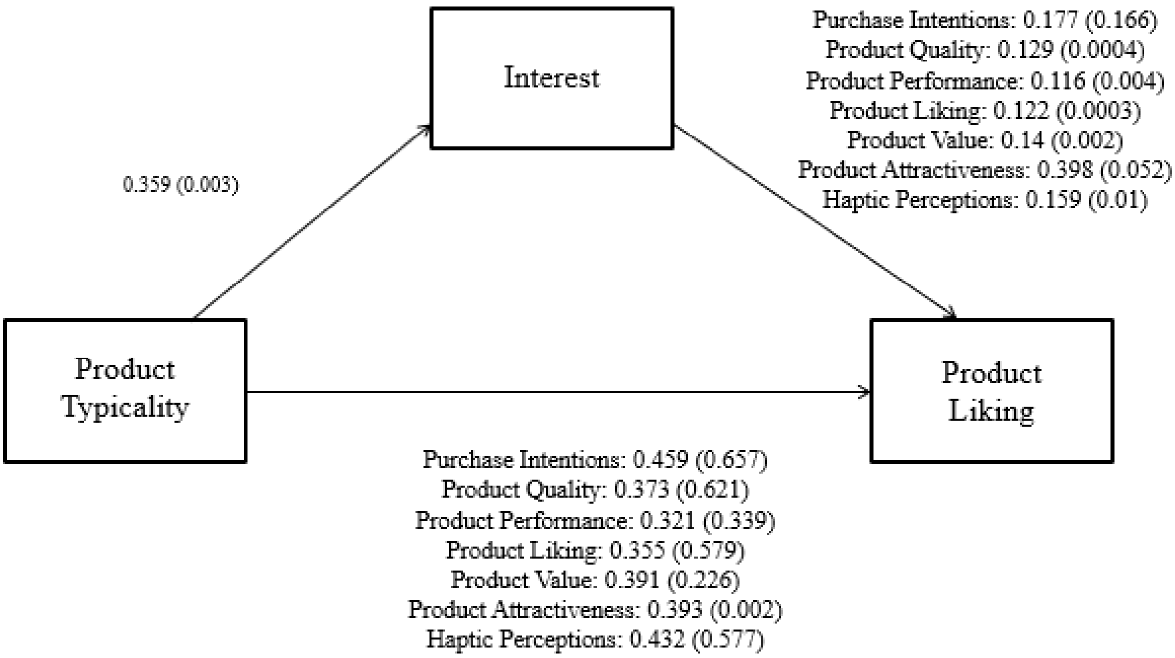


Figure 10a – Results of Study 2 – Mediation Analysis – Interest in the product (Standardized Regression Coefficients and p-value in parentheses).



Time spent on processing. A one-way ANOVA was conducted with response time scores as a function of product typicality conditions. The effect of product typicality was significant on response time during the automatic processing task, which was lower for the atypically (versus typically) scented product (Mat = 13382.15, SDat = 5106.01, SEat = 1280.406; Mt = 16997-3704, SDt = 7651.32, SEt = 1256.471), $F (1, 51) = 4.061$, $p < 0.05$. However, the effect of product typicality on response time in the controlled processing condition was not significant, $F (1, 51) < 1$, $p > 0.05$. This result demonstrates that atypically scented products stimulate a more automatic, and pleasant-based processing than typically scented products; however, atypically scented products are also processed more systematically (e.g., controlled processing) than typically scented products. Consequently, a more controlled processing, in turn, increases interest in the product.

6.6 Discussion

Study 2 confirms the results of study 1 that pleasure, and interest are two distinct aesthetic responses which contribute to the formation of aesthetic preference for the product. Consistently with the predictions of the PIA Model (Graf & Landwehr, 2015), study 2 suggests that pleasure and interest are triggered by different processing dynamics, which are those of automatic and controlled processing styles.

In particular, the results of study 2 show that the ratings of product perceived pleasure are higher after the automatic processing and that decrease in the controlled processing in both conditions of product scent typicality (e.g., atypical: amber and musk versus typical: wood), as previously demonstrated by studies applying the PIA model (Graf & Landwehr, 2017). However, the product perceived pleasure does not differ between the two conditions of product typicality, meaning that the two, differently scented products (e.g., amber and musk scent versus wood scent) were perceived as equally pleasant regardless the product perceived typicality and their appropriateness for the pencil. These results may be due to the perceived pleasantness of the two scents used in the study. Although the product was perceived as more typical in the typically scented product condition and more atypical in the atypically scented product condition, as confirmed by the manipulation check, the two scents were perceived as equally pleasant, thus appropriate for the pencil. I conclude that, as the two scents were both evaluated as highly pleasant, the two products were also perceived as equally pleasant, regarding the scent congruence with the product category.

Like study 1, study 2 shows that the ratings of interest in the product are lower after the automatic processing and that increase after the controlled processing in both conditions of product typicality (e.g., atypical versus typical). Specifically, the ratings of interest in the product differ between the two experimental conditions of product scent typicality, in such that atypically scented products are perceived as significantly more interesting before and after the controlled processing dynamics than the typically scented products, as predicted by the PIA model (Graf & Landwehr, 2017). Moreover, interest in atypically scented products increases much more than for typically scented products after the controlled processing. Accordingly, interest in the product is a function of the processing style of olfactory information and the product perceived typicality based on the scent manipulation.

The PIA model also discusses the importance of the perceived processing fluency. According to the predictions, the perceived processing fluency is higher after the automatic processing in both conditions of atypical versus typical product scent, and that is subject to a significant decrease in the controlled processing. In contrast with study 1, results of perceived fluency ratings of study 2 demonstrate that atypically scented products are processed less fluently than typically scented products and that participants experience a significant decrease in the perceived processing fluency from the automatic to the controlled processing condition, especially for atypically scented products. However, this fluency reduction resulted in a meaningful effort since the participants' interest in the product increased.

More importantly, I found a significant effect of product typicality on processing time scores during the automatic processing task (e.g., provide a gut-level evaluation of the product). Specifically, atypically scented products stimulate (i.e., speed up) a more automatic, and pleasant-based processing than typically scented products, meaning that disfluent products are more likely to shape a positive first impression of the product. Although there is no significant effect of product typicality on time scores during the controlled processing, the analyses of perceived fluency and interest ratings show that atypically scented products are processed less fluently than typically scented products, and that interest increases more for atypically scented than for typically scented products. Therefore, I conclude that the atypicality of the scent (e.g., amber and musk) for the product category (e.g., pencil) increases both, automatic aesthetic preferences and interest in the product simultaneously.

Study 2 also provides interesting results regarding general aesthetic liking. In particular, product attractiveness follows different dynamics depending on the degree of product perceived typicality.

More specifically, product attractiveness for typically scented products decreases from automatic to the controlled processing dynamics, while product attractiveness for atypically scented products increases, meaning that the interaction (e.g., effortful processing) of participants with the atypical product was meaningful since the interest in the product increased.

Surprisingly, the product perceived typicality does not affect the more general evaluations of the product used as dependent variables. In particular, atypically scented and typically scented products are equally effective to increase purchase intentions, product liking, product performance, product attractiveness, and product perceived value, as well as haptic perceptions of the product. I attribute these results exclusively to the scent perceived pleasantness. In other words, as the two scents (e.g., amber and musk scent versus wood scent) were perceived as equally pleasant regardless the congruence with the product category, the two products were also perceived as equally pleasant, and consequently equally preferred in terms of purchase intentions, product liking, product attractiveness, and product perceived value, and haptic perceptions. These results contradict the results of study 1 regarding the effect of product typicality based on olfactory information on general liking; however, these results also confirm the basic assumption of the PIA model (Graf & Landwehr, 2015) that atypical, less fluent products are more preferred in terms of general aesthetic liking since the effect of product typicality on product attractiveness was significant in favor of atypically (e.g., versus typically) scented products to enhance attractiveness.

Finally, I conducted a mediation analysis with pleasure and interest as mediators of the relationship between product typicality and the dependent variables and found that interest in the product fully mediates the effect of the product typicality on all dependent variables of purchase intentions, product quality, product liking, product value, and product attractiveness, making significant the effect of product typicality on general product evaluations.

In conclusion, similarly to study 1, study 2 provides evidence that pleasure and interest are distinct affective responses which contribute to shaping aesthetic liking. The two affective responses of pleasure and interest arouse depending on the distinct affective dynamics with which olfactory information of the product are processed. More importantly, results of study 2 show that olfactory cues are processed similarly to other, more descriptive, attributes of a product (e.g., verbal information). In contrast with the idea that olfactory information is more difficult to be processed (Engen, 1982) and mentally represented (Zucco, 2003), these findings demonstrate that the two scents of amber and musk, and wood were processed across several cognitive dimensions, such that congruence with the product category, pleasantness, typicality, and familiarity.

Study 2 shows that olfactory information is mentally processed as well as more tangible product attributes regardless scent recognition (i.e., participants were not told which scent was diffused on the product) and its congruence with the pencil. These findings also demonstrate that, differently from verbal information, olfactory cues are processed across two distinct processing dynamics simultaneously since the perceived pleasantness of the product scents was equally effective in speeding up the automatic processing and in increasing interest in the product. In other words, olfactory cues simultaneously create faster pleasant-based liking and stronger interest-based liking, which also fully mediates the effect of product typicality on general product evaluations and attractiveness.

7. Study 3

7.1 Overview of the Study

Study 3 investigates the effect of product typicality based on the manipulation of both, the verbal information about the product and the product scent on aesthetic liking. Product typicality was manipulated by varying the typicality of the descriptive information provided participants about the product (e.g., atypical versus typical), and the typicality of scent with which the product was scented (e.g., atypical versus typical). I included the two manipulations of product typicality (e.g., verbal information versus product scent) to investigate how informative versus olfactory attributes of the product are differently processed across the two processing dynamics, which have also been manipulated (e.g., the automatic and the controlled processing). Moreover, this study aims at exploring how descriptive information and olfactory cues differ in their effectiveness in shaping aesthetic liking for the product.

7.2 Stimuli

Product and olfactory stimuli were the same used in the pilot study. The pencil was selected as the unscented product since the respondents evaluated the attribute of the scent very unimportant for the pencil (M= 1.29, SD= 0.61), significantly different from the scale midpoint of 2.5, $t(36) = -11.846$, $p< 0.001$, and significantly different from importance ratings of the scented product (sunscreen lotion: M= 3.59, SD= 1.11), $t(36) = -13.302$, $p< 0.001$.

To manipulate product typicality through product scent (e.g., typical versus atypical), the scent of the pencil was manipulated (e.g., amber and musk versus wood).

The fragrance of amber and musk was evaluated as the more pleasant (M= 5.42, SD= 1.16), significantly different from the scale midpoint of 3.5, $t(18) = 7.158$, $p < 0.001$, and more familiar (M= 5.05, SD= 1.26), significantly different from the scale midpoint of 3.5, $t(18) = 5.337$, $p < 0.001$, but also as the less appropriate for the pencil (M= 2.84, SD= 2.11). The wood scent was also rated as pleasant (M= 4.57, SD= 1.86), significantly different from the scale midpoint of 3.5, $t(13) = 2.145$, $p < 0.05$, not very familiar (M= 3,79, SD= 2.00), and more appropriate (M= 4,07, SD= 1.63) for pencil. The amber and musk scent was selected as the pleasant but not appropriate fragrance and the wood scent as the pleasant and appropriate fragrance for the pencil in study 3. To manipulate product typicality through verbal information, the verbal instruction provided participants about the new pencil was manipulated (e.g., plantable versus common).

7.3 Sample and Design

One hundred and thirty-three undergraduate students from a business school of a large Brazilian metropolitan area participated in the experiment in return for course credit (79 men and 54 women). Participants, ranged in age from 17 to 27 (M= 20.03, SD= 1.6895, SE= 0.1465), took part in a 2 (product scent: typical versus atypical) X2 (verbal information: typical versus atypical) X 2(processing dynamics: automatic versus controlled) mixed design. The duration of the study was controlled by the experimenter and was between 14 and 20 minutes on average. No observations were excluded from the sample based on the duration of the experiment. Additionally, the sample includes only undergraduate students to control potential effects of age and culture on the olfactory sensitivity (Fleck & Maille, 2010).

I manipulated the product typicality through the attribute of the scent and the verbal information provided about the product as the between-subject factors (e.g., typical versus atypical), and the processing dynamics as the within-subject factor (e.g., automatic versus controlled). Participants were randomly assigned to one of the four between-subject conditions, while the automatic and controlled processing dynamics task was the same for all participants. In the typicality condition (e.g., typical product scent and typical verbal information), the pencil was imbued with a wood scent and participants were told that the pencil was a common pencil with no specific characteristic, whereas in the atypicality condition (e.g., atypical product scent and atypical verbal information), the pencil was imbued with an amber and musk scent and participants were told that the pencil contained a special seed capsule, and once it becomes too small to write or design, it can be plantable and delicious, fresh, and edible herbs, vegetables, or flowers, grow out of the pencil. As the within-subject factors, the processing dynamics were manipulated (e.g., automatic versus controlled).

I took the example of the plantable pencil since it is already available in the Brazilian market but is still a very novel product.

Following Graf and Landwehr (2017) the automatic processing dynamics manipulation consisted of asking participants to give a speed, gut-level evaluation of the pictures, whereas in the controlled processing manipulation participants were asked to deeply think about the product and to develop an appropriate slogan for the pencil. The slogan should be between three and ten words and contain a minimum of fifteen and a maximum of sixty characters.

7.4 Procedure

The experiment was performed in a laboratory and was presented as a study intended to understand the participants' evaluations of a new product to be introduced in the market.

After entering the laboratory, participants were asked to sit in front of a computer screen at an approximate distance of 50 cm and to start the questionnaire. In the first phase, participants were asked to complete the eighteen items of the Need for Cognition Scale (Cacioppo et al, 1986), which was used as the control variable since it accesses the degree to which individuals are inclined toward effortful cognitive activities, on a 7-point Likert scale. As the control variable, only the 9 positive items of the NFC Scale (Cronbach's $\alpha = 0.69$) were included, while the reverse coded items were excluded to simplify the analyses. I also asked participants to complete the OAS (Odor Awareness Scale) (Cronbach's $\alpha = 0.58$), which originally consists of a set of 11 items, of which I only use 9, accessing general individual differences in their attention to odors in the environment (Smeets et al., 2008). During the first section of the questionnaire, I also asked participants to provide ratings of their smoking frequency and allergy frequency which were included as the covariates.

The second phase of the experiment consisted of an incidental learning phase in which participants received the instruction that a new pencil is ready to be launched into the market and that the producer would like to understand the students' opinion about the product. Participants were also told that a sample of the product was available on the left side of the computer. Participants were randomly assigned to one of the four between-subject conditions. Moreover, participants were alternatively informed that the pencil was a common pencil with no specific characteristic, or that the pencil contained a special seed capsule, and once it becomes too small to write or design, it can be plantable and delicious fresh and edible herbs, vegetables, or flowers, grow out of the pencil.

Moreover, half of the participants evaluated a wood-scented pencil, while the other half evaluated an amber-scented pencil. As part of the instruction, participants were told that they could test, smell, touch, and view to evaluate it. To the left side of the computer, I provided participants with a sheet of paper measuring 14 cm in length and 7 cm in height and with a sample of the product. The pencil was an unbranded common black pencil easy to find in any stationery store. I used an unbranded pencil to control for potential brand effects on product evaluations. In the first phase, participants received the instruction that they were evaluating a new pencil to be introduced on the market. In the typical product scent condition, the pencil was scented with two drops of wood fragrance, while in the atypical product scent condition, the pencil was scented with two drops of amber and musk fragrance. Both scents were dripped into the wood of the pencil, which was then placed in airtight bags for 48 hours, as suggested by Krishna and colleagues (2010). After the exposure to the product, participants were exposed first to an automatic processing task, which consisted of providing a gut-level evaluation of the pencil, and then to a controlled processing task, in which I asked participants to create an appropriate slogan for the pencil. As dependent measures, aesthetic preferences for the product were collected as repeated measures after the automatic and the controlled tasks, across the two dimensions of pleasure and interest. The dimension of pleasure was measured with the two items taken from Turner and Silvia (2006) and was, "I perceive the product to be … (1) displeasing/pleasing, (2) unenjoyable/enjoyable." Interest was measured with two items adapted from Silvia (Silvia, 2005a,b), which was, "I perceive the product to be … (1) disinteresting/interesting, (2) boring/exciting." The third phase of the experiment consisted of the general evaluation task, in which participants were asked to complete several dependent measures.

