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The Nosy Decision Maker: How the Sense of Smell Influences Consumers' Decisions

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The Nosy Decision Maker: How the Sense of Smell Influences Consumers' Decisions

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Paper #1: The Smell Factor: Individual Differences in Olfaction Memory, Judgments and Decision-Making

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Paper #2: Exploring the Dark Side of Chocolate: Moral Cleansing and Licensing Among Restrained Eaters

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Paper #3: Love at First Sight or at First Smell? Order Effects of Olfactory and Visual Cues

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Paper #4: Seeing What You Smell: An Eye-Tracking Analysis of Visual Attention

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SESSION OVERVIEW

While sensory marketing has recently gained a lot of attention in the realm of consumer research, most studies in this domain have focused on visual and auditory aspects (Krishna 2009, 2012). In contrast, olfaction has received relatively less attention in the consumer literature. In that regard, this special session focuses on olfaction and our main objective is to present a series of studies exploring the influences of olfactory cues on consumption-related decisions and behaviors. This session also seeks to encourage discussion on the broader theme of sensory influences in consumer decision making and attract participation from researchers with a common interest in different aspects of sensory marketing.

Past research in the consumer literature has examined how scent impacts memory (Krishna, Lwin and Morrin 2010; Morrin and Ratneshwar 2003). What are rarely considered in these studies are individual differences in the sense of smell and the interaction of other senses with that of the sense of smell. In line with the conference's "Appreciating Diversity" theme, the first paper by Lin, Childers and Cross takes into consideration individuals' varying abilities to smell (ranging from a heightened sense of smell to a diminished or even absent sense of smell) and investigates its impact on consumer-related decisions for products and ads. Thus, this paper examines the role of olfaction in consumer behavior and how individual differences in olfaction ability and preference affect memory, judgment, and decision making.

Exploring the relationship between olfaction and vision, Lwin, Morrin, Chong and Tan investigate the manner in which olfactory cues attract and increase a person's attention to ad information using eye-tracking methods. Another paper in this session (Biswas, Labrecque and Lehmann) focuses on the sequential order effects of olfactory and visual stimuli and how the outcomes translate into food taste perceptions. Morrin, Pham, Lwin and Bublitz also explore the

complementary sensory relationship between olfaction and taste, and how dietary restraint moderates the effects. The extent to which olfaction affects taste expectations and actual eating behavior is thus explored in two of the studies (Biswas et al.; Morrin, Pham, Lwin and Bublitz).

The four papers comprising this special session on sensory influences all focus on olfaction and its role on consumer's information processing and decision-making. However, each paper embraces diversity by taking into account different dimensions of individual differences. Lin et al focus on individual differences in sense of smell, and examine how this varying ability influences their decisions in product purchase, judgment and scent memory. They also investigate the concerns individuals with either heightened or diminished sense of smell may have in the marketplace and household and methods of coping. Morrin et al examine restrained eaters and non-restrained eaters and find that there are individual differences in the effect of moral cleansing on chocolate consumption. Studying another dimension of food consumption, Biswas et al find that individuals under different states of hunger form opposite expectations for taste, depending on the order of encountering olfaction and visual cues. Finally, in Lwin et al's paper, they find that only when scent is congruent with the object in the ad, will people pay more attention to the information presented to individuals. Further, they find this effect is enhanced when the ad element is concrete versus abstract in nature.

In addition to the variety of topics related to the sense of smell, these papers use a variety of research methods to investigate their research questions. Lin et al take a multi-method approach, with a combination of surveys, in-depth interviews, experimental designs and neuroscience methods to address their broad research objective of understanding the impact of individual differences in olfactory ability. Lwin et al approach their research using eye-tracking methodologies. Morrin et al and Biswas et al use behavioral experiments to address food consumption decisions.

This session therefore contributes to the conference theme by embracing a diversity of approaches to the topic, a range of methods, with researchers from several areas of the world (Singapore, Hong Kong and the U.S.) with diverse cultural and geographic origins. Given the relatively nascent state of this topic domain, it is likely to lead to discussions for future research ideas.

Completion stage: Data have been collected and analyzed for all papers.

