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THE EFFECT OF AMBIGUOUS ODOR ON CURIOSITY AND SEARCH BEHAVIOR: IMPLICATIONS FOR CONSUMERS

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Abstract

With an increased emphasis on sensory marketing in the consumer behavior realm, the role of olfaction in consumer behavior is yet to be fully explored. Unlike taste and touch, olfaction is ubiquitous and can be argued to take precedence over other senses, leading to important implications for consumers. In this conceptual article, I focus on one aspect of odor, specifically ambiguous odor. I theorize the impact of ambiguous odor on search behavior in the novel brand realm. I propose that the ambiguity of smell increases epistemic curiosity, which, in turn, increases search behavior, particularly the search for novel brands. I theorize that this phenomenon is negatively moderated by risk; such that an increase in perceived risk decreases search behavior. In contrast, I theorize that individual differences in need for cognition will positively moderate the effect of ambiguous odor on search behavior such that the need for cognition will increase curiosity when encountering an ambiguous odor, in turn increasing search in the novel realm. Future opportunities for empirical research are proposed to further understand how ambiguous odor impacts curiosity with downstream consumer consequences. I discuss how this research has the potential to make important contributions to the sparse literature on olfaction in the consumer behavior realm.

Introduction

Imagine walking through a store and smelling vanilla scent. Vanilla scents can be classified into several different product categories, including food and medicine. How does this pique your curiosity, and impact your experience and shopping behavior? Does your curiosity motivate you to explore new products or brands that you might not have otherwise? How would risk and need for cognition influence this scenario? I explore these questions in this paper.

With the increased emphasis on sensory marketing, research on the sense of smell and its impact on consumer decision making has yet to be fully explored (Morrin et al., 2011). Unlike taste and touch, it is more difficult to turn the sense of smell on and off. As such, understanding the impact of olfaction on consumption is essential for consumers, marketers and policy makers.

Research has shown that odor has various effects on consumer behavior. For example, smell has been shown to increase memory, leading to higher product recall (Morrin et al., 2011). Additionally, pleasant odor has been shown to improve brand evaluation, especially for novel brands (Morrin & Ratneshwar, 2000). However, to the best of my knowledge, the literature examining the effects of ambiguous odor on consumer

behavior is sparse; hence, I focus on this aspect of odor and consumerism in this paper.

What is an ambiguous odor? There are numerous ways in which an odor can be ambiguous. For example, an odor can be ambiguous if it is unfamiliar, that is, it has not been encountered before, such as the smell of a new cuisine. An odor may also be ambiguous if it is unlabeled; it may be familiar, but if it is not labeled, it may be misidentified. For example, the odor of lime is a common odor, but, if not labeled, may be confused with similar odors such as that of lemon. Furthermore, certain odors are ambiguous in that they can be easily confused in regards to which category they belong to. For example, the odor of Pepto-Bismol can be confused with that of Root Beer because of their shared wintergreen ingredient. In addition, many cough syrups and other medicines have flavors and odors that can be confused with food products, such as cherry or vanilla. In this paper, I define an ambiguous odor as an odor which has an ambiguous source.

I aim to extend the theoretical sensory consumer behavior literature by proposing how ambiguous odor may impact consumer behavior. I propose that the ambiguity of smell increases epistemic curiosity, which in turn increases search behavior, particularly, the search for novel brands.

As such, this research makes important contributions to the sparse literature on olfaction and consumer behavior. First, I respond to the call by Morrin et al. (2011) for increased research on olfaction in the consumer behavior realm. Although there is literature on the link between various ambiguous stimuli triggering curiosity (Berlyne, 1962; Sääksjärvi et al., 2017; Zuckerman, 1994; Smock & Hold, 1962; Olson & Camp, 1984), to the best of my knowledge, this has not been studied in the realm of odor. Hence, I attempt to extend the literature on curiosity, triggered by ambiguous stimuli, to the realm of odor.