As dependent measures, participants evaluated the pencil based on the perceived value, performance, attractiveness, perceived quality, and valence with a single item 7-point Likert scale for each variable. Moreover, I asked participants to evaluate the scent of the pencil across its appropriateness for the pencil and pleasantness with a single item 7-point Likert scale for each measure. As manipulation checks, the degree of perceived typicality of the product and the degree of the perceived effort of processing were included. More specifically, the degree of perceived typicality of the product was measured with the question "The pencil is very common/typical in the market" (1= strongly agree, 7= strongly disagree), and the degree of perceived effort of information processing during the evaluation task was measured with the question "I perceived the process of evaluation of the pencil as (1) difficult – easy, (2) intense – bland, (3) stressful – natural", both on a 7-point Likert scale, as previously measured by Graf and Landwehr, 2017. The perceived processing fluency (e.g., ease of processing) was also measured twice, after the automatic and after controlled processing. As additional manipulation check of cognitive processing, the behavioral measures of the response time in milliseconds necessary to participants to complete both, the automatic and the controlled processing tasks were also measured, since the aim was to measure the time participants spent during their interaction with the product. At the end of the questionnaire, participants answered questions regarding their age and gender.

7.5 Results

Manipulation Checks. First, an independent sample *t*-test was conducted to compare participants' ratings of product typicality (e.g., 1= very typical, 7= very atypical) between the two verbal information conditions. The difference in the mean scores of the product perceived typicality was significant between the two conditions, and are shown in Table 1d. In particular, the product was perceived as less typical in the atypical attribute condition ($M = 4.7969$, $SD = 1.9369$, $SE = 0.2421$) than in the typical attribute condition ($M = 3.2174$, $SD = 2.1065$, $SE = 0.2535$), $t (131) = 4.491$, $p < 0.01$. Then, an independent sample *t*-test was conducted to compare participants' ratings of product typicality (e.g., 1= very typical, 7= very atypical) between the two product scent conditions. The difference in the mean scores of the product perceived typicality was significant between the two conditions, and are shown in Table 2d. In particular, the product was perceived as less typical in the atypical scent condition ($M = 4.6714$, $SD = 1.9165$, $SE = 0.229$) than in the typical scent condition ($M = 3.2063$, $SD = 2.1886$, $SE = 0.2754$), $t (131) = 4.118$, $p < 0.01$.
To check the difference in cognitive processing elaboration, a paired sample *t*-test was performed to compare whether response time ratings (RTs) varied across processing dynamics tasks. The analysis of milliseconds of RTs shows that there was a significant difference between the automatic and controlled processing styles. In particular, RTs in the automatic processing condition ($M = 16027.3$, $SD = 14102.16$, $SE = 1222.81$) were smaller than RTs in the controlled processing condition ($M = 93003.89$, $SD = 68067.78$, $SE = 5902.22$), and this difference was statistically significant, $t (132) = -12.909$, $p < 0.001$. This result, shown in

Table 3d, demonstrates that the instruction to create an appropriate slogan for the pencil has effectively influenced the time and the effort participants needed to process and to evaluate the product.

Table 1d - Results of Study 3 – Manipulations Check - Product Typicality based on verbal information (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

	Mean Score	Standard Error
Atypical Verbal information	4.7969 (1.9369)	0.2421
Typical Verbal information	3.2174 (2.1065)	0.2535

Table 2d - Results of Study 3 – Manipulations Check - Product Typicality based on product scent (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

	Mean Score	Standard Error
Atypical Product Scent (amber scent)	4.6714 (1.9165)	0.229
Typical Product Scent (wood scent)	3.2063 (2.1886)	0.2754

Table 3d - Results of Study 3 – Manipulations Check – Processing Style (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

	Mean Score	Standard Error
Automatic Processing	16027.3 (14102.16)	1222.8
Controlled Processing	93003.89 (68067.78)	5902.22

Pleasure. The ratings of the perceived product pleasure were analyzed as a function of the experimental conditions. The two items of pleasure measured before and after the controlled processing task were computed in two indices (Cronbach's α= 0.792, Cronbach's α= 0.884). As the ratings of pleasure were measured twice, after the automatic and the controlled processing tasks, a Repeated Measure ANOVA was performed with the pleasure ratings as the dependent variable, product typicality based on verbal information about the product and product scent as the two independent between-subject factors, and processing dynamics as the within-subject factor. The ratings of pleasure across the experimental conditions are shown in Table 4d. The results show that product perceived pleasure is higher after the automatic processing and diminishes in the controlled processing in all experimental conditions. In particular, in the case of atypical verbal information (e.g., plantable pencil) and atypical scent (e.g., amber and musk), product perceived pleasure after automatic processing is higher, (Mat = 5.6212, SDat= 1.097, SEat = 0.206) than in the condition of typical verbal information (e.g., common pencil) and typical scent (e.g., wood), (Mt = 4.6406, SDt = 1.2714, SEt = 0.210), and compared with the incongruent conditions of atypical product scent and typical verbal information (Mat = 5.2973, SDat = 1.3041, SEat = 0.195), and typical product scent and atypical verbal information (Mt = 5.2742, SDt = 1.0233, SEt = 0.213). Moreover, pleasure ratings after the controlled processing decrease in all experimental conditions. More specifically, in the case of atypical verbal information (e.g., plantable pencil) and atypical scent (e.g., amber and musk), product perceived pleasure after controlled processing diminishes more, (Mat = 5.4848, SDat= 1.1956, SEat = 0.207) than in the condition of atypical verbal information (e.g., plantable pencil) and typical scent (e.g., wood), (Mt = 5.2419, SDt = 1.0398, SEt = 0.213), as well as pleasure ratings are much lower in the condition of atypical product scent (e.g., amber and musk) and typical verbal information, (Mat = 4.9054, SDat = 1.3272, SEat = 0.195) than in the condition of typical scent (e.g., wood) and typical verbal information (Mt = 4.4531, SDt = 1.13843, SEt = 0.210). In other words, after the controlled processing the pleasure ratings of atypically scented products decrease more than pleasure ratings of typically scented products regardless the typicality of the verbal information.

The results of the (RM)-ANOVA show that there was a significant main effect of the processing style factor on the pleasure ratings, F (1, 129) = 5.060, $p < 0.05$, $\eta 2 = 0.038$. However, the interaction of the processing style, product typicality based on scent, and product typicality based on verbal information were not significant, F (1, 129) < 1, $p > 0.05$. The analysis of RM ANOVA also demonstrated a significant main effect of the between-subject factors of typicality of verbal information, F (1, 129) = 9.496, $p < 0.05$, $\eta 2 = 0.069$, and typicality of product scent, F (1, 129) = 5.067, $p < 0.05$, $\eta 2 = 0.038$. However, the interaction of the typicality of verbal information and typicality of product scent was not significant, F (1, 129) < 1, $p > 0.05$.

The results show that pleasure ratings decrease from automatic to the controlled processing style and differ across typical and atypical verbal information and product scent conditions.

Table 4d - Results of Study 3 – Pleasure Ratings (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

			Mean Score	Standard Error
Automatic Processing	Amber and musk	Atypical Attribute	5.6212 (1.097)	0.206
		Typical Attribute	5.2973 (1.3041)	0.195
	Wood	Atypical Attribute	5.2742 (1.0233)	0.213
		Typical Attribute	4.6406 (1.2714)	0.210
Controlled Processing	Amber and musk	Atypical Attribute	5.4848 (1.1956)	0.207
		Typical Attribute	4.9054 (1.3272)	0.195
	Wood	Atypical Attribute	5.2419 (1.0398)	0.213
		Typical Attribute	4.4531 (1.1384)	0.210

Interest. The ratings of the interest in the product were analyzed as a function of the experimental conditions. The two items of interest measured before and after the controlled processing task were computed in two indices (Cronbach's α= 0.854, Cronbach's α= 0.892). As the ratings of interest were measured twice, after the automatic and the controlled processing tasks, a Repeated Measure ANOVA was conducted with the interest ratings as the dependent variable, product typicality based on verbal information about the product and product scent as the two independent between-subject factors, and processing dynamics as the within-subject factor. The ratings of pleasure across the experimental conditions are shown in Table 5d. The results show that interest in the product increases after the controlled processing in all experimental conditions, except in the condition of typical product scent (e.g., wood) and atypical verbal information (e.g., plantable pencil), in which interest in the product is a little higher after the automatic (Mt = 4.9516, SDt = 1.3865, SEt = 0.253) than controlled processing (Mt = 4.9355, SDt = 1.34, SEt = 0.217). In particular, in the case of atypical verbal information (e.g., plantable pencil) and atypical scent (e.g., amber and musk), interest in the product after the controlled processing is higher, (Mat = 5.3333, SDat= 1.1703, SEat = 0.230) than in the condition of typical verbal information (e.g., common pencil) and typical scent (e.g., wood), (Mt = 3.25, SDt = 1.448, SEt = 0.234), and compared with the incongruent conditions of atypical product scent and typical verbal information (Mat = 4.8108, SDat = 1.3194, SEat = 0.217), and typical product scent and atypical verbal information (Mt = 4.9355, SDt = 1.34, SEt = 0.237).

Moreover, interest ratings after the controlled processing increase in all experimental conditions, except in the incongruent condition of typical product scent (e.g., wood) and atypical verbal information (e.g., plantable pencil). More specifically, in the case of atypical verbal information (e.g., plantable pencil) and atypical scent (e.g., amber and musk), interest in the product after controlled processing increases more, (Mat = 5.3333, SDat= 1.1703, SEat = 0.230) than in the condition of atypical verbal information (e.g., plantable pencil) and typical scent (e.g., wood), (Mt = 4.9355, SDt = 1.34, SEt = 0.237), typical verbal information (e.g., common pencil) and atypical scent (e.g., amber and musk), (Mat = 4.8108, SDat = 1.3194, SEat = 0.217), and typical verbal information (e.g., common pencil) and typical scent (e.g., wood), (Mt = 3.25, SDt = 1.448, SEt = 0.234). In other words, after the controlled processing the interest ratings of atypically scented products increases more than interest ratings of typically scented products regardless the typicality of the verbal information.

The results of the (RM)-ANOVA show that there was a significant main effect of the processing style factor on the interest ratings, F (1, 129) = 3.936, $p < 0.05$, η2 = 0.030. However, the interaction of the processing style, product typicality based on scent, and product typicality based on verbal information were not significant, F (1, 129) < 1, $p > 0.05$.

The analysis of RM ANOVA also demonstrated a significant main effect of the between-subject factors of typicality of verbal information, F (1, 129) = 27.826, $p < 0.001$, η2 = 0.177, and typicality of product scent, F (1, 129) = 15.016, $p < 0.001$, η2 = 0.104, as well as the interaction of typicality of verbal information and typicality of product scent, F (1, 129) = 8.264, $p < 0.05$, η2 = 0.060.

The results show that interest ratings increase from automatic to the controlled processing style and differ across typical and atypical verbal information and product scent conditions.

Table 5d - Results of Study 3 – Interest Ratings (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

			Mean Score	Standard Error
Automatic Processing	Amber and musk	Atypical Attribute	4.984 (1.2715)	0.246
		Typical Attribute	4.473 (1.3841)	0.232
	Wood	Atypical Attribute	4.9516 (1.3865)	0.253
		Typical Attribute	3.125 (1.5913)	0.249
Controlled Processing	Amber and musk	Atypical Attribute	5.3333 (1.1703)	0.230
		Typical Attribute	4.8108 (1.3194)	0.217
	Wood	Atypical Attribute	4.9355 (1.34)	0.237
		Typical Attribute	3.25 (1.448)	0.234

Perceived Processing Fluency. The ratings of the perceived processing fluency were analyzed as a function of the experimental conditions. The three items of perceived fluency measured before and after the controlled processing task were computed in two indices (Cronbach's α= 0.867, Cronbach's α= 0.862). As the ratings of perceived fluency were measured twice, after the automatic and the controlled processing tasks, a Repeated Measure ANOVA was performed with fluency ratings as the dependent variable, product typicality based on verbal information about the product and product scent as the two independent between-subject factors, and processing dynamics as the within-subject factor. The ratings of perceived fluency across the experimental conditions are shown in Table 6d. The results show that the perceived processing fluency after the automatic processing is higher in both conditions of atypical product scent and atypical verbal information (Mat = 5.9091, SDat = 1.2112, SEat = 0.259), and atypical product scent and typical verbal information (Mat = 5.3784, SDat = 1.2672, SEat = 0.245) and decreases in the controlled processing in the same conditions of atypical product scent and atypical verbal information (Mat = 5.3535, SDat = 1.5588, SEat = 0.260), and atypical product scent and typical verbal information (Mat = 4.7838, SDat = 1.3081, SEat = 0.245). However, in the two conditions of typical product scent (e.g., wood) the perceived processing fluency is subject to a little increase from the automatic processing of atypical verbal information (Mt = 4.9677, SDt = 1.5235, SEt = 0.268), and typical verbal information (Mt = 4.7187, SDt = 1.9009, SEt = 0.263) to the controlled processing of atypical verbal information (Mt = 4.9892, SDt = 1.4919, SEt = 0.268), and typical verbal information (Mt = 4.9479, SDt = 1.6178, SEt = 0.264).

The results of the (RM)-ANOVA show that there was a significant main effect of the processing style factor on the interest ratings, F (1, 129) = 4.147, $p < 0.05$, η2 = 0.031, and the interaction of processing style and product typicality based on scent, F (1, 129) = 10.059, $p < 0.05$, η2 = 0.072. However, the interaction of processing style and product typicality based on the verbal information, and between processing style, product typicality based on verbal information, and processing style based on product scent were not significant, F (1, 129) < 1, $p > 0.05$.

The analysis of RM ANOVA also demonstrated a significant main effect of the between-subject factor of typicality of product scent, F (1, 129) = 3.688, $p < 0.05$, η2 = 0.028, whereas the between-subject factor of typicality of verbal information was not significant, F (1, 129) < 1, $p > 0.05$, nor the interaction of the two between-subject factors, F (1, 129) < 1, $p > 0.05$.

The results show that the perceived processing fluency decreases from the automatic to the controlled processing style of atypically scented products, whereas increases from the automatic to the controlled processing style of typically scented products and does not differ between atypical and typical verbal information conditions.

Table 6d - Results of Study 3 – Fluency of Processing (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

			Mean Score	Standard Error
Automatic Processing	Amber and musk	Atypical Attribute	5.9091 (1.2112)	0.259
		Typical Attribute	5.3784 (1.2672)	0.245
	Wood	Atypical Attribute	4.9677 (1.5235)	0.268
		Typical Attribute	4.7187 (1.9009)	0.263
Controlled Processing	Amber and musk	Atypical Attribute	5.3535 (1.5588)	0.260
		Typical Attribute	4.7838 (1.3081)	0.245
	Wood	Atypical Attribute	4.9892 (1.4919)	0.268
		Typical Attribute	4.9479 (1.6178)	0.264

Product Attractiveness. The ratings of product attractiveness were analyzed as a function of the experimental conditions. As the ratings of product attractiveness were measured twice, after the automatic and the controlled processing tasks, a Repeated Measure ANOVA was conducted with product attractiveness ratings as the dependent variable, product typicality based on verbal information about the product and product scent as the two independent between-subject factors, and processing dynamics as the within-subject factor. The ratings of product attractiveness across the experimental conditions are shown in Table 7d. The results show that the product attractiveness in the controlled processing is higher in the conditions of atypical product scent and atypical verbal information (Mat = 5.1818, SDat = 1.1306, SEat = 0.244), and typical product scent and atypical verbal information (Mt = 4.2258, SDat = 1.4767, SEat = 0.252), compared with the same conditions after the automatic processing task, (Mat = 4.9091, SDat = 1.6271, SEat = 0.281; Mt = 3.8065, SDat = 1.4926, SEat = 0.290). In contrast, the product attractiveness in the controlled processing is subject to a little decrease in the condition of atypical product scent and typical verbal information (Mat = 4.4865, SDat = 1.4648, SEat = 0.230), and a significant decrease in the condition of typical product scent and typical verbal information (Mt = 2.875, SDat = 1.4973, SEat = 0.248), compared with the same conditions after the automatic processing task, (Mat = 4.6757, SDat = 1.7803, SEat = 0.266; Mt = 3.125, SDat = 1.5187, SEat = 0.286).

The results of the (RM)-ANOVA show that the effect of the within-subject factor of processing style was not significant, F (1, 129) < 1, $p > 0.05$, nor the interaction of processing style with product typicality based on scent, F (1, 129) < 1, $p > 0.05$, and the interaction of processing style with product typicality based on verbal information and product scent, F (1, 129) < 1, $p > 0.05$. However, the interaction of processing style with product typicality based on verbal information was significant, F (1, 129) = 5.295, $p < 0.05$, η2 = 0.044.