The Smell Factor: Individual Differences in Olfaction Memory, Judgments and Decision-Making

EXTENDED ABSTRACT

Olfaction is often a subtle, but important, tool used by consumers in their memory associations, social and marketplace interactions and their judgments and evaluation of product and consumption choices. Yet, although there are a growing number of studies on the loss of smell, primarily in medical journals (Miwa et al 2001; Aschenbrenner et al 2007), this is still a greatly under-researched area in the marketing and psychology literature. In addition, very little, if any, research has been done looking at individual differences in smell based on the level of olfactory sensitivity in consumers. This research examines individual differences in olfaction on consumer memory, judgments and decision making. We specifically study the

impact of olfaction in consumers with a complete loss of smell (anosmia) or a diminished olfactory sensitivity (hyposmia); those with an enhanced olfactory sensitivity (hyperosmia) and those who have a normal sense of smell.

Stevenson (2010) identifies three main functions of the olfactory system: to aid or complement ingestive behavior; to avoid environmental hazards; and to facilitate social communication. In their research on anosmics, Miwa et al (2001) noted that olfactory loss primarily affected food and safety related activities, but also had an effect on quality of life. Aschenbrenner et al (2007) discussed the social implications, noting that individuals with olfactory loss avoid mealtime interactions with friends, showing a reluctance to comment on food they can't really experience and also reported going out to eat at restaurants less often. Thus, there is an impact both on social interactions and purchase behavior. However, research on hyperosmics has even been more limited with a focus on odor intolerance (Nordin et al 2003; Dalton 1999). Thus, we know little about how smell fits into the everyday lives and shopping patterns of individuals with elevated olfactory abilities.

Thus our research questions are as follows. 1) What is the role of olfaction in consumer behavior? 2) What are the individual differences in olfaction ability and preference? 3) How do these differences affect olfaction memory, judgments and decision making?

To answer these questions, we use a multi-phase design approach, which incorporates a mix of qualitative and quantitative studies, both sequential and embedded (Creswell and Clark 2011). There are four phases in the overall study. In phases 2 to 4, individuals differing in olfactory sensitivity (diminished, sensitive, normal) were specifically recruited. Part 1 is a questionnaire study with approximately 700 undergraduate student participants, using a mix of existing olfactory scales (c.f., Wrzeniewski et al 1999; Martin et al 2001). In the 2nd phase, based on the survey responses in phase 1, 240 undergraduate participants, differing in reported olfactory sensitivity were selected for behavioral experiments. These were extensions of studies by Krishna et al (2010) and Bulsing et al (2007). In the 3rd phase, in-depth interviews incorporating two olfaction tests (UPenn BSIT; Sniffin' Sticks) were conducted with 35 mature participants (ages ranged from 25 to 70 years old). In these interviews, the researchers explored issues of safety, food consumption, social and marketplace interactions and overall consumer well-being. The final phase of the project is an ERP study with 60 participants where the neuro-responses to olfactory related words are recorded.

Across the scales used, we see a similar pattern of results: a U-shaped relationship with hyperosmics a little higher than normals and the decreased group (hyposmics and anosmics) in the middle. This is the pattern for the different scales testing the use of smell, the dispensability of smell, liking through smell, emotions and smell and attention to odors. Findings across the studies also illustrate that not only do those in the heightened group see smell as a more important aspect of life than those in the diminished group, but odors and scents are shown as better able to elicit memories for this group versus the diminished group. This is potentially disturbing as smell is considered very important for its ability to facilitate recall of past experiences (Stevenson 2010).

Olfactory sensitivity is also seen to impact where, how and why individual consumers make purchase decisions and what consumption choices they make. The sense of smell is a taken for granted, but heavily relied upon, sense that often becomes a salient factor when it is seen as deviating from the norm or affects social, workplace or marketplace interactions. Coping strategies used to counteract these effects are both cognitive and experiential and fall into the categories of avoidance, compensation, removal and deliberation. The authors

explore the nuances of olfactory sensitivity and develop a typology of smell-related triggers and phases. Results indicate that olfactory-related responses are often involuntary, context-driven, complement our other senses and perceived in relation to others.

Based on our studies (n = 781), approximately 10% of the population sampled has no ability or a diminished ability to smell (which mirrors the existing literature), 19% fall into the heightened category and 71% fall into a normal range. This research thus makes a theoretical contribution to our existing knowledge of individual differences and sensory influences, by exploring the impact of olfaction across all three groups and fostering appreciation for the sensory aspects of consumer diversity. Level of olfactory sensitivity is seen to affect memory, judgment and decision making. It also has an impact not just on consumption choice, but also on the purchase decision process and the overall shopping experience. Yet, unlike other sensory stimuli (vision, touch, taste, hearing), consumers' expectations of marketplace accommodation are low and marketplace responses to consumer concerns are unconsidered, low or misguided. Finally, this study uses a mixed method approach to understanding individual differences in olfaction, triangulating across methods with a scope that has not been previously used in the consumer behavior literature. The authors show that a diversity of approaches and perspectives serves to highlight and illuminate the importance and implications of olfaction on consumption.