There is also literature on the link between curiosity and exploratory search behavior (Kashdan & Silvia, 2009; Kang et al., 2009; Hoyer & Ridway, 1984; Dember & Earl, 1957; Sääksjärvi et al., 2017; Hansen & Topolinski, 2011; Eelen et al., 2005). I particularly examine this in the realm of ambiguous odor stimuli, which I propose will trigger curiosity and lead to an exploratory search for novel brands. As mentioned earlier, the sense of smell is special in comparison to the other senses because it is ubiquitous and, therefore, difficult to control; its vast potential applications in consumer marketing and decision-making are yet to be fully discovered. Hence, I hope this theoretical work will provide insight into consumer decision-making processes surrounding ambiguous odor and benefit both consumers and marketing firms.

Conceptual Development

Complexity of Odor Perception

Research has shown that the way odors are presented influences how they are perceived. For example, Dalton (1996) showed that participants misidentified odors based on whether they were told that they would smell a healthy or potentially hazardous odor. Others have also contributed to the role of expectations in odor perception (Slosson 1899; Engen 1972; Knasko et al., 1990; De Araujo et al., 2005). The perception of odor can be manipulated by labeling the presentation, especially

when the odors are ambiguous (Herz & von Clef, 2001). Manescu et al. (2013) showed that positive labeling increases pleasantness ratings and edibility perceptions.

There is also evidence that context plays a role in odor perception, which is evident when comparing odors. For example, research has revealed that when individuals compare an odor comprising of citrus and wood to a pure citrus odor, it is perceived as a smell more of wood; however, when the odor mixture is compared to a pure wood odor, it is perceived to smell more of citrus— an example of perceptual contrast (Lawless et al., 1991). In this paper, I theorize how an ambiguous source of an odor affects perception and downstream behavior.

Ambiguity of Odor

As odor perception is complex, there are many potentially interesting facets of olfaction to examine. In this paper, I examine ambiguous odor, particularly odor with an ambiguous source. I theorize that ambiguous odor will stimulate curiosity, as curiosity is triggered by external stimuli that have a lack of information (Berlyne 1954; Lowenstein, 1994; Sääksjärvi et al., 2017). Hence, in the context of an odor with an unclear source, I propose that curiosity is stimulated.

Curiosity

In this study, I specifically focus on one type of curiosity: epistemic curiosity, which is triggered by an information gap. Although I focus on epistemic curiosity, there are other categories of curiosity which I briefly review here. Psychologist Daniel Berlyne is one of the most important figures in terms of laying down the foundational theory of curiosity (Kidd & Hayden, 2015; Litman & Spielberger, 2003). Berlyne constructed two dimensions of curiosity. The first dimension consists of perceptual curiosity, aroused by novel stimuli, versus epistemic curiosity, which is a desire for knowledge from an information gap. Berlyne differentiated between perceptual and epistemic curiosity. Perceptual curiosity he regarded to that which was studied in non-human animals. He writes, “In the case of the rat, for example, there appears to be a drive which is aroused by novel stimuli and reduced by continued exposure to these stimuli” (Berlyne, 1954, p. 180).

Berlyne explains that although similar behavior is likely triggered by new things in humans, especially in infants, that since humans have the ability for higher order thinking, he defines epistemic curiosity as that which concerns humans. He theorizes that epistemic curiosity is triggered by a lack of information that motivates the learning of new information. Whereas perceptual curiosity is triggered by the perception of new stimuli, epistemic curiosity is triggered by an information gap and leads to search for new information (Berlyne, 1954). Hence, I focus on epistemic curiosity, triggered by a lack of information (i.e., the source) of an odor.