The analysis of RM ANOVA also demonstrated a significant main effect of the two between-subject factors of typicality of product scent, F (1, 129) = 9.824, $p < 0.05$, η2 = 0.191, and typicality of verbal information, F (1, 129) = 30.542, $p < 0.05$, η2 = 0.070.

The results show that the product attractiveness increases from the automatic to the controlled processing of atypical products (e.g., plantable and amber-scented pencil), whereas strongly decreases from the automatic to the controlled processing style of typical products (e.g., common and wood-scented pencil). Moreover, the product attractiveness does not differ across automatic and controlled processing style.

Table 7d - Results of Study 3 – Product Attractiveness (Mean, Standard Deviation in parenthesis, and Standard Error of the mean).

			Mean Score	Standard Error
Automatic Processing	Amber and musk	Atypical Attribute	4.9091 (1.6271)	0.281
		Typical Attribute	4.6757 (1.7803)	0.266
	Wood	Atypical Attribute	3.8065 (1.4926)	0.290
		Typical Attribute	3.125 (1.5187)	0.286
Controlled Processing	Amber and musk	Atypical Attribute	5.1818 (1.1306)	0.244
		Typical Attribute	4.4865 (1.4648)	0.230
	Wood	Atypical Attribute	4.2258 (1.4767)	0.252
		Typical Attribute	2.875 (1.4973)	0.248

Scent Evaluations. The ratings of scent appropriateness for the pencil and scent pleasantness were analyzed as a function of the experimental conditions. The results show that the scent appropriateness for the pencil was perceived as a little lower in the atypically scented product condition (Mat = 4.21, SDat = 1.7742, SEat = 0.212) than in the typically scented product condition (Mt = 4.37, SDat = 1.6588, SEat = 0.2089), whereas the scent pleasantness was higher in the atypically (versus typically) scented product condition (Mat = 5.2286, SDat =

1.6166, SEat = 0.1932; Mt = 4.619, SDat = 1.6207, SEat = 0.204). The effect of the two between-subject factors of typicality of product scent, and typicality of verbal information, were not significant on scent appropriateness for the pencil, $F (1, 132) < 1$, $p > 0.05$, but were significant on scent pleasantness ratings, $F (1, 132) = 5.107$, $p < 0.05$, $\eta 2 = 0.038$ (i.e., typicality of product scent) and $F (1, 132) = 4.691$, $p < 0.05$, $\eta 2 = 0.035$ (i.e., typicality of verbal information.

These results show that the two scents (e.g., amber and musk, and wood) were perceived as equally appropriate for the pencil, although the product was perceived as more typical in the typically scented product condition, as confirmed by the manipulation checks. Moreover, the results also indicate that the atypical scent (e.g., amber and musk) was perceived as significantly more pleasant than typical scent (e.g., wood), despite both scents were perceived as very pleasant (Mat = 5.2286, SDat = 1.6166, SEat = 0.1932; Mt = 4.619, SDat = 1.6207, SEat = 0.204), significantly different from the scale midpoint of 3.5, $t (69) = 8.946$, $p < 0.001$ (e.g., amber and musk), and $t (62) = 5.48$, $p < 0.001$ (e.g., wood).

Product Evaluations. I have hypothesized that atypical products (e.g., atypicality based on scent and based on verbal information) enhance product evaluations. I conducted a MANCOVA on the dependent variables: purchase intentions, product liking, product perceived quality, product perceived value, product attractiveness, product performance, and haptic perceptions. Moreover, the Need for Cognition (NFC) Scale (Cronbach's $\alpha = 0.69$), the OAS (Odor Awareness Scale) (Cronbach's $\alpha = 0.58$), smoking frequency, and allergy frequency were included as the covariates in the analysis. As the effect of the NFC, OAS, smoking frequency, and allergy frequency were not significant on all dependent variables, ($F < 1$), $p > 0.05$, the covariates were excluded from the analysis. A MANOVA on dependent variables demonstrated that the atypical products enhance general product evaluations more than typical products in both conditions of product typicality (e.g., atypical verbal information and atypical product scents). Moreover, the results show that product evaluations of the atypically scented pencil (e.g., amber and musk) are higher than product evaluations of the typically scented pencil (e.g., wood), atypical verbal information (e.g., plantable pencil), and typical verbal information (e.g., common pencil). Results are summarized in Table 8d, below.

Moreover, the results show a main effect of the between-subject factor of product typicality based on verbal information (e.g., plantable versus common pencil) on purchase intentions, $F (1,132) = 8.647$, $p < 0.05$, $\eta 2 = 0.063$, product liking, $F (1,132) = 6.097$, $p < 0.05$, $\eta 2 = 0.045$, product quality, $F (1,132) = 4.25$, $p < 0.05$, $\eta 2 = 0.032$, product perceived value, $F (1,132) =$

21.788, $p < 0.001$, $\eta 2 = 0.144$, product attractiveness, $F (1,132) = 13.132$, $p < 0.001$, $\eta 2 = 0.092$, and product performance, $F (1,132) = 4.254$, $p < 0.05$, $\eta 2 = 0.032$. The effect of product typicality based on verbal information was not significant on haptic perceptions, $F (1,51) < 1$, $p > 0.05$.

The main effect of the between-subject factor of product typicality based on product scent (e.g., amber and musk versus wood) was significant on product perceived value, $F (1,132) = 10.809$, $p < 0.001$, $\eta 2 = 0.077$, product attractiveness, $F (1,132) = 21.282$, $p < 0.001$, $\eta 2 = 0.142$, product performance, $F (1,132) = 11.310$, $p < 0.05$, $\eta 2 = 0.081$, and haptic perceptions, $(1,132) = 3.76$, $p < 0.05$, $\eta 2 = 0.028$, whereas was not significant on purchase intentions, $F (1,51) < 1$, $p > 0.05$, product liking, $F (1,51) < 1$, $p > 0.05$, and product quality, $F (1,51) < 1$, $p > 0.05$.

The interaction of the two between-subject factors of product typicality based on verbal information and product typicality based on product scent was significant only on product perceived value, $F (1,132) = 6.474$, $p < 0.05$, $\eta 2 = 0.048$.

The results of study 3 confirm results of the pilot, study 1 and 2 that atypical products are more likely to enhance general product evaluations than typical products. In particular, product typicality based on verbal information provided about the product (e.g., plantable pencil) increases general product evaluations, except product performance. Regarding the product typicality based on product scent (e.g., amber and musk, and wood), the results of the present study confirm those of the pilot study and study 2 that atypical scents are strong predictors of aesthetic preferences and product attractiveness, according to the predictions of the PIA model (Graf and Landwehr, 2015). Moreover, study 3 demonstrates that, when the atypical scent is also perceived as significantly more pleasant than typical scent, it also regulates general product evaluations, in contrast with results of study 2, which demonstrated that the two scents (e.g., atypical and typical) were perceived as equally pleasant.

Table 8d - Results of Study 3 – Dependent Measures (Mean, and Standard Deviation in parenthesis).

DV	Scent Typicality	Info Typicality	Mean Score	Standard Error
Purchase Intentions	Amber and musk	Atypical Attribute	5.636 (1.4538)	0.296
		Typical Attribute	4.973 (1.7870)	0.280
	Wood	Atypical Attribute	5.452 (1.7481)	0.306
		Typical Attribute	4.375 (1.7915)	0.301
Product Liking	Amber and musk	Atypical Attribute	5.030 (1.4248)	0.254
		Typical Attribute	4.811 (1.5426)	0.240
	Wood	Atypical Attribute	5.097 (1.2207)	0.262

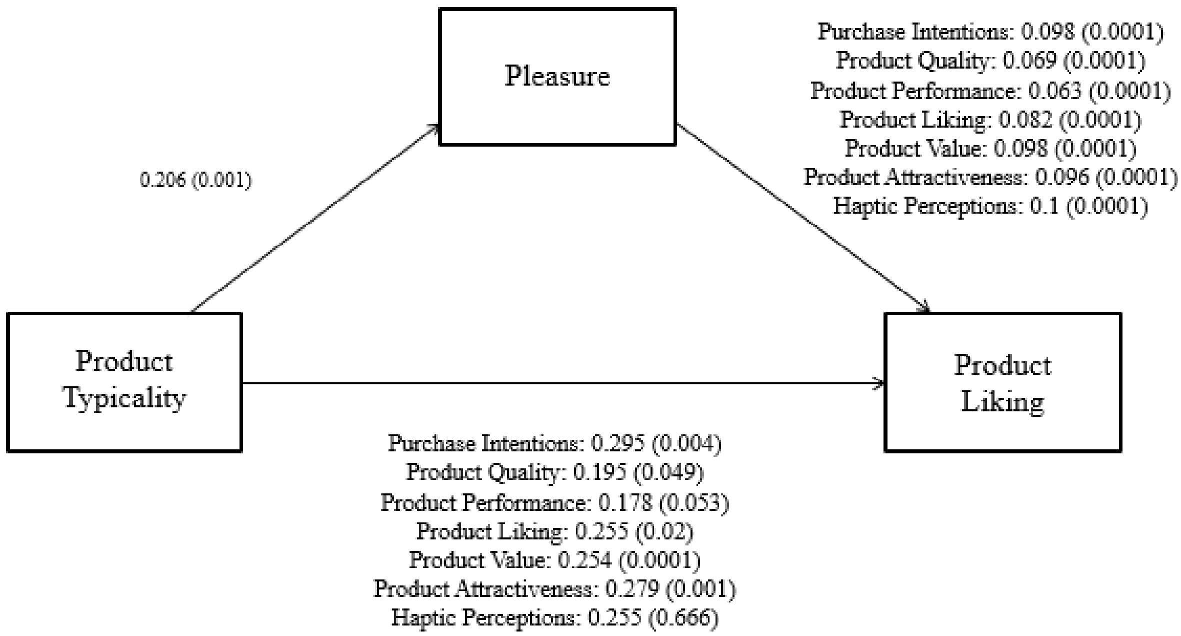
DV	Scent Typicality	Info Typicality	Mean Score	Standard Error
		Typical Attribute	4.062 (1.6051)	0.258
Product Quality	Amber and musk	Atypical Attribute	5.03 (0.8472)	0.196
		Typical Attribute	4.784 (1.2049)	0.185
	Wood	Atypical Attribute	4.903 (1.1649)	0.202
		Typical Attribute	4.344 (1.2341)	0.199
Product Value	Amber and musk	Atypical Attribute	4.727 (1.3293)	0.241
		Typical Attribute	4.216 (1.0310)	0.228
	Wood	Atypical Attribute	4.548 (1.7481)	0.249
		Typical Attribute	2.813 (1.4013)	0.245
Product Attractiveness	Amber and musk	Atypical Attribute	5.212 (1.3171)	0.261
		Typical Attribute	4.486 (1.5920)	0.247
	Wood	Atypical Attribute	4.226 (1.5643)	0.269
		Typical Attribute	3.062 (1.5013)	0.265
Product Performance	Amber and musk	Atypical Attribute	5.091 (0.8048)	0.173
		Typical Attribute	4.676 (1.0288)	0.163
	Wood	Atypical Attribute	4.452 (0.8884)	0.178
		Typical Attribute	4.156 (1.1943)	0.175
Haptic Perceptions	Amber and musk	Atypical Attribute	5.030 (1.4248)	0.253
		Typical Attribute	5.162 (1.3020)	0.239
	Wood	Atypical Attribute	4.806 (1.3764)	0.261
		Typical Attribute	4.406 (1.7012)	0.257

Mediation Analysis. A mediation analysis using pleasure and interest ratings as mediators of the effect of product typicality based on verbal information on dependent measures was performed. All the mediation analyses were executed on the 2015 version of SPSS utilizing the macro PROCESS (model 4) provided by Hayes (2013). The mediation of pleasure was significant for all dependent variables. I first regressed the mediator, the product perceived pleasure, on the independent variable, product typicality based on verbal information, and the effect of product typicality was significant, $F(1, 131) = 10.5326$, $p < 0.05$. Then, I regressed the dependent variables, purchase intentions, product liking, product perceived quality, product perceived value, product attractiveness, product performance, and haptic perceptions on the independent variable, product typicality based on verbal information, and the mediator, product perceived pleasure. In particular, the effect of the mediator was significant on purchase intentions, $F(2, 130) = 47.0296$, $p < 0.001$, product liking, $F(2, 130) = 52.8869$, $p < 0.001$, product quality, $F(2, 130) = 29.317$, $p < 0.001$, product value, $F(2, 130) = 23.9422$, $p < 0.001$, on product attractiveness, $F(2, 130) = 41.9969$, $p < 0.001$, on product performance $F(2, 130) = 29.6211$, $p < 0.001$, and haptic perceptions, $F(2, 130) = 9.8416$, $p < 0.001$. The value of Sobel's test was also significant for all dependent variables. Results are summarized in Table 9d and graphically represented in Figure 11a.

Table 9d - Results of Study 3 – Mediation Analysis – Product Typicality based on verbal information with Pleasure as the mediator (F, p-value, and Sobel's Test).

Purchase Intentions	**F**	**P-value**	**Sobel's Test**
Product Typicality on Pleasure	F (1,131) = 10.5326	p < 0.001	
Pleasure on Purchase Intentions	F (2,130) = 47.0296	p < 0.001	
Product Typicality on Purchase Intentions	F (1, 131) = 8.2836	p < 0.05	p < 0.05
Product Liking			
Product Typicality on Pleasure	F (1,131) = 10.5326	p < 0.001	
Pleasure on Product Liking	F (2,130) = 52.8869	p < 0.001	
Product Typicality on Product Liking	F (1,131) = 5.4728	p < 0.05	p < 0.05
Product Quality			
Product Typicality on Pleasure	F (1,131) = 10.5326	p < 0.001	
Pleasure on Product Quality	F (2,130) = 29.317	p < 0.001	
Product Typicality on Product Quality	F (1,131) = 3.948	p < 0.05	p < 0.05
Product Value			
Product Typicality on Pleasure	F (1,131) = 10.5326	p < 0.001	
Pleasure on Product Value	F (2,130) = 23.9422	p < 0.001	
Product Typicality on Product Value	F (1,131) = 17.8576	p < 0.001	p < 0.05
Product Attractiveness			
Product Typicality on Pleasure	F (1,131) = 10.5326	p < 0.001	
Pleasure on Product Attractiveness	F (2,130) = 41.9969	p < 0.001	
Product Typicality on Product Attractiveness	F (1,131) = 10.5417	p < 0.05	p < 0.05
Product Performance			
Product Typicality on Pleasure	F (1,131) = 10.5326	p < 0.001	
Pleasure on Product Performance	F (2,130) = 29.6211	p < 0.001	
Product Typicality on Product Performance	F (1,131) = 3.7864	p < 0.05	p < 0.05
Haptic Perceptions			
Product Typicality on Pleasure	F (1,131) = 10.5326	p < 0.001	
Pleasure on Haptic Perceptions	F (2,130) = 9.8416	p < 0.001	
Product Typicality on Haptic Perceptions	F (1,131) < 1	p = 0.666	p < 0.05

Figure 11a - Results of Study 3 – Mediation Analysis – Product Typicality based on verbal information with Pleasure as the mediator (F, p-value, and Sobel's Test).