Exploring the Dark Side of Chocolate: Moral Cleansing and Licensing Among Restrained Eaters

EXTENDED ABSTRACT

The obesity rate in the U.S. has doubled since 1980, and now stands at about a third of the adult population, with another third classified as overweight. Overeating can have negative consequences not only for one's health, but also for one's psyche, in terms of the social stigma associated with it. Dietary restraint refers to the chronic effort to restrict food intake, especially of forbidden foods or those considered fattening. Individuals who score high on measures of dietary restraint (e.g., Herman and Polivy 1980) have greater concerns about their shape and weight and exhibit a strong desire for thinness. We argue that for many dieters, overeating or eating "forbidden" foods is associated with acting contrary to social norms, and thus has a negative impact on their moral identity. One's moral identity is typically measured in terms of beliefs that one is caring, compassionate, fair, friendly, generous, helpful, hardworking, honest and kind (Aquino and Reed 2002; Hart et al. 1998). For dieters it can also involve food consumption behavior. We argue here that in addition to environmental cues impacting dieters' eating behavior, their dynamic moral self-worth also plays a role. Both moral cleansing (remunerative moral strivings) and moral licensing (relaxed moral strivings) have been observed in other domains (Jordan, Mullen and Murningham 2011) and we expect to observe them in the domain of food consumption.

Embodied cognition theory suggests that metaphors are used to link abstract concepts to physical and sensory experiences (Barsalou 2008, Lakoff and Johnson 1980). In this way, physically cleansing the body can lead to beliefs about moral purity. Smelling a citrus scent activates concepts related to cleanliness (Holland, Henriks and Aarts 2005; Schnall, Benton and Harvey 2008). Hand washing has been shown to not only physically clean but also psychologically cleanse an individual of past moral transgressions (Zhong & Liljenquist 2006). We explore here the potential ability of physical cleansing to morally cleanse dieters of their misdeeds in terms of forbidden food consumption, which will be evident in their feeling licensed to

re-indulge in forbidden food consumption. The physically cleansing products in this study contain scents strongly associated with cleansing activities (mint, citrus).

Two hundred and three undergraduate students participated for a small cash payment. The design consisted of a 2 (tasting condition: eat chocolate, resist eating chocolate) x 3 (cleansing condition: groom with haircomb; cleanse with handwipe, cleanse with toothbrush) full factorial. Participants were randomly assigned to one of the six cells. All participants were provided with a sample of chocolate. They were instructed to look at, smell, and touch the chocolate and either eat it [or not] and to provide an evaluation of the product. Participants then evaluated a haircomb (i.e., were groomed but not cleansed), a citrus-scented handwipe (i.e., were cleansed), or a toothbrush with mint-scented toothpaste (i.e., were cleansed). After completing various closed items in a survey, participants chose a gift from a selection of chocolates, pencils, and erasers, arranged randomly on a table, on the way out of the experiment. Their gift choice was covertly recorded.

We conducted a logistic regression on whether or not chocolate was chosen on the way out of the experiment (yes, no) as a function of tasting condition, cleansing condition, dietary restraint, and all possible interactions. Two effects were significant: the 2-way interaction between dietary restraint and cleansing condition, and the 3-way interaction between dietary restraint, cleansing condition, and tasting condition. We find that among those low in dietary restraint, there are no significant differences in likelihood of taking chocolate on the way out of the experiment within cleansing conditions as a function of whether the participant had eaten or resisted chocolate. However, among those high in dietary restraint who were not cleansed (i.e., used the haircomb), significantly fewer took chocolate on the way out if they had tasted versus resisted chocolate. Among restrained eaters, cleansing with either a citrus-scented hand wipe or toothbrush with minty toothpaste compared to grooming with a comb significantly increased the likelihood of taking chocolate on the way out of the experiment, if chocolate had been tasted. We thus find that physical cleansing absolves only restrained eaters from what only they perceive as moral transgression associated with forbidden food consumption.