In regards to epistemic curiosity, Berlyne explains that “when a question is put, whether by the subject himself or by anyone else, and the answer is already known, the appropriate response is made as a reaction conditioned by previous learning of the stimulus pattern, and this relieves the drive immediately. However, when the answer is unknown, the drive persists (Berlyne, 1954, p. 182-183).” Berlyne goes on to detail the potential thought processes that result from this curiosity drive, including trial and error,

tapping into intuition, observation and seeking expert opinion. Berlyne (1954) notes "If the processes lead to a pattern of responses that the subject's prior learning enables him to accept as an adequate answer, then the drive will be reduced. If the answer does not arrive readily using any of the procedures mentioned above, then the process may end in various ways. Some distractions may occur (p. 183)." As explained in detail later, I introduce risk as an example of a *distraction* that, I propose, interrupts the effect of curiosity on exploratory search behavior.

The second dimension of curiosity, delineated by Berlyne, differentiates exploratory behavior as specific versus diversive. Whereas diversive behavior is triggered by a lack of stimulation, i.e., boredom, and motivates search for "stimulation regardless of source or content," (Berlyne, 1966 p. 26) specific exploratory behavior is motivated by curiosity and leads to search for novel stimuli to gain knowledge (Berlyne, 1966; Litman & Spielberger, 2003). Hence, within epistemic curiosity, I focus on a specific dimension. As discussed in detail later, I propose that epistemic curiosity, triggered by an ambiguous odor, leads to the search for information about novel brands.

Ambiguity and Curiosity

Extant research delineates how ambiguous stimuli trigger epistemic curiosity by creating a knowledge gap, which in turn stimulates the desire to find more information (Berlyne, 1962; Sääksjärvi et al., 2017; Zuckerman, 1994; Smock & Hold, 1962; Olson & Camp, 1984). For example, Berlyne (1962) found that increased ambiguity led to epistemic curiosity among high school students. He conducted a fascinating experiment where high school students were given famous quotes and 3 potential authors, as well as factitious percentages of experts' opinions of who was the author of each quote. They manipulated ambiguity such that in the high (vs. low) ambiguity group, there was discordance (vs. consensus) amongst the expert opinions regarding who wrote each quote, and increased ambiguity led to increased levels of epistemic curiosity. Additionally, Sääksjärvi et al. (2017) demonstrated that ambiguous rumors increased curiosity about novel products, and Zuckerman (1994) showed that ambiguity of visual stimuli induced curiosity. In contrast, Smock and Hold (1962) illustrated that the absence of ambiguous stimuli elicited less curiosity in children. Considering the above literature, I propose the following:

> **P1.** Ambiguous odor leads to epistemic curiosity in order to fill a knowledge gap.

Curiosity and Novelty Seeking

Extant research suggests that curiosity affects consumer decision-making and outcomes (Vidler, 1980). Although there are different theories of curiosity, there is a consensus that curiosity is an exploratory state with the desire to search in novel realms (Kashdan & Silvia, 2009). As mentioned above, Berlyne (1954) wrote about *epistemic curiosity* resulting from a lack of information. He suggested that this type of curiosity can motivate *specific exploratory behavior* to seek new information. When curiosity is stimulated, it works through a reward system whereby there is a motivation to seek the novel realm, and this novelty seeking is rewarded (Kashdan & Silvia, 2009; Kang et al., 2009). Kang et al. (2009) conducted an interesting study in which participants read trivial questions and were asked how curious they felt while undergoing fMRI (Kang et

al., 2009). They found that the parts of the brain that lit up when participants felt curious were the caudate nucleus and inferior frontal gyrus, parts of the brain's reward system (Kang et al., 2009).

Although there is uncertainty in searching for the unknown, individuals are more likely to engage in uncertainty when they feel curious about filling a knowledge gap (Kashdan & Silvia, 2009) and after curiosity fulfillment, individuals may feel relieved (Lowenstein, 1994).

Reimann et al. (2012) used fMRIs to study the areas of the brain activated in response to novel and familiar brands. Their research supports the theory that novelty-seeking is rewarded when curiosity is evoked. They found that the cingulate gyrus, an area of the brain that is also involved in reward-based decision-making, is activated in response to novel brands, supporting the theory that a curiosity-mediated reward system is involved in choosing novel brands.