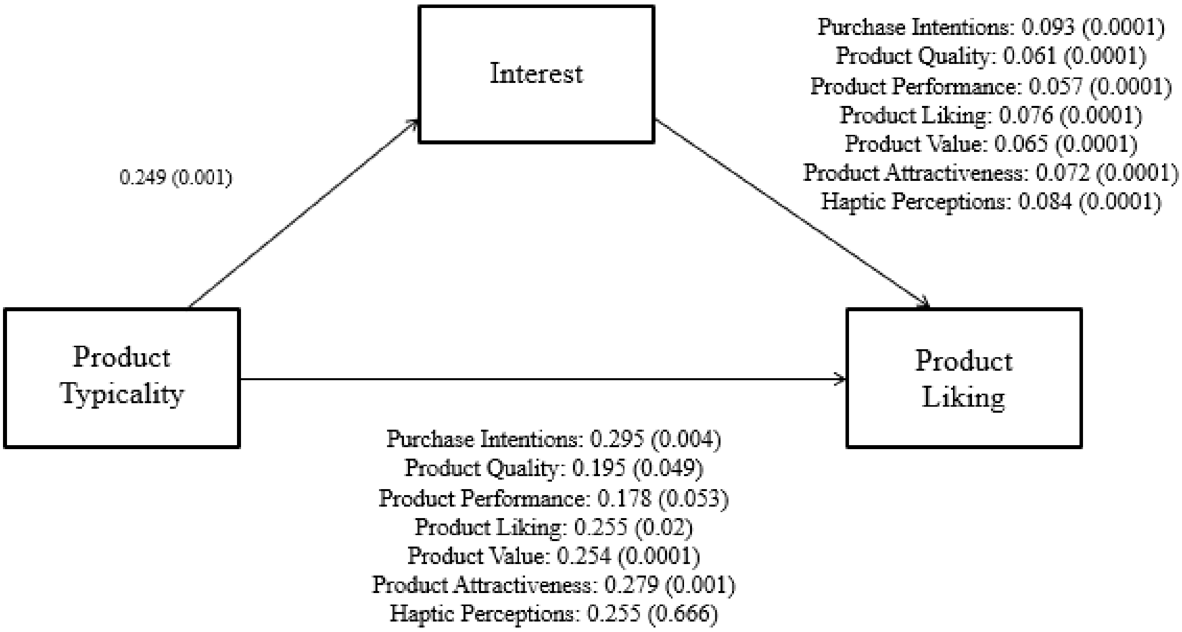


The mediation of interest in the product was also significant for all dependent variables. I first regressed the mediator, interest in the product, on the independent variable, product typicality based on verbal information, and the effect of product typicality was significant, $F(1, 131) = 17.9042$, $p < 0.001$. Then, I regressed the dependent variables, purchase intentions, product liking, product perceived quality, product perceived value, product attractiveness, product performance, and haptic perceptions on the independent variable, product typicality based on verbal information, and the mediator, interest in the product. In particular, the effect of the mediator was significant on purchase intentions, $F(2, 130) = 21.1312$, $p < 0.001$, product liking, $F(2, 130) = 30.3085$, $p < 0.001$, product quality, $F(2, 130) = 18.0307$, $p < 0.001$, product value, $F(2, 130) = 72.2763$, $p < 0.001$, on product attractiveness, $F(2, 130) = 66.6214$, $p < 0.001$, on product performance $F(2, 130) = 13.7438$, $p < 0.001$, and haptic perceptions, $F(2, 130) = 8.9904$, $p < 0.05$. The value of Sobel's test was also significant for all dependent variables. Results are summarized in Table 10d and graphically represented in figure 12a.

Table 10d - Results of Study 3 – Mediation Analysis – Product Typicality based on verbal information with Interest in the product as the mediator (F, p-value, and Sobel's Test).

Purchase Intentions	**F**	**P-value**	**Sobel's Test**
Product Typicality on Interest	F (1,131) = 17.9042	p < 0.001	
Interest on Purchase Intentions	F (2,130) = 21.1312	p < 0.001	
Product Typicality on Purchase Intentions	F (1, 131) = 8.2836	p < 0.05	p < 0.05
Product Liking			
Product Typicality on Interest	F (1,131) = 17.9042	p < 0.001	
Interest on Product Liking	F (2,130) = 30.3085	p < 0.001	
Product Typicality on Product Liking	F (1,131) = 5.4728	p < 0.05	p < 0.05
Product Quality			
Product Typicality on Interest	F (1,131) = 17.9042	p < 0.001	
Interest on Product Quality	F (2,130) = 18.0307	p < 0.001	
Product Typicality on Product Quality	F (1,131) = 3.948	p < 0.05	p < 0.05
Product Value			
Product Typicality on Interest	F (1,131) = 17.9042	p < 0.001	
Interest on Product Value	F (2,130) = 72.2763	p < 0.001	
Product Typicality on Product Value	F (1,131) = 17.8576	p < 0.001	p < 0.05
Product Attractiveness			
Product Typicality on Interest	F (1,131) = 17.9042	p < 0.001	
Interest on Product Attractiveness	F (2,130) = 66.6214	p < 0.001	
Product Typicality on Product Attractiveness	F (1,131) = 10.5417	p < 0.05	p < 0.05
Product Performance			
Product Typicality on Interest	F (1,131) = 17.9042	p < 0.001	
Interest on Product Performance	F (2,130) = 13.7438	p < 0.001	
Product Typicality on Product Performance	F (1,131) = 3.7864	p < 0.05	p < 0.05
Haptic Perceptions			
Product Typicality on Interest	F (1,131) = 17.9042	p < 0.001	
Interest on Haptic Perceptions	F (2,130) = 8.9904	p < 0.05	
Product Typicality on Haptic Perceptions	F (1,131) < 1	p = 0.666	p < 0.05

Figure 12a - Results of Study 3 – Mediation Analysis – Product Typicality based on verbal information with Interest as the mediator (F, p-value, and Sobel's Test).



I conducted a mediation analysis using pleasure and interest ratings as mediators of the effect of product typicality based on product scent on dependent measures. All the mediation analyses were executed on the 2015 version of SPSS utilizing the macro PROCESS (model 4) provided by Hayes (2013). The mediation of pleasure was not significant for all dependent variables ($F < 1$, Sobel's test $p > 0.05$). The mediation of interest in the product was, instead, significant for all dependent variables. I first regressed the mediator, interest in the product, on the independent variable, product typicality based product scent, and the effect of product typicality was significant, $F (1, 131) = 15.1079$, $p < 0.001$. Then, I regressed the dependent variables, purchase intentions, product liking, product perceived quality, product perceived value, product attractiveness, product performance, and haptic perceptions on the independent variable, product typicality based on product scent, and the mediator, interest in the product. In particular, the effect of the mediator was significant on purchase intentions, $F (2, 130) = 20.7118$, $p < 0.001$, product liking, $F (2, 130) = 31.0041$, $p < 0.001$, product quality, $F (2, 130) = 18.1022$, $p < 0.001$, product value, $F(2, 130) = 69.3943$, $p < 0.001$, on product attractiveness, $F(2, 130) = 71.6005$, $p < 0.001$, on product performance $F(2, 130) = 15.8686$, $p < 0.001$, and haptic perceptions, $F (2, 130) = 8.7375$, $p < 0.05$. The value of Sobel's test was also significant for all dependent variables. Results are summarized in Table 11d and graphically represented in figures 13a and 14a.

Table 11d - Results of Study 3 – Mediation Analysis – Product Typicality based on product scent with Interest in the product as the mediator (F, p-value, and Sobel's Test).

Purchase Intentions	**F**	**P-value**	**Sobel's Test**
Product Typicality on Interest	F (1,131) = 15.1079	p < 0.001	
Interest on Purchase Intentions	F (2,130) = 20.7118	p < 0.001	
Product Typicality on Purchase Intentions	F (1, 131) = 1.5771	p = 0.211	p < 0.05
Product Liking			
Product Typicality on Interest	F (1,131) = 15.1079	p < 0.001	
Interest on Product Liking	F (2,130) = 31.0041	p < 0.001	
Product Typicality on Product Liking	F (1,131) = 1.7432	p = 0.189	p < 0.05
Product Quality			
Product Typicality on Interest	F (1,131) = 15.1079	p < 0.001	
Interest on Product Quality	F (2,130) = 18.1022	p < 0.001	
Product Typicality on Product Quality	F (1,131) = 2.0269	p = 0.156	p < 0.05
Product Value			
Product Typicality on Interest	F (1,131) = 15.1079	p < 0.001	
Interest on Product Value	F (2,130) = 69.3943	p < 0.001	
Product Typicality on Product Value	F (1,131) = 9.0662	p < 0.05	p < 0.05
Product Attractiveness			
Product Typicality on Interest	F (1,131) = 15.1079	p < 0.001	
Interest on Product Attractiveness	F (2,130) = 71.6005	p < 0.001	
Product Typicality on Product Attractiveness	F (1,131) = 19.3073	p < 0.001	p < 0.05
Product Performance			
Product Typicality on Interest	F (1,131) = 15.1079	p < 0.001	
Interest on Product Performance	F (2,130) = 15.8686	p < 0.001	
Product Typicality on Product Performance	F (1,131) = 10.7577	p < 0.05	p < 0.05
Haptic Perceptions			
Product Typicality on Interest	F (1,131) = 15.1079	p < 0.001	
Interest on Haptic Perceptions	F (2,130) = 8.7375	p < 0.05	
Product Typicality on Haptic Perceptions	F (1,131) = 3.8934	p < 0.05	p < 0.05

Figure 13a - Results of Study 3 – Mediation Analysis – Product Typicality based on product scent with Pleasure as the mediator (F, p-value, and Sobel's Test).

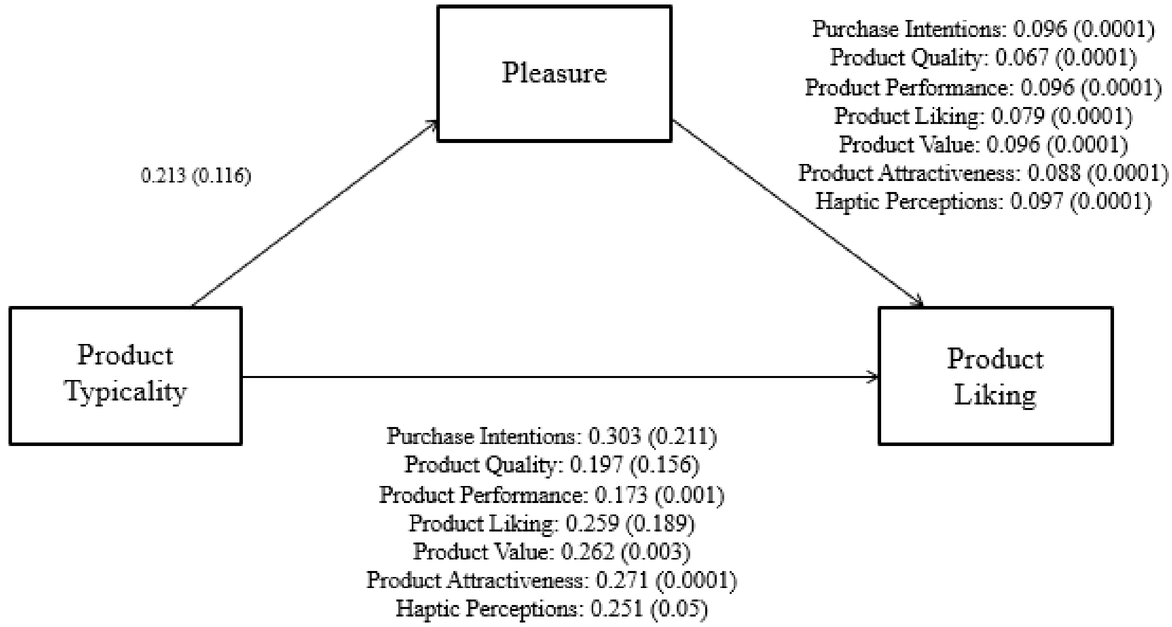
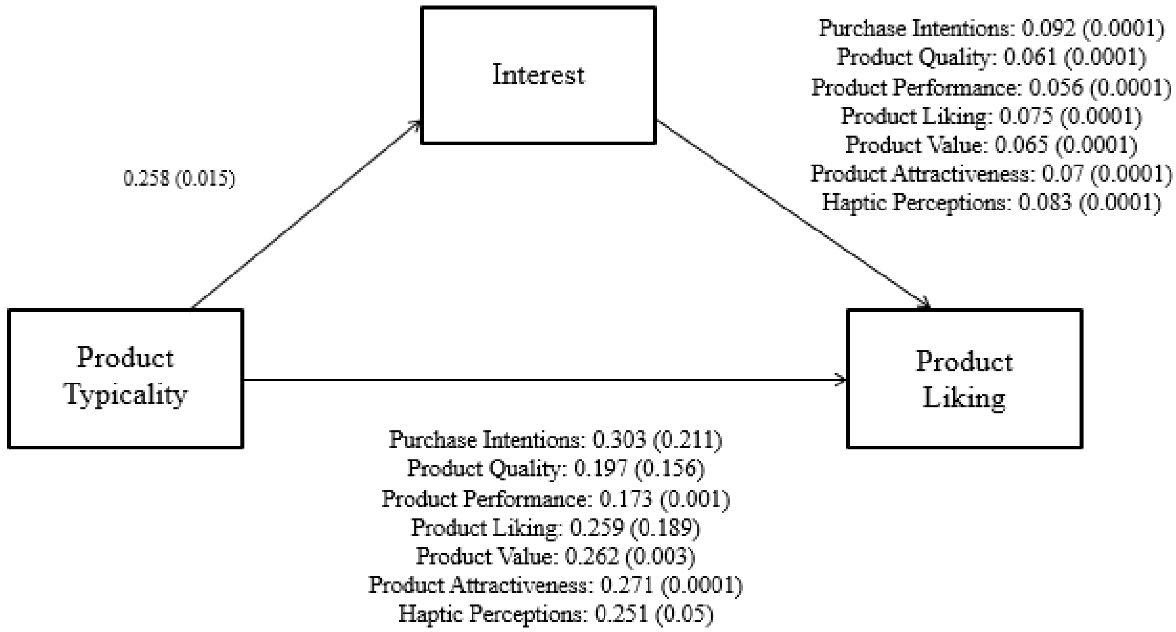


Figure 14a - Results of Study 3 – Mediation Analysis – Product Typicality based on product scent with Interest as the mediator (F, p-value, and Sobel's Test).



Time spent on processing. A one-way ANOVA was performed on response time scores as a function of product typicality conditions. The analyses show that atypically scented products are processes more slowly (Mat = 18686.48) than typically scented products (Mt = 14.864) during the automatic processing task, and faster (Mat = 90702.62; Mt = 103592.38) during the controlled processing task. Moreover, no significant difference between the two conditions of product typicality based on verbal information (e.g., plantable versus common pencil) was found. However, the effect of the between-subject factors of product typicality based on verbal information and product typicality based on product scent, nor their interaction were significant on response time scores, $F (1, 51) < 1, p > 0.05$.
Contrary to the results of study 1 and 2, which demonstrated that atypically scented products stimulate a more automatic, and pleasant-based processing than typically scented products, and that atypically scented products are also processed more systematically (e.g., controlled processing) than typically scented products, these results show that product typicality does not affect processing dynamics.

7.6 Discussion

Study 3 confirms the results of study 1 and 2 that pleasure, and interest are two distinct aesthetic responses which contribute to the formation of aesthetic preference for the product. Consistently with the predictions of the PIA Model (Graf & Landwehr, 2015), these results show that pleasure and interest are triggered by different processing dynamics, which are those of automatic and controlled processing styles.
In particular, the results of study 3 show that the ratings of product perceived pleasure are higher after the automatic processing and that decrease in the controlled processing in all the conditions of product typicality (e.g., atypical versus typical), as previously demonstrated by studies applying the PIA model (Graf & Landwehr, 2017). In contrast with results of study 2, study 3 demonstrates that atypical products are perceived as more pleasant than typical products, especially in the case of atypically (versus typically) scented products (H1). These results also confirm the results emerged from the analysis of scent evaluations, according to which the atypical scent of amber and musk was perceived as more pleasant than the typical scent of wood, although the two scents were both perceived as highly pleasant. Oppositely to study 2, in which the two scents were perceived as equally pleasant, study 3 shows that scents

evaluations also differ between the two conditions of product scent typicality, which in turn determines a difference in pleasure ratings.

Similarly to study 1 and 2, study 3 shows that the ratings of interest in the product are lower after the automatic processing and that increase in the controlled processing in both conditions of the typicality of verbal information about the product (e.g., common versus plantable pencil) but only for the atypically scented products (e.g., amber and musk). As predicted by the PIA model (Graf & Landwehr, 2017), atypical products are perceived as significantly more interesting before and after the controlled processing dynamics than typical products. More importantly, atypically (versus typically) scented products are more likely to trigger interest in the product (H2) than atypical (versus typical) verbal information (H5). Therefore, I conclude that interest in the product is a function of the processing dynamics, the product perceived typicality based on the verbal information and product scent manipulations, and interest is a strong predictor of product attractiveness.

The PIA model also discusses the importance of the perceived processing fluency dynamics. According to the predictions, the perceived processing fluency is higher after the automatic processing in both conditions of atypical versus typical product scent, and that is subject to a significant decrease in the controlled processing. According to the results emerged from study 2, study 3 shows that atypically scented products are processed less fluently than typically scented products.

As predicted by the PIA model (Graf & Landwehr, 2015), the reduction of the perceived processing fluency from the automatic to the controlled processing dynamics might result in a meaningful effort of participants since the interest in the product increases.

Study 3 also provides interesting results regarding general aesthetic liking. In particular, product attractiveness follows different dynamics depending on the degree of product perceived typicality.

More specifically, product attractiveness for typical products decreases from automatic to the controlled processing dynamics, while product attractiveness for atypical products increases, meaning that the interaction (e.g., effortful processing) of participants with the atypical products was meaningful since the interest in the product increased.

Moreover, these results suggest that product attractiveness is not a function of the participants' processing style, meaning that the aesthetic responses of pleasure and interest are triggered by different processing dynamics, whereas product attractiveness is independent by the meaning and the time of participants' interaction with the product, regardless the product perceived typicality. This result contributes to the PIA model demonstrating that pleasure and interest are independent affective phenomena and follow different dynamics of the more general product evaluations, which should be investigated separately.