Love at First Sight or at First Smell? Order Effects of Olfactory and Visual Cues

EXTENDED ABSTRACT

Prior research, across multiple disciplines, has documented the effects of different types of sensory stimuli inputs on the evaluation of products. These studies have typically examined the effects of sensory stimuli such as color, scent, touch, and taste. Some studies have also examined the effects of multiple sensory stimuli such as touch and taste or vision and touch (Krishna 2012). However, no study has examined how the *sequential order* in which multiple sensory stimuli are encountered influence product evaluations. This is especially relevant since in many real world situations, consumers can encounter multiple sensory stimuli sequentially (and not simultaneously, especially since different sensory cues are acquired differently. For example, visual stimuli can be evaluated with a greater degree of non-proximity than olfactory or haptic stimuli. That is, objects can usually be seen from a further distance than they can be smelled. On the other hand, for visual stimuli processing, one needs to have the object in the line of vision, whereas olfactory stimuli can be evaluated omnidirectionally. Hence, cases can be made for different sensory stimuli to be encountered in sequentially different orders. As an illustrative example, suppose a consumer enters a chocolate

shop, and smells the chocolates first before she actually sees them versus if the consumer first sees the chocolates (e.g., through the store window) before she smells them. Would the consumer's evaluation of the chocolates be influenced by the sequential order in which she sees versus smells the chocolates? The present research attempts to make an important first step in trying to answer this research question.

Our propositions and hypotheses are influenced by recent work in the domain of interaction and carryover effects between sensory stimuli and the related sensory-neurological reactions (Krishna 2012; Rolls et al. 2010), along with research on order effects (Biswas et al. 2010). We test our propositions/hypotheses with the help of five experiments. First, Study 1 examines the sequential order effects of evaluating a beverage's visual aspects such as color (henceforth referred to as "V") versus olfactory/scent aspects (henceforth referred to as "O"). Study 1 used a single-factor (sequential order of sensory stimuli: V-O vs. O-V) between-subjects design experiment. A concocted beverage was used as the product in Study 1, with the beverage color and scent determined through a series of pretests. Participants were given the beverages in cups with lids and were asked to take off the lids after receiving the beverages. In the V-O condition, participants received the beverages in transparent cups, whereby they could see the color first before they could smell the beverage. In the O-V condition, participants received the beverages in opaque cups of similar quality, with the odor dissipating through the porous lid. As a result, they could smell the scent of the beverage first before they could see the beverage color. To ensure that the quality of the cups did not influence consumer taste perceptions (e.g., Krishna and Morrin 2008), the quality and price of the cups were identical, with the only difference of the cups being opaque versus transparent. The results of Study 1 showed that a beverage's taste is more favorably evaluated when participants encounter the visual aspects of the product prior to the olfactory aspects (that is, the sequence of V-O leads to more favorable evaluations than the sequence of O-V).

Study 2 then provides additional process evidence and also examines sensory cue order effects across a non-food context and the moderating effects of individual visual processing tendency (e.g., Wyer, Hung, and Jiang 2008). The results show that overall product evaluations are higher when the visual stimulus is earlier in a sequence of sensory stimuli, with the effects primarily being driven by those who are high on visual processing tendency.

Although the results of Studies 1 and 2 support our theoretical premises related to sensory carryover interactions and the sequential dominance of the visual cues over olfactory or auditory cues, there can be a potential alternative explanation of the results related to the role of short term working memory (e.g., Biswas et al. 2010). Hence, in order to further investigate which of the two underlying processes (sensory carryover versus role of working memory) is more dominant, Studies 3A and 3B were conducted. These studies examine the order effects of evaluating a food's visual and olfactory aspects when the visual color is desirable but the olfactory aspect (scent/odor) is undesirable (henceforth referred to as O') or when the olfactory aspect is desirable but the visual color is undesirable (henceforth referred to as V'). The results of Study 3A show that taste perceptions are higher for V-O' than for O'-V and the results of Study 3B show that taste perceptions are higher for O-V' than for V'-O.

Finally, Study 4 identifies a boundary condition (by examining the moderating effects of hunger) whereby the effects of Study 1 are reversed. Under low hunger, consumers have more favorable product taste perceptions for the V-O than the O-V sequence, consistent with the results observed in Study 1. However, under high levels of hunger, the effects get reversed, whereby consumers' taste percep-

tions were higher for the O-V, than the V-O, sequence. This occurs because the odor/scent of a food has stronger sensory impact under high levels of hunger.