In their theoretical model of exploratory purchase behavior, Hoyer and Ridway (1984) argued that since curiosity is an essential part of novelty seeking (Dember & Earl, 1957), an increase in curiosity will lead to a higher likelihood of trying out new brands and products. As mentioned earlier in this paper, Sääksjärvi et al. (2017) show that epistemic curiosity, triggered by ambiguous rumors, leads to interest in novel products. Hansen and Topolinsk (2011) also demonstrate that curiosity leads to interest in the novel. They reported that "even a very unobtrusive exploratory mindset may cause individuals to consider novel information more favorably than familiarity and safety cues. In such an exploratory context, which triggers attention for new and unfamiliar information, preference for familiar prototypes may be reduced for the benefit of novel stimuli. Consequently, we predicted that an exploratory mindset would increase liking for novel objects (Hansen & Topolinski, 2011, p. 710)." They confirm this through an interesting experiment in which they either labeled dots as stars (curiosity-induced mindset) versus peas (mundane) and presented a series of familiar or novel dots. They found that those with a curiosity-induced mindset preferred novel dot designs, confirming that a curiosity mindset leads to openness, and even a preference for the novel.

Research suggests that a curiosity mindset translates into effects that go beyond the initial stimuli triggering curiosity. Since curiosity is agreed upon as an exploratory state with the desire to search in novel realms (Kashdan & Silvia, 2009), a curiosity mindset has been shown to impact consumer attitudes, openness, and behavior toward novelty beyond the initial source of curiosity.

For example, research has shown that a curiosity (exploratory) mindset may be induced by unusual circumstances, and that this curiosity mindset translates to an increase in brand attitude and purchase intention of novel items (Eelen et al., 2005). Eelen and colleagues conducted an experiment in which they primed a curious (exploratory) mindset by having participants describe what was unusual about their day and then asked their opinions about several products. They found that participants in the curiosity mindset condition liked novelty items (labeled "new") more than the familiar items (not labeled "new").

Hence, I propose that ambiguous odor creates a curiosity mindset for exploration. I

propose that this curiosity mindset translates beyond the initial odor stimuli to an increase in search behavior for novelty, particularly for novel brands.

> **P2:** Ambiguous odor leads to epistemic curiosity, increasing search behavior in the novel realm, particularly in the search for novel brands.

Perceived Risk as a Moderator

Once curiosity is triggered by ambiguous stimuli, factors may alter the usual effect of curiosity on exploratory behavior (Berlyne, 1966). Certain factors have been shown to decrease exploration in general, including high states of arousal (Berlyne, 1966; Berlyne & Lewis, 1963). For example, Berlyne (1966) demonstrated that animals were more likely to prefer familiar (vs. novel) stimuli after being aroused with methamphetamine. Other situations of high arousal, including fear, pain and hunger have also been shown to also decrease search in the novel realm (Berlyne, 1966; Berlyne & Lewis, 1963; Chapman & Levy, 1957; Thompson & Higgins, 1958; Montgomery & Monkman, 1955). For example, Montgomery and Monkman (1955) found that when rats were induced with fear, they were less likely to explore new environments.

One antecedent of arousal is perceived risk, and research has illustrated that when perceived risk is high, consumers prefer familiar options (Campbell & Goodstein, 2001; Erdem, 1998). For example, Erdem (1998) found that perceived risk led consumers to prefer familiar brands and Campbell & Goodstein (2001) illustrated that consumers evaluated familiar (vs. novel) shaped wine bottles more positively in high (vs. low) risk situations.

Hence, I propose that risk will moderate the effect of ambiguous odor on search behavior by decreasing the impact of curiosity on search in the novel realm, instead leading to search of the familiar.

> **P3:** Risk moderates the effect of epistemic curiosity on novel search behavior, such that risk will trigger a drive to search for familiar over novel brands.