Study 3 also found support for the effect of product typicality on general product evaluations, addressing that the typicality of verbal information and the typicality of product scent trigger distinct evaluations of the product. More specifically, atypical verbal information about the pencil (e.g., plantable pencil) increased all general product evaluations, except haptic perceptions, of the pencil, whereas atypically-scented products increase product perceived value, haptic perceptions, product performance, and product attractiveness but have no significant effect on product purchase intentions and perceived quality. According to the results of study 1 and 2, the results of study 3 confirm the basic assumption of the PIA model (Graf & Landwehr, 2015) that atypical, less fluent products are more preferred since the effect of product typicality on product attractiveness was significant in favor of atypical (e.g., versus typical) products to enhance attractiveness, although the direct effect of product typicality on the other general product evaluation variables depended on the typicality of the attribute being evaluated (e.g., the verbal information or the product scent). Moreover, from this study emerge that attractiveness is more likely to be enhanced by atypical product scent than atypical verbal information, meaning that odors are more likely than verbal information to regulate aesthetic and affective responses.

Finally, the mediation analysis with pleasure and interest as mediators of the relationship between product typicality and the dependent variables suggests that typicality based on verbal information and typicality based on product scent also differ in determining the general product evaluations. In particular, while product typicality based on the manipulation of product verbal information (e.g., plantable pencil) enhances product general evaluations through the mediation of both, pleasure and interest in the product, the effect of atypically (versus typically) scented products on product evaluations is fully mediated exclusively by the interest in the product (H4), especially on those evaluations for which the effect of product typicality was not significant, such as purchase intentions, product quality, product liking.

In conclusion, similarly to study 1 and 2, study 3 provides evidence that pleasure and interest are distinct affective responses which contribute to shaping aesthetic liking. The two affective responses of pleasure and interest arouse depending on the distinct affective dynamics with which olfactory information of the product are processed. More importantly, results of study 3 show that olfactory cues are processed similarly to other, more declarative, attributes of a product but also that odors are more likely than verbal stimuli to trigger aesthetic liking. In contrast with the idea that olfactory information is more difficult to be processed (Engen,

1982) and mentally represented (Zucco, 2003), this study demonstrates that the two scents of amber and musk, and wood were processed across several cognitive dimensions, such that congruence with the product category, pleasantness, typicality, and familiarity. Study 2 shows that olfactory information is mentally processed as well as more vivid product attributes regardless scent recognition (i.e., participants were not told which scent was diffused on the product) and its congruence with the pencil.

Study 3 also suggests that, differently from verbal information, olfactory cues are processed across two distinct processing dynamics simultaneously since the perceived pleasant of the product scent speeds up the automatic processing and increases the interest in the product. In other words, olfactory cues simultaneously create faster pleasant-based liking and stronger interest-based liking, which also fully mediates the effect of product typicality on general product evaluations and purchase intentions.

8. Final Remarks

8.1 Theoretical Contributions

This research addresses several theoretical contributions to sensory marketing, scent research, and literature on aesthetic preferences. First, these findings contribute to the literature on aesthetic preferences applying the PIA model (Graf & Landwehr, 2015) to the investigation of how odors affect consumers' aesthetic liking. In particular, this research applies the PIA model to olfaction research and confirms that aesthetic liking may be triggered by the two distinct aesthetic responses of pleasure and interest in the product, depending on the underlying processing dynamics through which people process the stimulus being encoded, the automatic and the controlled processing.

Second, the results of the four studies confirm that aesthetic preferences differ depending on the degree of perceived typicality of the product in such that atypical products are preferred over typical products. Moreover, the research addresses that the manipulation of product scent may successfully change the perceived typicality of the product by demonstrating that add an atypical scent to an unscented product increases pleasure and interest in the product more than typical scents.

Third, the present research addresses that aesthetic liking arouse in consequence of a more effortful processing (e.g., controlled processing) in such that people may assign a meaning to their cognitive effort and to the product itself which, in turn, increases interest in the product and general aesthetic preferences.

Moreover, this research contributes to the literature on aesthetic preferences demonstrating that pleasure and interest are different aesthetic responses from a more general product attractiveness and liking, as they are directly triggered by the underlying processing dynamics of automatic and controlled processing style, while product attractiveness results from the increased pleasure and interest but is independent of the processing dynamics.

Finally, the results demonstrate that interest in the product fully mediates the relation between product scent and general evaluations of the product and show that interest is a stronger predictor of aesthetic liking than pleasure.

This research also contributes to scent marketing literature in several ways. First, this research moves beyond the traditional approach of Stimulus-Organism-Response Model (Donovan &

Rossiter, 1982), largely applied in studies on the effect of scent on consumer behavior, and show that the positive effect of pleasant scent on product evaluations does not always occurs through the unconscious reaction to olfactory stimuli, but through a more cognitive elaboration of the stimulus itself which, in turn, shapes aesthetic preferences for the product.

Second, this research demonstrates that product scent is a strong predictor of aesthetic preferences as well as a more vivid attribute (e.g., verbal information about the product), as shown in pilot study and study 3. Contrary to the notion that odors might not be perceived in isolation (Smeets & Dijksterhuis, 2014; Zucco, 2003), the results of these four studies suggest that product scent alone is sufficient to enhance both, pleasure-based liking and interest-based liking for the product (Study 2), even more than more vivid information (e.g., verbal cue) (Biederman & Cooper, 1991). More specifically, this research provides evidence that consumers' assign to scented products unique qualities which regulate their aesthetic preference for the products based solely on product scent (pilot study, study 2 and 3). Moreover, in contrast with the idea that olfactory information is more difficult to be processed (Engen, 1982) and mentally represented (Zucco, 2003), these findings demonstrate that the two scents of amber and musk, and wood were processed across several cognitive dimensions, such that congruence with the product category, pleasantness, typicality, and familiarity.

Third, this research supports the investigation of olfaction in the field of consumer behavior under a cognitive-based approach. The results of the studies demonstrate that pleasant scents influence not only the way consumers feel but also the way they think and behave by showing that odors might also be cognitively processed by individuals across two different processing dynamics, the automatic and the controlled processing (study 2 and 3). In particular, I found that the scent of the product affects the cognitive processing of the product itself since I collected response time scores as the behavioral measure of individuals' processing dynamics. Contrary to the belief that odors are more difficult to be processed due to their ambiguity (Engen, 1972; Zucco, 2003), this research shows that odors are interpreted following the same underlying cognitive mechanism of other product attributes, such as verbal information (Study 3) and product design (Graf & Landwehr, 2017). According to the application of the PIA model to olfaction research, the studies show that the scent of the product contributes to enhancing pleasure-based liking when processed automatically and interest-based liking when processed in a controlled manner, similarly to more vivid attributes of the product (e.g., visual or verbal).

More importantly, this research contributes to scent marketing by demonstrating that scent congruence not always matters to increase product evaluations since the scent is perceived as highly pleasant. Contrary to previous studies on the effect of scent congruence with the product category on consumer behaviors and evaluations (Bosmans, 2006; Mitchell t al., 1995; Morrin and Ratneshwar 2003), the analysis of fluency ratings show that the congruent scent of wood makes processing a little more difficult than the incongruent scent of amber and musk, and that the atypical scent is more likely to increase pleasure-based liking and interest-based liking than the typical scent. I attribute these findings regarding the scent congruence with the product category to the idea that product scent might also represent a good manipulation of product typicality, an unexpected attribute for the product category (e.g., pencil) and through which it is possible to create a fascinating product and surprise consumers during their experience with the product. Thus, the scent appropriateness with the category is no longer important to enhance aesthetic liking than scent pleasantness, in our case.

8.2 Methodological Contributions

This research also addresses methodological issues relative to scent marketing studies. First, the application of the PIA model (Graf & Landwehr, 2015) to olfaction research allows researchers to expand the methodological boundaries of scent studies, by introducing the notion that odors may also be encoded and processed in isolation, in contrast with the notion that odors are mostly processed together with other stimuli (Smeets & Dijksterhuis, 2014; Zucco, 2003). The idea that odors may be processed in isolation does not mean that olfactory stimuli do not interact with other sensory modalities but that they do so in a more meaningful manner since the attribute of the scent alone is sufficient to shape aesthetic preference for the product, as shown in these studies.

This article also addresses contribution to methodology regarding the manipulations of both, product scent and processing dynamics. In particular, the manipulation of product typicality based on scent demonstrated that laboratory settings are suitable to reliably predict the effect of scent on product aesthetic preferences. Moreover, the manipulation of processing dynamics (e.g., automatic and controlled processing styles) allowing researchers to effectively manipulate the way in which individuals think and interact with products (or other stimuli more in general) also in laboratory settings.

Finally, this research is the first that collects behavioral measures regarding individuals' processing dynamics. In particular, these results demonstrate that people behave differently depending on the underlying processing dynamics and the time of processing with which individuals interact with the product. The measure of response time scores may be applied to the fields of marketing and consumer behavior extending the more general findings of the applied social psychology and increasing the robustness of the research on consumer choice and decision-making.

8.3 Managerial Implications

The present research also has significant managerial implications. First, the effective manipulation of processing dynamics demonstrates that managers may effectively modify the time consumers spent with the product and the content of their interaction with the product, making their consumption experience more meaningful. More specifically, these results open the way for managers and retailers to create more interactive environments and products which stimulate a more meaningful interaction of consumers that, in turn, increases their interest and their aesthetic preferences.

The present findings suggest that product scent is a low-cost opportunity and an easy-to-manipulate stimulus to invest in products that are most preferred by consumers in the marketplace. In particular, as the present research suggests, product scent is more likely to increase aesthetic liking for the product than a more vivid verbal attribute. Since then, managers and retailers may add a particular scent to increase aesthetic preferences of certain products in the store, such as new products or products with which consumers are not highly familiar, products in a promotion, or very common products for which consumers have no strong preferences over other similar products in the market.

Finally, results support that scent congruence with the product category not always matter as much as the scent perceived pleasantness. The idea that scent congruence is not the primary dimension through which the scent is perceived (e.g., scent pleasantness) does not mean that should not be taken into careful consideration. Instead, I believe that the results regarding scent congruence may serve to design specific guidelines for sale and retail strategies, encouraging managers and retailers to apply olfactory stimuli more carefully and selecting scents with characteristics that better fit their specific goals. For example, managers and retailers may use a particular scent to create a signature scent for their brands, regardless the scent congruence with the product category. Moreover, retailers may choose between using certain scents that better suits the overall store environments to improve consumer shopping experience or specific products, and scents that do not fit any product in the store but, because of their pleasant atypicality, may surprise and fascinate consumers, who end up prefer those products over other, more common products in the same category.

8.4 Limitations and Future Research

This research is not without limitations. First, I used only two scents belonging to the woody and floral categories since they have been previously applied in research using pencils as the main product of the studies (Krishna et al., 2010). I suggest that further studies could investigate whether other odors belonging to different categories, are equally effectively to drive aesthetic preferences for the product.

Second, the present experiments only explored the effect of product scent on a very common and low-involvement product (e.g., pencil). Further studies may explore how product scent typicality work with luxury or high-involvement products, especially to understand how consumers process atypically scented products belonging to those categories for which consumers apply a more deliberate (versus heuristic) evaluation process (e.g., jewelry, luxury brands).

Third, the experimental design included a very strong manipulation of product typicality based on the verbal description of the product, but a very subtle manipulation of product typicality based on scent. Future studies may investigate how different degrees of the perceived novelty and typicality of the product affect processing dynamics and, in turn, the aesthetic preference for the product.

This research is also limited because I only used attributes (e.g., product scent and verbal information about the product) that were perceived as highly pleasant and attractive by participants. Future studies should investigate how more ambiguous and contradictory product attributes are processed and shape aesthetic preferences for the product. For example, art experts find the more complex (Silvia, 2005c) and abstract (Hekkert & Van Wieringen, 1996) forms of art more interesting, but inexpert or consumers who are not familiar with the contemporary art may find the same paintings as more difficult to understand and, thus, less interesting.

Finally, I encourage further studies to explore the aesthetic responses of pleasure and interest separately from the more general product evaluations since results demonstrated that pleasure and interest are directly shaped by the underlying aesthetic dynamics, while general product evaluations only emerge as the result of the increased interest in the product.

9. Conclusions

The third article of the dissertation focused on the role of cognition in determining consumer aesthetic preferences for the products. In particular, the findings of the present research clarify the reason why consumers express, in many situations, contradictory preferences for apparently difficult-to-process products. More specifically, the present research investigated why people choose scented products over other, unscented alternatives, focusing more on the process through which aesthetic liking occurs instead on the very general product evaluations, which represent only the outcome of the process through which aesthetic preferences arouse. Moreover, this research clarifies the underlying processing dynamics under which odors are processed providing empirical evidence that pleasure and interest in the product are two distinct positive affective responses to olfactory stimuli which both contribute to driving aesthetic liking and product attractiveness.

I hope to encourage further investigations on the role of scent in the process of aesthetic preferences formation under a cognitive-based perspective to extend the boundaries of scent marketing research beyond the environmental psychology model to an approach which considers the odor perceptions not merely as an unconscious reaction to a stimulus but a more meaningful aesthetic experience.

CHAPTER 5

GENERAL CONCLUSIONS

This dissertation has investigated the role of olfactory stimuli in regulating consumers' aesthetic preferences and choices. The three articles had general purposes: i) to present a systematic review of the existing findings of scent research and present the current theories and approaches to the investigation of scent effects on consumer behavior (Article 1); ii) to propose a cognitive-based approach to be applied to scent research which may contribute to the advance of scent marketing research (Article 1); and iii) to test cognitive-based theories, such as odor priming (Article 2) and the PIA Model (Pleasure and Interest Model for Aesthetic Preference) (Article 3).

The study of scent effects on consumer behavior and choices under a cognitivist perspective may contribute to scent marketing literature in several ways, as shown by the results of this dissertation: i) solving some inconsistencies of previous studies; ii) extending the notion that odors are multisensory and complex experiences that are not only emotionally perceived but processed through their meanings; iii) exploring the underlying mechanism through which odors regulate behavior and decision-making through cognition; and iv) addressing the implications which may result from a cognitive-based approach to scent studies for managers and public policies makers.

Moreover, each article of the dissertation had specific purposes. Article 1 presented a systematic review and a discussion of the most relevant scent marketing studies with the aim of proposing a cognitive-based approach to the study of the effects of scent on consumer behavior. Despite the great interest in the study of the effects of scent on a variety of consumer behavior variables, the role of cognition in regulating the relationship between olfactory perceptions and consumers' choices has been underestimated. The focus on cognition in further scent marketing studies may contribute to solve mixed or contradictory results concerning the interplay between olfactory perceptions and emotions, to conceptualize odors as multisensory and complex experiences and to explore the underlying mechanism through which odors are elaborated and affect decision-making and choices. The discussion proposed in Article 1 offered a conceptualization of the sense of smell as more cognitive than emotional sense and theoretically clarified that the application of a cognitive-based approach might contribute to the literature on scent marketing supporting researchers to explore the underlying mechanism through which scent is mentally processed by individuals, and clarify how mental processing of scent information may contribute to developing preferences and meanings for products, environments, and social phenomena.

Article 2 had the specific purpose of finding support for the application of a cognitive-based approach to scent marketing studies. In particular, Article 2 discussed and empirically tested the potential of odor affective and semantic priming effects on consumer decision-making and choices. In the eight experiments of the article results support the idea that olfactory stimuli influence cognitive processing even when they are perceived unconsciously and regulate product and brand choices. In particular, the results of Article 2 confirmed that odors are primarily perceived through the dimension of their valence (i.e., pleasant or unpleasant), and confirm the already established notion that pleasant odors have a positive effect on consumer responses and behaviors but also extend the idea that odors may serve as affective primes and subconsciously guide information processing. Moreover, the research also addressed that semantic priming effects elicited by odors are a real phenomenon but occur under the certain condition of odor perceived pleasantness. In other words, the underlying psychological and physiological process why odor priming occurs is one of affective-based versus associative-based mechanism. Finally, results of Article 2 go beyond the traditional approach of Stimulus-Organism-Response Model (Donovan & Rossiter, 1982), and show that the effect of pleasant scent on consumer behavior is not merely a consequence of an unconscious, emotion-driven reaction to olfactory stimuli which consumers cannot avoid; the results of the studies clarified that scent effects on consumer behavior, decision-making and choice occur through a more complex affective-based underlying mechanism based on odor mental representation, interpretation, and elaboration that, in turn, influences behavior and choice. Moreover, priming effects aroused by odors and not previously explored by the literature may also explain why prior studies have not always observed a positive effect of scent on consumer approach and avoidance behaviors (Cirrincione, Estes, & Carù, 2014; Morrison et al., 2011).