Taken together, the results of the five experiments reveal interesting theoretical and practical insights regarding the effects of sequential presentation of sensory stimuli (e.g., olfactory and visual) on consumer product evaluations.

Seeing what you Smell: An Eye Tracking Analysis of Visual Attention

EXTENDED ABSTRACT

Interest in sensory marketing is on the rise, with growing evidence that sensory inputs such as scent can enhance consumer both product evaluations (Spangenberg, Crowley and Henderson 1996) and memory for product information (Krishna, Lwin and Morrin 2010; Morrin and Ratneshwar 2003). Most studies to date have investigated such effects using relatively distal measures such as self-reported attitudes and/or delayed recall. The present research investigates the effect of scent on visual attention to elements in print advertisements with eye-tracking technology. We explore whether the presence or absence of a pleasant scent increases attention generally, or only when objects in the ad are semantically congruent with the odors being smelled.

In this research we manipulate not only the presence or absence of scent, but also the congruency between the scent (if present) and objects in the ad. Cue congruity refers to the degree to which a particular cue, such as a product's scent, complements a target stimulus (Bone and Ellen 1999). In the present research we operationalize congruency in terms of the semantic associations between the scent and product or service promoted in a print advertisement.

The literature on scent and attitudes suggests congruent odors often increase consumer evaluations (Spangenberg, Sprott, Grohmann and Tracy 2006), but the literature on scent and memory is mixed. Morrin and Ratneshwar (2003) found that incongruent ambient scents were just as effective as congruent ambient scents at enhancing recall and recognition of brand names and packaging. Nevertheless, Bone and Ellen (1999) argue that incongruent scents, which are those that are perceived by the consumer as not fitting with the product, may interfere with the processing of relevant brand information. Do only congruent scents facilitate the processing and storage of product information and enhance accessibility to stored information and elaboration through the process of attention? We seek to explore this issue by examining the effect of scent on visual attention to elements in print advertisements.

The use of eye-tracking technology has been relatively scarce in consumer research, although studies are beginning to emerge (e.g., Wedel and Pieters 2000). In the current set of studies, a Tobii T60 Eye Tracker (integrated into a 17" TFT monitor) was used to record the visual activity of participants. Upon entering the laboratory, participants were seated at a desk where several scent stimuli, a canister of coffee grounds, and the eye-tracking monitor had been set up. Each of the scent stimuli contained filter paper that had been infused [or not] with an essential oil. The eye tracker was calibrated according to each individual's height and position. Participants sniffed five scent packets, one at a time, as they viewed each of five advertisements. The participants were exposed to five randomly ordered ads for hypothetical brands in different product categories, one of which was the target ad. For the target ad we measure eye fixation count, which indicates degree of drawing attention to stimulus, and eye gaze fixation length, which indicates overall interest in the stimulus. Pre-determined areas of interest (AOI's) representing the location

of a manipulated ad element (word or picture) were mapped out. In between each ad, coffee grounds were sniffed to clear out nasal passages. After viewing the ads, participants completed a survey booklet with other measures.

Three studies were conducted using this procedure. In study one, a strawberry scent was [or was not] sniffed while viewing a full color advertisement for a hypothetical brand of food coloring. The ad contained pictures of four bottles of colored liquid. The bottle in the upper right quadrant appeared either in grey or red to manipulate color congruency with the strawberry scent. In study 2, a lemon scent was [or was not] sniffed while viewing an ad for a juice bar. The advertisement contained pictures of four different smoothie ingredients. The item in the upper right quadrant was either a lemon or banana to manipulate congruency with the lemon scent (controlling for color congruency). In study 3, a citrus scent was [or was not] sniffed while viewing either a pictorial ad for a retail superstore or a text-based ad for taekwondo services. In the upper right corner of each ad was a woman cleaning a kitchen sink [or placing a book on a shelf] in the visual ad; or the word "clean" [or "walk"] in the verbal ad.

We conducted analyses of variance on mean fixation count and fixation length as well as other measures captured in the survey booklet as a function of scent (yes, no) and ad element congruency (yes, no). Across the studies we find that sniffing a scent increases both eye fixation count and length of eye gaze on the area of interest *only* when the scent is congruent with an object in the ad. Moreover, we find that the size of the enhanced attention effect is larger when the ad element is concrete versus abstract in nature. Implications for consumer multi-sensory processing are discussed.

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