Need For Cognition

Individual differences may be other potential moderators in the proposed model. I propose one particular individual difference, namely, need for cognition, as a moderator. Need for cognition is defined as “a need to understand and make reasonable the experiential world (Cohen et al., 1955, p. 291).”

Research suggests that need for cognition is closely related to curiosity (Olson et al., 1984). Olson and colleagues noted “to the extent that curiosity involves the desire for cognitive exploration, it should be related to need for cognition” (p. 71). They found that the need for cognition is significantly correlated with almost all measures of curiosity and that some of the highest correlations were with the following subset measures of curiosity: specific curiosity, ambiguity, and novelty. Hence, I theorize that increasing levels of need for cognition will lead to increasing levels of curiosity after smelling an ambiguous odor, as one engages in thinking about which category the odor might belong to. This in turn will lead to a greater search for information, particularly among novel brands.

P4: Need for cognition moderates the impact of ambiguous odor on search behavior by increasing curiosity, which in turn increases search in the novel realm.

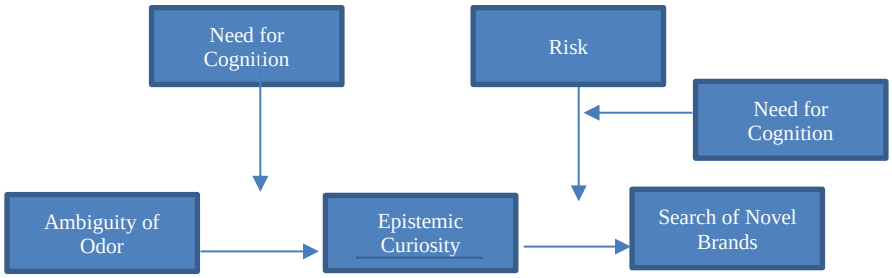
Extant research shows that those with a high level of need for cognition are less affected by mood when making decisions (Lin et al., 2006). For example, research has shown that sadness leads to risk taking; however, this phenomenon is diminished in individuals with high levels of need for cognition (Lin et al., 2006). Hence, I propose that a high level of need for cognition will attenuate the effect of risk on search behavior, such that in individuals with a high need for cognition, their internal drive to understand and learn will lead them to continue searching for new information, i.e., to search within unfamiliar brands.

P5: Individuals with a high need for cognition will not be as affected by risk, so that they will still search for information about novel brands once epistemic curiosity is triggered by an ambiguous odor.

Other individual differences that may affect the proposed model, which are areas for future research, include risk orientation, regulatory focus, promotion prevention, openness to experience, cognitive closure, sensation seeking, and the need for closure.

Figure A

Theoretical Model



General Discussion

In this paper, I propose ways consumer researchers can explore the complex world of ambiguous odor, curiosity, and search behaviors. Specifically, I outline five propositions that consumer researchers may empirically examine to understand how ambiguous odor impacts curiosity and search behavior in the novel realm. I propose that ambiguous odor induces epistemic curiosity, motivating the search for novel brands. I also identify two potential moderators that could be easily tested: perceived risk and need for cognition. I propose that while risk will decrease search in the novel realm triggered by ambiguous odor, individuals with higher levels of need for cognition will have greater levels of curiosity stimulated by an ambiguous odor, translating into increased search in the novel realm.

To the best of our knowledge, this study is the first to propose a link between ambiguous odor, curiosity, and search behavior in the novel realm. As the study of odor in consumer behavior has been recognized as vital (Morrin, Krishna & Lwin, 2011), this

paper offers a theoretical conceptualization around a novel aspect of odor in the consumer behavior realm, namely, ambiguous odor and its downstream impact on curiosity and search behavior.

As companies increasingly use sensory marketing, it is important to understand the impact on consumers. Understanding how companies may utilize ambiguous odor and curiosity may shed light on how consumers can be vigilant of predatory advertising by companies that use sense of smell and curiosity as part of their appeal. In conclusion, I hope that this proposal provides guidance to spur research for consumer researchers wishing to tackle this important phenomenon.

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