Article 3 had the specific purpose of applying a cognitive-based theory, the PIA Model (Pleasure and Interest Model for Aesthetic Preference) to the investigation of how olfactory stimuli contribute to building consumers' aesthetic preferences for the products. The results of this article confirmed that aesthetic liking may be triggered by the two distinct aesthetic responses of pleasure and interest in the product, depending on the underlying processing dynamics through which people process the stimulus being encoded, the automatic and the controlled processing. In other words, the findings demonstrated that the scent of the product contributes to enhancing pleasure-based liking when processed automatically and interest-based liking when processed in a controlled manner, similarly to more vivid attributes of the product (e.g., visual or verbal). Moreover, these findings confirmed that product scent may be a strong predictor of aesthetic preferences and that those may differ depending on the degree of perceived typicality of the product and are enhanced by a more effortful processing (e.g., controlled processing) which increases interest in the product. This research also contributed to the literature on aesthetic preferences demonstrating that pleasure and interest are different aesthetic responses from a more general product attractiveness and liking, as they are directly triggered by the underlying processing dynamics of automatic and controlled processing style, while product attractiveness results from the increased pleasure and interest but is independent of the processing dynamics.

This dissertation contributes to methodology in scent marketing studies addressing that odors may also be encoded in isolation, which extends that laboratory settings are suitable to reliably predict scent effects on information processing and decision-making. Also, this dissertation shows that the way in which individuals think and interact with products may also be successfully manipulated. Finally, this research collects behavioral measures regarding individuals' processing dynamics and demonstrates that people behave differently depending on the underlying processing dynamics and the time of processing with which individuals interact with the product. The measure of response time scores may be applied to the fields of marketing and consumer behavior extending the more general findings of the applied social psychology and increasing the robustness of the research on consumer choice and decision-making.

This dissertation has managerial implications since it opens the way for managers and retailers to better predict the effect of particular scents in regulating consumers' aesthetic preferences and choices. Findings suggest that product scent is a low-cost opportunity and an easy-to-manipulate stimulus to increase aesthetic preferences of certain products in the store, and to create more interactive environments and more meaningful interaction of consumers with products, which stimulates their interest and liking. Moreover, the effective manipulation of processing dynamics demonstrates that managers may effectively modify the time consumers spent with the product and the content of their interaction with the product, making their consumption experience more meaningful.

However, this dissertation is not without limitations. First, I used only scents belonging to very familiar categories (e.g., food and floral scents). I suggest that further studies should investigate the affective and semantic priming effects (Article 2), as well as the effect of odors on consumers' aesthetic preferences (Article 3) applying odors belonging to different, may be more complex categories, to validate the results in other domains of consumer behavior. Second, in both Article 2 and Article 3 the scent manipulation did not involve diffusing the scent in the environment, and was not subliminal as in previous studies. Thus, participants of these experiments were not completely unaware of the olfactory stimulus they were primed with. Further researches should address to what extent the awareness of the odor interacts with the affective and semantic priming effects (Article 2) and with the process of aesthetic preferences formation (Article 3) and drive consumers' decision-making and choices.
Third, this dissertation is also limited because included only positive affective and semantic priming (e.g., pleasant scents and pleasant food stimuli) (Article 2) and very positive product attributes (e.g., pleasant product scent and pleasant verbal information about the product) (Article 3), that were perceived as highly pleasant and attractive by participants. Future studies should investigate how more ambiguous, negative, and contradictory product stimuli and attributes are processed and shape odor priming effects as well as aesthetic preferences for the product. Finally, these studies did not include the exploration of moderating effects of other relevant variables. I suggest that future studies should also investigate the possible moderating effects of individuals' olfactory sensibility, individual differences in encoding olfactory stimuli, odor free recognition, and motivation to process.

This dissertation still leaves many research questions open. For this reason, I hope that my research may inspire and stimulate the interest of other researchers in this topic and may serve as a starting point for further studies of scent marketing under a cognitivist approach.

REFERENCES

1. Abelson, R. P., Aronson, E. E., McGuire, W. J., Newcomb, T. M., Rosenberg, M. J., & Tannenbaum, P. H. (1968). Theories of cognitive consistency: A sourcebook.
2. Acharya, C., & Elliott, G. (2003). Consumer ethnocentrism, perceived product quality and choice—An empirical investigation. *Journal of International Consumer Marketing*, *15*(4), 87-115.
3. Adams, C., & Doucé, L. (2016). The effect of crossmodal congruency between ambient scent and the store environment on consumer reactions. M. Jeusfeld c/o Redaktion Sun SITE, Informatik V.
4. Ahluwalia, R., & Gürhan-Canli, Z. (2000). The effects of extensions on the family brand name: an accessibility-diagnosticity perspective. *Journal of Consumer Research*, *27*(3), 371-381.
5. Alter, A. L., Oppenheimer, D. M., Epley, N., & Eyre, R. N. (2007). Overcoming intuition: metacognitive difficulty activates analytic reasoning. *Journal of Experimental Psychology: General*, *136*(4), 569-576.
6. Auty, S., & Lewis, C. (2004). Exploring children's choice: The reminder effect of product placement. *Psychology & Marketing, 21*(9), 697-713.
7. Auvray, M., & Spence, C. (2008). The multisensory perception of flavor. *Consciousness and cognition, 17*(3), 1016-1031.
8. Bagozzi, R. P., Gopinath, M., & Nyer, P. U. (1999). The role of emotions in marketing. *Journal of the academy of marketing science, 27*(2), 184-206.
9. Bargh, J. A. (1992). The ecology of automaticity: Toward establishing the conditions needed to produce automatic processing effects. *The American journal of psychology, 105*(2), 181-199.
10. Bargh, J. A., Chaiken, S., Govender, R., & Pratto, F. (1992). The generality of the automatic attitude activation effect. *Journal of personality and social psychology, 62*(6), 893-912.
11. Bargh, J. A., Chaiken, S., Raymond, P., & Hymes, C. (1996). The automatic evaluation effect: Unconditional automatic attitude activation with a pronunciation task. *Journal of experimental social psychology*, *32*(1), 104-128.

12. Bargh, J. A., Chen, M., & Burrows, L. (1996). Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. *Journal of personality and social psychology, 71*(2), 230-244.

13. Bargh, J. A., & Ferguson, M. J. (2000). Beyond behaviorism: on the automaticity of higher mental processes. *Psychological bulletin*, *126*(6), 925-945.

14. Bargh, J. A., & Morsella, E. (2008). The unconscious mind. *Perspectives on psychological science, 3*(1), 73-79.

15. Bargh, J. A., Williams, L. E., Huang, J. Y., Song, H., & Ackerman, J. M. (2010). From the physical to the psychological: Mundane experiences influence social judgment and interpersonal behavior. *Behavioral and Brain Sciences, 33*(04), 267-268.

16. Baron, R. A. (1981). Olfaction and human social behavior: Effects of a pleasant scent on attraction and social perception. *Personality and Social Psychology Bulletin*, *7*(4), 611-616.

17. Bellizzi, J.A., Crowley, A.E., & Hasty, R.W. (1983). The Effects of Colors in Store Design. *Journal of Retailing, 59*(Spring), 21-45.

18. Berlyne, D. E. (1971). *Aesthetics and psychobiology* (Vol. 336). New York: Appleton-Century-Crofts.

19. Bettman, J. R. (1979). *An information processing theory of consumer choice*. Reading, MA: Addison-Wesley.

20. Biederman, I., & Cooper, E. E. (1991). Priming contour-deleted images: Evidence for intermediate representations in visual object recognition. *Cognitive psychology, 23*(3), 393-419.

21. Binder, J. R., Westbury, C. F., McKiernan, K. A., Possing, E. T., & Medler, D. A. (2005). Distinct brain systems for processing concrete and abstract concepts. *Journal of cognitive neuroscience, 17*(6), 905-917.

22. Biswas, D., Labrecque, L. I., Lehmann, D. R., & Markos, E. (2014). Making choices while smelling, tasting, and listening: The role of sensory (dis) similarity when sequentially sampling products. *American Marketing Association, 78*(1), 112-126.

23. Bitner, M. J. (1990). Evaluating Service Encounters: The Effects of Physical Surroundings and Employee Responses. *Journal of Marketing, 54*(2), 69-82.

24. Bless, H., Bohner, G., Schwarz, N., & Strack, F. (1990). Mood and persuasion: A cognitive response analysis. *Personality and Social Psychology Bulletin*, *16*(2), 331-345.

25. Bone, P. F., & Ellen, P. S. (1998). Does it matter if it smells? Olfactory stimuli as advertising executional cues. *Journal of Advertising, 27*(4), 29-39.

26. Bone, P. F., & Ellen, P. S. (1999). *Scents in the marketplace: Explaining a fraction of olfaction. Journal of retailing, 75*(2), 243-262.

27. Bone, P. F., & Jantrania, S. (1992). Olfaction as a cue for product quality. *Marketing letters, 3*(3), 289-296.

28. Bosmans, A. (2006). Scents and sensibility: When do (in) congruent ambient scents influence product evaluations? *Journal of Marketing, 70*(3), 32-43.

29. Bouzaabia, R. (2014). The Effect of Ambient Scents on Consumer Responses: Consumer Type and His Accompaniment State as Moderating Variables. *International Journal of Marketing Studies, 6*(1), 155-167.

30. Bowman, D., & Gatignon, H. (1996). Order of entry as a moderator of the effect of the marketing mix on market share. *Marketing Science, 15*(3), 222-242.

31. Cacioppo, J. T., Petty, R. E., Kao, C. F., & Rodriguez, R. (1986). Central and peripheral routes to persuasion: An individual difference perspective. *Journal of personality and social psychology*, *51*(5), 1032-1043.

32. Calvert, G., Spence, C., & Stein, B. E. (Eds.). (2004). The handbook of multisensory processes. MIT press.

33. Carbon, C. C., & Leder, H. (2005). The repeated evaluation technique (RET). A method to capture dynamic effects of innovativeness and attractiveness. *Applied Cognitive Psychology*, *19*(5), 587-601.

34. Carver, C. S., & Scheier, M. F. (1990). Origins and functions of positive and negative affect: A control-process view. *Psychological review*, *97*(1), 19-35.

35. Chaiken, S. (1980). Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *Journal of personality and social psychology*, *39*(5), 752-766.

36. Chaiken, S. (1987). The heuristic model of persuasion. In Zanna, M. P., Olson, J. M. & Herman, C. P. (Eds), *Social influence: the Ontario symposium* (Vol. 5, pp. 3-39). Hillsdale, NJ: Lawrence Erlbaum.

37. Chaiken, S., & Trope, Y. (1999). *Dual-process theories in social psychology*. Guilford Press.

38. Chebat, J. C., & Michon, R. (2003). Impact of ambient odors on mall shoppers' emotions, cognition, and spending: A test of competitive causal theories. *Journal of Business Research, 56*(7), 529-539.

39. Chebat, J. C., Morrin, M., & Chebat, D. R. (2009). Does age attenuate the impact of pleasant ambient scent on consumer response? *Environment and Behavior, 41*(2), 258-267.

40. Childers, T. L., & Houston, M. J. (1984). Conditions for a picture-superiority effect on consumer memory. *Journal of Consumer Research, 11*(2), 643-654.

41. Cirrincione, A., Estes, Z., & Carù, A. (2014). The Effect of Ambient Scent on the Experience of Art: Not as Good as It Smells. *Psychology & Marketing, 31*(8), 615-627.

42. Coelho, J. S., Polivy, J., Herman, C. P., & Pliner, P. (2009). Wake up and smell the cookies. Effects of olfactory food-cue exposure in restrained and unrestrained eaters. *Appetite, 52*(2), 517-520.

43. Cox, D., & Cox, A. D. (2002). Beyond first impressions: The effects of repeated exposure on consumer liking of visually complex and simple product designs. *Journal of the Academy of Marketing Science*, *30*(2), 119-130.

44. Dalton, P. (2000). Psychophysical and behavioral characteristics of olfactory adaptation. *Chemical Senses, 25*(4), 487-492.

45. De Lange, M. A., Debets, L. W., Ruitenburg, K., & Holland, R. W. (2012). Making less of a mess: Scent exposure as a tool for behavioral change. *Social Influence, 7*(2), 90-97.

46. Degel, J., & Köster, E. P. (1998). Implicit memory for odors: a possible method for observation. *Perceptual and motor skills, 86*(3), 943-952.

47. Dehaene, S., Naccache, L., Le Clec'H, G., Koechlin, E., Mueller, M., Dehaene-Lambertz, G., ... & Le Bihan, D. (1998). Imaging unconscious semantic priming. *Nature, 395*(6702), 597-600.

48. Demattè, M. L., Sanabria, D., Sugarman, R., & Spence, C. (2006). Cross-modal interactions between olfaction and touch. *Chemical Senses, 31*(4), 291-300.

49. Diener, E. D. & Emmons, R. A., (1985). The independence of positive and negative affect. *Journal of Personality and Social Psychology, 47*(5), 1105-1117.

50. Dijksterhuis, A., Smith, P. K., Van Baaren, R. B., & Wigboldus, D. H. (2005). The unconscious consumer: Effects of environment on consumer behavior. *Journal of Consumer Psychology, 15*(3), 193-202.

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

52. Drobnick, J. (2006). *The smell culture reader* (pp. 1-12). Oxford: Berg.

53. Doucé, L., & Janssens, W. (2011). The presence of a pleasant ambient scent in a fashion store: The moderating role of shopping motivation and affect intensity. *Environment & Behavior, 45*(2), 215-238.

54. Doucé, L., Poels, K., Janssens, W., & De Backer, C. (2013). Smelling the books: The effect of chocolate scent on purchase-related behavior in a bookstore. *Journal of Environmental Psychology, 36*(6), 65-69.

55. Efklides, A., & Petkaki, C. (2005). Effects of mood on students' metacognitive experiences. *Learning and Instruction*, *15*(5), 415-431.

56. Ehrlichman, H., & Halpern, J. N. (1988). Affect and memory: effects of pleasant and unpleasant odors on retrieval of happy and unhappy memories. *Journal of Personality and Social Psychology, 55*(5), 769-779.

57. Ekman, P. (1992). An argument for basic emotions. *Cognition & emotion*, *6*(3-4), 169-200.

58. Engen, T. (1972). The effect of expectation on judgments of odor. *Acta Psychologica, 36*(6), 450-458.

59. Engen, T. (1982). The perception of odors. New York, NY: Academic Press.

60. Engen, T., & Ross, B. M. (1973). Long-term memory of odors with and without verbal descriptions. *Journal of Experimental Psychology, 100*(2), 221.

61. Evans, J. S. B. (2006). The heuristic-analytic theory of reasoning: Extension and evaluation. *Psychonomic Bulletin & Review*, *13*(3), 378-395.

62. Evans, J. S. B. (2008). Dual-processing accounts of reasoning, judgment, and social cognition. *Annu. Rev. Psychol.*, *59*(1), 255-278.

63. Faerber, S. J., Leder, H., Gerger, G., & Carbon, C. C. (2010). Priming semantic concepts affects the dynamics of aesthetic appreciation. *Acta Psychologica*, *135*(2), 191-200.

64. Fazio, R. H., Sanbonmatsu, D. M., Powell, M. C., & Kardes, F. R. (1986). On the automatic activation of attitudes. *Journal of Personality and Social Psychology, 50*(2), 229-238.

65. Fazio, R. H., & Zanna, M. P. (1981). Direct experience and attitude-behavior consistency. *Advances in experimental social psychology*, *14*(C), 161-202.

66. Fedoroff, I., Polivy, J., & Herman, C. P. (2003). The specificity of restrained versus unrestrained eaters' responses to food cues: general desire to eat, or craving for the cued food? *Appetite, 41*(1), 7-13.

67. Feldman, J. M., & Lynch, J. G. (1988). Self-generated validity and other effects of measurement on belief, attitude, intention, and behavior. *Journal of applied Psychology, 73*(3), 421-435.

68. Ferrand, L., & New, B. (2003). Semantic and associative priming in the mental lexicon. In P. Bonin (Ed.), Mental lexicon: Some words to talk about words (pp. 25–43). Hauppage, NY: Nova Science Publishers.

69. Ferré, P., & Sánchez-Casas, R. (2014). Affective Priming in a Lexical Decision Task: Is There an Effect of Words' Concreteness? *Psicologica: International Journal of Methodology and Experimental Psychology, 35*(1), 117-138.

70. Fitzsimons, G. M., Chartrand, T. L., & Fitzsimons, G. J. (2008). Automatic effects of brand exposure on motivated behavior: how apple makes you "think different". *Journal of consumer research, 35*(1), 21-35.

71. Fleck, N., & Maille, V. (2010). Thirty years of conflicting studies on the influence of congruence as perceived by the consumer: Overview, limitations and avenues for research. *Recherche Et Applications En Marketing (English Edition)*, *25*(4), 69-92.

72. Flores d'Arcais, G. B., Schreuder, R., & Glazenborg, G. (1985). Semantic activation during recognition of referential words. *Psychological research, 47*(1), 39-49.

73. Fox, K. (2006). The smell report. Social Issues Research Centre. http://www.sirc.org/publik/smell.html).

Downloaded from http://www.sirc.org/publik/smell_human.html on 12/09/2017.

74. Frijda, N. H. (1986). The emotions: Studies in emotion and social interaction. *Paris: Maison de Sciences de l'Homme*.

75. Gallace, A., & Spence, C. (2006). Multisensory synesthetic interactions in the speeded classification of visual size. *Perception & Psychophysics*, *68*(7), 1191-1203.

76. Gaillet, M., Sulmont-Rossé, C., Issanchou, S., Chabanet, C., & Chambaron, S. (2013). Priming effects of an olfactory food cue on subsequent food-related behaviour. *Food Quality and Preference, 30*(2), 274-281.

77. Garbarino, E. C., & Edell, J. A. (1997). Cognitive effort, affect, and choice. *Journal of Consumer Research*, *24*(2), 147-158.

78. Gottfried, J. A., O'Doherty, J., & Dolan, R. J. (2003). Encoding predictive reward value in human amygdala and orbitofrontal cortex. *Science, 301*(5636), 1104-1107.

79. Graf, L. K., & Landwehr, J. R. (2015). A dual-process perspective on fluency-based aesthetics: the pleasure-interest model of aesthetic liking. *Personality and Social Psychology Review*, *19*(4), 395-410.

80. Graf, L. K., & Landwehr, J. R. (2017). Aesthetic Pleasure versus Aesthetic Interest: The Two Routes to Aesthetic Liking. *Frontiers in psychology*, *8*, 15-15.

81. Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. (1998). Measuring individual differences in implicit cognition: the implicit association test. *Journal of personality and social psychology, 74*(6), 1464-1480.

82. Gruber, T., & Müller, M. M. (2002). Effects of picture repetition on induced gamma band responses, evoked potentials, and phase synchrony in the human EEG. *Cognitive Brain Research, 13*(3), 377-392.

83. Guenther, R. K., Klatzky, R. L., & Putnam, W. (1980). Commonalities and differences in semantic decisions about pictures and words. *Journal of Verbal Learning and Verbal Behavior, 19*(1), 54-74.

84. Gvili, Y., Levy, S., & Zwilling, M. (2017). The sweet smell of advertising: the essence of matching scents with other ad cues. *International Journal of Advertising*, 1-23.

85. Hall, L., Johansson, P., Tärning, B., Sikström, S., & Deutgen, T. (2010). Magic at the marketplace: Choice blindness for the taste of jam and the smell of tea. *Cognition, 117*(1), 54-61.

86. Hallem, E. A., & Carlson, J. R. (2006). Coding of odors by a receptor repertoire. *Cell, 125*(1), 143-160.

87. Harmon-Jones, E. (2000). Cognitive dissonance and experienced negative affect: Evidence that dissonance increases experienced negative affect even in the absence of aversive consequences. *Personality and Social Psychology Bulletin*, *26*(12), 1490-1501.

88. Hayes, A. F. (2013). Introduction to Mediation, Moderation, and Conditional Process Analysis. A Regression-Based Approach. 2013. New York: Guilford.

89. Harris, J. L., Bargh, J. A., & Brownell, K. D. (2009). Priming effects of television food advertising on eating behavior. *Health psychology, 28*(4), 404-413.

90. Heider, F. (1946). Attitudes and cognitive organization. *Journal of Psychology*, *21*(1), 107–111.

91. Heider, F. (1958). The psychology of interpersonal relations. New York: Wiley.

92. Hekkert, P., Snelders, D., & Wieringen, P. C. (2003). 'Most advanced, yet acceptable': Typicality and novelty as joint predictors of aesthetic preference in industrial design. *British journal of Psychology*, *94*(1), 111-124.

93. Hekkert, P., & Van Wieringen, P. C. (1996). Beauty in the eye of expert and nonexpert beholders: A study in the appraisal of art. *The American Journal of Psychology*, *109*(3), 389-407.

94. Helmefalk, M., & Hultén, B. (2017). Multi-sensory congruent cues in designing retail store atmosphere: Effects on shoppers' emotions and purchase behavior. *Journal of Retailing and Consumer Services, 38*, 1-11.
95. Henshaw, V. (2013). *Urban smellscapes: Understanding and designing city smell environments*. Routledge.
96. Hermans, D., & De Houwer, J. (1994). Affective and subjective familiarity ratings of 740 Dutch words. *Psychologica Belgica, 34*(2-3), 115-139.
97. Hermans, D., Baeyens, F. & Eelen, P. (1998). Odours as Affective-processing Context for Word Evaluation: A Case of Cross-modal Affective Priming. *Cognition and Emotion, 12*(4), 601-613.
98. Hermans, D., Baeyens, F., Lamote, S., Spruyt, A., & Eelen, P. (2005). Affective priming as an indirect measure of food preferences acquired through odor conditioning. *Experimental Psychology, 52*(3), 180-186.
99. Herr, P. M. (1989). Priming price: Prior knowledge and context effects. *Journal of consumer research, 16*(1), 67-75.
100. Herr, P. M., Kardes, F. R., & Kim, J. (1991). Effects of word-of-mouth and product-attribute information on persuasion: An accessibility-diagnosticity perspective. *Journal of consumer research*, *17*(4), 454-462.
101. Herrmann, A., Zidansek, M., Sprott, D. E., & Spangenberg, E. R. (2013). The power of simplicity: Processing fluency and the effects of olfactory cues on retail sales. *Journal of Retailing, 89*(1), 30-43.
102. Herz, R. S., & Cupchik, G. C. (1995). The emotional distinctiveness of odor-evoked memories. *Chemical Senses, 20*(5), 517-528.
103. Herz, R. S., & von Clef, J. (2001). The influence of verbal labeling on the perception of odors: evidence for olfactory illusions? *Perception, 30*(3), 381-391.
104. Hirsch, A. R. (1995). Effects of ambient odors on slot-machine usage in a Las Vegas casino. *Psychology & Marketing, 12*(7), 585-594.
105. Hirsch, A. R., & Gomez, R. (1995). Weight reduction through inhalation of odorants. *Journal of Neurological and Orthopaedic Medicine and Surgery*, *16*, 28-28.
106. Holbrook, M. B., & Hirschman, E. C. (1982). The experiential aspects of consumption: Consumer fantasies, feelings, and fun. *Journal of consumer research, 9*(2), 132-140.

107.Holland, R. W., Hendriks, M., & Aarts, H. (2005). Smells Like Clean Spirit Nonconscious Effects of Scent on Cognition and Behavior. *Psychological Science, 16*(9), 689-693.

108.Holmes, T. H., & McCormick, M. I. (2010). Smell, learn and live: the role of chemical alarm cues in predator learning during early life history in a marine fish. *Behavioural Processes, 83*(3), 299-305.

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

110.Hultén, B. (2011). Sensory marketing: the multi-sensory brand-experience concept. *European Business Review, 23*(3), 256-273.

111.Im, H., Lennon, S. J., & Stoel, L. (2010). The perceptual fluency effect on pleasurable online shopping experience. *Journal of Research in Interactive Marketing*, *4*(4), 280-295.

112.Isen, A. M. (1987). Positive affect, cognitive processes, and social behavior. *Advances in experimental social psychology*, *20*, 203-253.

113.Jacob, C., Stefan, J., & Guéguen, N. (2014). Ambient scent and consumer behavior: a field study in a florist's retail shop. *The International Review of Retail, Distribution and Consumer Research, 24*(1), 116-120.

114.James, W. [1980] 1950. The Principles of Psychology. New York: Holt.

115.Joordens, S., & Becker, S. (1997). The long and short of semantic priming effects in lexical decision. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 23*(5), 1083-1105.

116.Kaeppler, K., & Mueller, F. (2013). Odor Classification: A Review of Factors Influencing Perception-Based Odor Arrangements. *Chemical senses, 38*(3), 189-209.

117.Kahneman, D., Treisman, A., & Gibbs, B. J. (1992). The reviewing of object files: Object-specific integration of information. *Cognitive psychology, 24*(2), 175-219.

118.Kardes, F. R. (1986). Effects of initial product judgments on subsequent memory-based judgments. *Journal of Consumer Research*, *13*(1), 1-11.

119.Kardes, F. R., Posavac, S. S., & Cronley, M. L. (2004). Consumer inference: A review of processes, bases, and judgment contexts. *Journal of Consumer Psychology*, *14*(3), 230-256.

120.Keller, P. A., & Block, L. G. (1997). Vividness effects: A resource-matching perspective. *Journal of Consumer Research*, *24*(3), 295-304.

121.Kemp, S. E., & Gilbert, A. N. (1997). Odor intensity and color lightness are correlated sensory dimensions. *The American journal of psychology, 110*(1), 35-46.

122.Kempf, D. S., & Smith, R. E. (1998). Consumer processing of product trial and the influence of prior advertising: A structural modeling approach. *Journal of Marketing Research*, *35*(3), 325-338.

123.Kermen, F., Chakirian, A., Sezille, C., Joussain, P., Le Goff, G., Ziessel, A., ... & Bensafi, M. (2011). Molecular complexity determines the number of olfactory notes and the pleasantness of smells. *Scientific reports, 1*(206), 1-5.

124.Kim, H., Park, K., & Schwarz, N. (2009). Will this trip really be exciting? The role of incidental emotions in product evaluation. *Journal of Consumer Research*, *36*(6), 983-991.

125.Kim, M., & Lennon, S. (2008). The effects of visual and verbal information on attitudes and purchase intentions in internet shopping. *Psychology & Marketing, 25*(2), 146-178.

126.Kirk-Smith, M. D., Van Toller, C., & Dodd, G. H. (1983). Unconscious odour conditioning in human subjects. *Biological psychology, 17*(2), 221-231.

127.Kisielius, J., & Roedder, D. L. (1983). The effects of imagery on attitude-behavior consistency. *NA-Advances in Consumer Research Volume 10*(1), 72-74.

128.Klauer, K. C., & Musch, J. (2003). Affective priming: Findings and theories. In J. Musch & K. C. Klauer (Eds.), The psychology of evaluation: Affective processes in cognition and emotion (pp. 7–50).

129.Köster, E. P., Degel, J., & Piper, D. (2002). Proactive and retroactive interference in implicit odor memory. *Chemical Senses, 27*(3), 191-206.

130.Kousta, S. T., Vigliocco, G., Vinson, D. P., Andrews, M., & Del Campo, E. (2011). The representation of abstract words: why emotion matters. *Journal of Experimental Psychology: General, 140*(1), 14-34.

131.Kreuter, M. W., Chheda, S. G., & Bull, F. C. (2000). How does physician advice influence patient behavior? *Evidence for a priming effect. Archives of family medicine, 9*(5), 426-433.

132.Krishna, A. (2012). An integrative review of sensory marketing: Engaging the senses to affect perception, judgment and behavior. *Journal of Consumer Psychology, 22*(3), 332-351.

133.Krishna, A., & Morrin, M. (2008). Does touch affect taste? The perceptual transfer of product container haptic cues. *Journal of Consumer Research, 34*(6), 807-818.

134.Krishna, A., Elder, R. S., & Caldara, C. (2010). Feminine to smell but masculine to touch? Multisensory congruence and its effect on the aesthetic experience. *Journal of Consumer Psychology, 20*(4), 410-418.

135.Krishna, A., Lwin, M. O., & Morrin, M. (2010). Product scent and memory. *Journal of consumer research, 37*(1), 57-67.

136.Kruglanski, A. W., Orehek, E., Dechesne, M., & Pierro, A. (2010). Lay epistemic theory: The motivational, cognitive, and social aspects of knowledge formation. *Social and Personality Psychology Compass*, *4*(10), 939-950.

137.Landwehr, J. R., Labroo, A. A., & Herrmann, A. (2011). Gut liking for the ordinary: Incorporating design fluency improves automobile sales forecasts. *Marketing Science*, *30*(3), 416-429.

138.Landwehr, J. R., Wentzel, D., & Herrmann, A. (2013). Product Design for the Long Run: Consumer Responses to Typical and Atypical Designs at Different Stages of Exposure. *Journal of Marketing*, *77*(5), 92-107.

139.Larsson, M. (1997). Semantic factors in episodic recognition of common odors in early and late adulthood: a review. *Chemical Senses, 22*(6), 623-633.

140.Lazarus, R. S. (1991). Emotion and adaptation. Oxford University Press on Demand.

141.Leder, H., Belke, B., Oeberst, A., & Augustin, D. (2004). A model of aesthetic appreciation and aesthetic judgments. *British journal of psychology*, *95*(4), 489-508.

142.Leder, H., Carbon, C. C., & Ripsas, A. L. (2006). Entitling art: Influence of title information on understanding and appreciation of paintings. *Acta psychologica*, *121*(2), 176-198.

143.Leenders, M. A., Smidts, A., & El Haji, A. (2016). Ambient scent as a mood inducer in supermarkets: The role of scent intensity and time-pressure of shoppers. *Journal of Retailing and Consumer Services*, 1-11.

144.Lehrner, J., Eckersberger, C., Walla, P., Poetsch G. & Deecke L. (2000). Ambient odor of orange in a dental office reduces anxiety and improves mood in female patients. *Physiology and Behavior, 71*(1-2), 83-86.

145.Lehrner, J., Marwinski, G., Lehr, S., Johren, P., & Deecke, L. (2005). Ambient odors of orange and lavender reduce anxiety and improve mood in a dental office. *Physiology and Behavior, 86*(1-2), 92-95.

146.Li, W., Moallem, I., Paller, K. A., & Gottfried, J. A. (2007). Subliminal smells can guide social preferences. *Psychological science, 18*(12), 1044-1049.

147.Li, W., Zinbarg, R. E., Boehm, S. G., & Paller, K. A. (2008). Neural and behavioral evidence for affective priming from unconsciously perceived emotional facial expressions and the influence of trait anxiety. *Journal of Cognitive Neuroscience, 20*(1), 95-107.

148.Losch, M. E., & Cacioppo, J. T. (1990). Cognitive dissonance may enhance sympathetic tonus, but attitudes are changed to reduce negative affect rather than arousal. *Journal of Experimental Social Psychology*, *26*(4), 289-304.

149.Lwin, M. O., & Morrin, M. (2012). Scenting movie theatre commercials: The impact of scent and pictures on brand evaluations and ad recall. *Journal of Consumer Behaviour, 11*(3), 264-272.

150.Lwin, M. O., Morrin, M., Chong, C. S. T., & Goh, S. X. (2016). Odor semantics and visual cues: What we smell impacts where we look, what we remember, and what we want to buy. *Journal of Behavioral Decision Making, 29*(2-3), 336-350.

151.Lwin, M., Morrin, M., & Krishna, A. (2010). Exploring the superadditive effects of scent and pictures on verbal recall: An extension of dual coding theory. *Journal of Consumer Psychology, 20*(3), 317-326.

152.Macrae, C. N., & Johnston, L. (1998). Help, I need somebody: Automatic action and inaction. *Social Cognition, 16*(4), 400-417.

153.Mackie, D. M., & Worth, L. T. (1989). Processing deficits and the mediation of positive affect in persuasion. *Journal of personality and social psychology*, *57*(1), 27-40.

154.Madzharov, A. V., Block, L. G., & Morrin, M. (2015). The Cool Scent of Power: Effects of Ambient Scent on Consumer Preferences and Choice Behavior. *Journal of Marketing, 79*(1), 83-96.

155.Mandel, N., & Johnson, E. J. (2002). When web pages influence choice: Effects of visual primes on experts and novices. *Journal of consumer research, 29*(2), 235-245.

156.Marslen-Wilson, W., Tyler, L. K., Waksler, R., & Older, L. (1994). Morphology and meaning in the English mental lexicon. *Psychological review, 101*(1), 3-33.

157.Mattila, A. S., & Wirtz, J. (2001). Congruence of scent and music as a driver of in-store evaluations and behavior. *Journal of retailing, 77*(2), 273-289.

158.Mayr, S., & Buchner, A. (2007). Negative priming as a memory phenomenon. *Journal of Psychology, 215*(1), 35-51.

159.Mehrabian, A., & Russell, J. A. (1974). An approach to environmental psychology. The MIT Press.

160.Meyer, D. E., & Schvaneveldt, R. W. (1971). Facilitation in recognizing pairs of words: Evidence of a dependence between retrieval operations. *Journal of experimental psychology, 90*(2), 227-234.

161.Michon, R., & Chebat, J. C. (2004). The interaction effect of background music and ambient scent on the perception of service quality. *Journal of Business Research, 34*(3), 191-196.

162.Michon, R., Chebat, J. C., & Turley, L. W. (2005). Mall atmospherics: the interaction effects of the mall environment on shopping behavior. *Journal of Business Research, 58*(5), 576-583.

163.Miller, E. G., & Kahn, B. E. (2005). Shades of meaning: the effect of color and flavor names on consumer choice. *Journal of consumer research, 32*(1), 86-92.

164.Mitchell, A. A., & Olson, J. C. (2000). Are product attribute beliefs the only mediator of advertising effects on brand attitude? *Advertising & Society Review, 1*(1), 318-332.

165.Mitchell, D. J., Kahn, B. E., & Knasko, S. C. (1995). There's something in the air: effects of congruent or incongruent ambient odor on consumer decision making. *Journal of Consumer Research, 22*(2), 229-238.

166.Morrin, M., & Chebat, J. C. (2005). Person-place congruence the interactive effects of shopper style and atmospherics on consumer expenditures. *Journal of Service Research, 8*(2), 181-191.

167.Morrin, M., & Ratneshwar, S. (2000). The impact of ambient scent on evaluation, attention, and memory for familiar and unfamiliar brands. *Journal of Business Research, 49*(2), 157-165.

168.Morrin, M., & Ratneshwar, S. (2003). Does it make sense to use scents to enhance brand memory? *Journal of Marketing Research, 40*(1), 10-25.

169.Morrin, M., Krishna, A., & Lwin, M. (2011a). Is scent-enhanced memory immune to retroactive interference? *Journal of Consumer Psychology, 21*(35), 354-361.

170.Morrin, M., Krishna, A., & Lwin, M. (2011b). Retroactive interference from scent cues and the effect on product recall. *Journal of Consumer Psychology, 21*(3), 354-361.

171.Morrison, M., Gan, S., Dubelaar, C., & Oppewal, H. (2011). In-store music and aroma influences on shopper behavior and satisfaction. *Journal of Business Research, 64*(6), 558-564.

172.Morrot, G., Brochet, F., & Dubourdieu, D. (2001). The color of odors. *Brain and language, 79*(2), 309-320.

173.Murphy, S. T., & Zajonc, R. B. (1993). Affect, cognition, and awareness: affective priming with optimal and suboptimal stimulus exposures. *Journal of personality and social psychology*, *64*(5), 723-739.

174.Muth, C., & Carbon, C. C. (2013). The Aesthetic Aha: On the pleasure of having insights into Gestalt. *Acta Psychologica*, *144*(1), 25-30.

175.Nasri, N., Beno, N., Septier, C., Salles, C., & Thomas-Danguin, T. (2011). Cross-modal interactions between taste and smell: Odour-induced saltiness enhancement depends on salt level. *Food quality and preference, 22*(7), 678-682.

176.Neely, J. H. (1991). Semantic priming effects in visual word recognition: A selective review of current findings and theories. Basic processes in reading: *Visual word recognition, 11*(1), 264-336.

177.Neumann, E., & DeSchepper, B. G. (1991). Costs and benefits of target activation and distractor inhibition in selective attention. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 17*(6), 1136-1145.

178.North, A. C. (2012). The effect of background music on the taste of wine. *British Journal of Psychology, 103*(3), 293-301.

179.North, A. C., Hargreaves, D. J., & McKendrick, J. (1999). The influence of in-store music on wine selections. *Journal of Applied psychology, 84*(2), 271-276.

180.Nosek, B. A., Greenwald, A. G., & Banaji, M. R. (2007). The Implicit Association Test at age 7: A methodological and conceptual review. *Automatic processes in social thinking and behavior*, 265-292.

181.Oatley, K. (1992). *Best laid schemes: The psychology of the emotions*. Cambridge University Press.

182.Olofsson, J. K., Rogalski, E., Harrison, T., Mesulam, M. M., & Gottfried, J. *A. (2013). A cortical pathway to olfactory naming: evidence from primary progressive aphasia. Brain, 136*(4), 1245-1259.

183.Olson, J. C. (1980). Encoding Processes: Levels of Processing and Existing Knowledge Structures1. *Advances in Consumer Research,* 7, 154-160.

184.Orth, U.R., & Bourrain, A. (2005). Optimum stimulation level theory and the differential impact of olfactory stimuli on consumer exploratory tendencies. *Advances in Consumer Research, 32*(1), 613–619.

185.Paivio, A., & Csapo, K. (1969). Concrete image and verbal memory codes. *Journal of Experimental psychology, 80*(2), 279-285.

186.Paivio, A., Rogers, T. B., & Smythe, P. C. (1968). Why are pictures easier to recall than words? *Psychonomic Science, 11*(4), 137-138.

187.Park, C. W., Milberg, S., & Lawson, R. (1991). Evaluation of brand extensions: the role of product feature similarity and brand concept consistency. *Journal of consumer research*, *18*(2), 185-193.

188.Parsons, A. G. (2009). Use of scent in a naturally odourless store. *International Journal of Retail & Distribution Management, 37*(5), 440-452.

189.Pauli, P., Bourne Jr, L. E., Diekmann, H., & Birbaumer, N. (1999). Cross-modality priming between odors and odor-congruent words. *The American journal of psychology, 112*(2), 175-186.

190.Pecher, D., Zeelenberg, R., & Raaijmakers, J. G. (1998). Does pizza prime coin? Perceptual priming in lexical decision and pronunciation. *Journal of Memory and Language, 38*(4), 401-418.

191.Petrova, P. K., & Cialdini, R. B. (2005). Fluency of consumption imagery and the backfire effects of imagery appeals. *Journal of Consumer Research*, *32*(3), 442-452.

192.Petty, R. E., & Cacioppo, J. (1986). Elaboration likelihood model. *Handbook of theories of social psychology. London, England: Sage.*

193.Poon, T., & Grohmann, B. (2014). Spatial density and ambient scent: Effects on consumer anxiety. *American Journal of Business, 29*(1), 76-94.

194.Rabin, M. D., & Cain, W. S. (1984). Odor recognition: familiarity, identifiability, and encoding consistency. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 10*(2), 316-325.

195.Reber, R., Schwarz, N., & Winkielman, P. (2004). Processing fluency and aesthetic pleasure: Is beauty in the perceiver's processing experience? *Personality and social psychology review*, *8*(4), 364-382.

196.Reber, R., Winkielman, P., & Schwarz, N. (1998). Effects of perceptual fluency on affective judgments. *Psychological science*, *9*(1), 45-48.

197.Reisberg, D. (1997). Cognition: Exploring the science of the mind. WW Norton & Co.

198.Richardson, J. T., & Zucco, G. M. (1989). Cognition and olfaction: a review. *Psychological bulletin, 105*(3), 352-360.

199.Rose, J. (1992). The aromatherapy book. Berkeley, CA.

200.Royet, J. P., Zald, D., Versace, R., Costes, N., Lavenne, F., Koenig, O., & Gervais, R. (2000). Emotional responses to pleasant and unpleasant olfactory, visual, and auditory stimuli: a positron emission tomography study. *Journal of Neuroscience, 20*(20), 7752-7759.

201.Sarafoleanu, C., Mella, C., Georgescu, M., & Perederco, C. (2009). The importance of the olfactory sense in the human behavior and evolution. *Journal of medicine and life, 2*(2), 196-198.

202.Schab, F. (1991). Odor memory: taking stock. *Psychological bulletin, 109*(2), 242-251.

203.Schacter, D. L. (1992). Priming and multiple memory systems: Perceptual mechanisms of implicit memory. *Journal of Cognitive Neuroscience, 4*(3), 244-256.

204.Schacter, D. L., Dobbins, I. G., & Schnyer, D. M. (2004). Specificity of priming: A cognitive neuroscience perspectiv*e. Nature Reviews Neuroscience, 5*(11), 853-862.

205.Schifferstein, H. N., & Blok, S. T. (2002). The signal function of thematically (in) congruent ambient scents in a retail environment. *Chemical Senses, 27*(6), 539-549.

206.Schreuder, R., Flores d'Arcais, G. B., & Glazenborg, G. (1984). Effects of perceptual and conceptual similarity in semantic priming. *Psychological Research, 45*(4), 339-354.

207.Schvaneveldt, R. W., & Meyer, D. E. (1973). Retrieval and comparison processes in semantic memory (pp. 395-409). Attention and performance IV. New York: Academic Press.

208.Secundo, L., & Sobel, N. (2006). The influence of smelling coffee on olfactory habituation.Neuroscience. Berkeley, CA: University of California, Berkeley http://www.senseofsmell.org/achems_06.php.

209.Seo, H. S., Roidl, E., Müller, F., & Negoias, S. (2010). Odors enhance visual attention to congruent objects. *Appetite, 54*(3), 544-549.

210.Shapiro, S., & Spence, M. T. (2002). Factors affecting encoding, retrieval, and alignment of sensory attributes in a memory-based brand choice task. *Journal of Consumer Research*, *28*(4), 603-617.

211.Shepard, R. N. (1967). Recognition memory for words, sentences, and pictures. *Journal of verbal Learning and verbal Behavior, 6*(1), 156-163.

212.Shiffrin, R. M., & Schneider, W. (1977). Controlled and automatic human information processing: II. Perceptual learning, automatic attending and a general theory. *Psychological review, 84*(2), 127-190.

213.Silvia, P. J. (2005a). Cognitive appraisals and interest in visual art: Exploring an appraisal theory of aesthetic emotions. *Empirical studies of the arts*, *23*(2), 119-133.

214.Silvia, P. J. (2005b). What is interesting? Exploring the appraisal structure of interest. *Emotion*, *5*(1), 89-102.

215.Silvia, P. J. (2005c). Artistic training and interest in visual art: Applying the appraisal model of aesthetic emotions. *Empirical studies of the arts*, *24*(2), 139-161.

216.

217.Smeets, M. A. M., & Dijksterhuis, G. B. (2014). Smelly primes–when olfactory primes do or do not work. *Frontiers in psychology, 5*(96), 1-15.

218.Smeets, M. A., Schifferstein, H. N., Boelema, S. R., & Lensvelt-Mulders, G. (2008). The Odor Awareness Scale: a new scale for measuring positive and negative odor awareness. *Chemical senses*, *33*(8), 725-734.

219.Sowa, J. F. (1987). Semantic networks. Encyclopedia of Cognitive Science.

220.Spangenberg, E. R., Crowley, A. E., & Henderson, P. W. (1996). Improving the store environment: do olfactory cues affect evaluations and behaviors? *The Journal of Marketing, 60*(2), 67-80.

221.Spangenberg, E. R., Grohmann, B., & Sprott, D. E. (2005). It's beginning to smell (and sound) a lot like Christmas: the interactive effects of ambient scent and music in a retail setting. *Journal of business research, 58*(11), 1583-1589.

222.Spangenberg, E. R., Sprott, D. E., Grohmann, B., & Tracy, D. L. (2006). Effect of gender-congruent ambient scent influences on approach and avoidance behaviors in a retail store. *Journal of Business Research, 59*(12), 1281-1287.

223.Starch, D. (1966). How does the shape of ads affect readership. *Media/Scope, 10*(7), 83-85.

224.Stein, B. E., & Meredith, M. A. (1993). The merging of the senses. The MIT Press.

225.Stevenson, R. J. (2009). An initial evaluation of the functions of human olfaction. *Chemical senses, 35*(1), 3-20.

226.Stevenson, R. J., & Wilson, D. A. (2007). Odour perception: an object-recognition approach. *Perception, 36*(12), 1821-1833.

227.Stevenson, R. J., Prescott, J., & Boakes, R. A. (1999). Confusing tastes and smells: how odours can influence the perception of sweet and sour tastes. *Chemical Senses, 24*(6), 627-635.

228.Stevenson, R. J., Rich, A., & Russell, A. (2012). The nature and origin of cross-modal associations to odours. *Perception, 41*(5), 606-619.

229.Summers, T. A., & Hebert, P. R. (2001). Shedding some light on store atmospherics: influence of illumination on consumer behavior. *Journal of business research, 54*(2), 145-150.

230.Sweller, J. (1994). Cognitive load theory, learning difficulty, and instructional design. *Learning and instruction*, *4*(4), 295-312.

231.Sweller, J., Ayres, P., & Kalyuga, S. (2011). Cognitive load theory (Vol. 1). Springer Science & Business Media.

232.Tipper, S. P. (1985). The negative priming effect: Inhibitory priming by ignored objects. *The Quarterly Journal of Experimental Psychology, 37*(4), 571-590.

233.Tulving, E., Schacter, D. L., & Stark, H. A. (1982). Priming effects in word-fragment completion are independent of recognition memory. *Journal of experimental psychology: learning, memory, and cognition, 8*(4), 336-342.

234.Turner Jr, S. A., & Silvia, P. J. (2006). Must interesting things be pleasant? A test of competing appraisal structures. *Emotion*, *6*(4), 670-674.

235.Van Rompay, T. J., & Pruyn, A. T. (2011). When visual product features speak the same language: Effects of shape-typeface congruence on brand perception and price expectations. *Journal of Product Innovation Management, 28*(4), 599-610.

236.Veryzer Jr, R. W., & Hutchinson, J. W. (1998). The influence of unity and prototypicality on aesthetic responses to new product designs. *Journal of consumer research*, *24*(4), 374-394.

237.Vigliocco, G., Meteyard, L., Andrews, M., & Kousta, S. (2009). Toward a theory of semantic representation. *Language and Cognition, 1*(2), 219-247.

238.Vinitzky, G., & Mazursky, D. (2011). The effects of cognitive thinking style and ambient scent on online consumer approach behavior, experience approach behavior, and search motivation. *Psychology & Marketing, 28*(5), 496-519.

239.Wang, Y., Pu, Y., & Shen, P. (2013). Neuropeptide-gated perception of appetitive olfactory inputs in Drosophila larvae. *Cell reports*, *3*(3), 820-830.

240.Wiggs, C. L., & Martin, A. (1998). Properties and mechanisms of perceptual priming. Current opinion in neurobiology, 8(2), 227-233.

241.Wilkie, M. (1995). Scent of a market. *American Demographics, 17*(8), 40-47.

242.Willander, J., & Larsson, M. (2006). Smell your way back to childhood: Autobiographical odor memory. *Psychonomic bulletin & review, 13*(2), 240-244.

243.Wilson, D. A., & Stevenson, R. J. (2006). Learning to smell: olfactory perception from neurobiology to behavior. JHU Press.

244.Winkielman, P., & Cacioppo, J. T. (2001). Mind at ease puts a smile on the face: psychophysiological evidence that processing facilitation elicits positive affect. *Journal of personality and social psychology*, *81*(6), 989-1000.

245.Winkielman, P., & Zajonc & Norbert Schwarz, R. B. (1997). Subliminal affective priming resists attributional interventions. *Cognition & Emotion, 11*(4), 433-465.

246.Workman, J. E., & Caldwell, L. F. (2007). Centrality of visual product aesthetics, tactile and uniqueness needs of fashion consumers. *International Journal of consumer studies*, *31*(6), 589-596.

247.Yalch, R. F., & Spangenberg, E. R. (2000). The effects of music in a retail setting on real and perceived shopping times. *Journal of business Research, 49*(2), 139-147.

248.Yan, L., Yan, L., Liu, M. T., Liu, M. T., Chen, X., Chen, X., ... & Shi, G. (2016). An arousal-based explanation of affect dynamics. *European Journal of Marketing*, *50*(7/8), 1159-1184.

249.Yi, Y. (1990). Cognitive and affective priming effects of the context for print advertisements. *Journal of advertising, 19*(2), 40-48.

250.Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American psychologist*, *35*(2), 151-175.

251.Zajonc, R.B., & Markus, H. (1984). Affect and cognition: The hard interface. In Izard, C. E., Kagan, J., & Zajonc, R. B. (Eds). Emotions, cognition and behavior, 63-103). CUP Archive.

252.Zellner, D. A., & Kautz, M. A. (1990). Color affects perceived odor intensity. *Journal of Experimental Psychology: Human Perception and Performance, 16*(2), 391-397.

253.Zevon, M. A., & Tellegen, A. (1982). The structure of mood change: An idiographic/nomothetic analysis. *Journal of Personality and Social Psychology, 43*(1), 111-122.

254.Zillmann, D. (1971). Excitation transfer in communication-mediated aggressive behavior. *Journal of experimental social psychology*, *7*(4), 419-434.

255.Zucco, G. M. (2003). Anomalies in cognition: olfactory memory. *European Psychologist, 8*(2), 77-86.