Exploring the Role of Putative Human Pheromones in Consumer Behaviour

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Abstract

Putative human pheromone, 4,16-androstadien-3-one (Androstadienone), acts as a subliminal mood enhancing agent modulating attention to emotional information in social contexts. However, its role in consumer behaviour, specifically product evaluation, choice and memory has largely been overlooked. In view of its widespread use in the industry, we review the latest literature on the subject and call for more research in marketing. We propose a model and set of propositions to guide further research in this emerging area of consumer behaviour.

Introduction

"Easy Rider Cologne for Men (Attracts Women)", "Seduction Perfume for Women (Attracts Men)," "Madonna Perfume for Women (Attracts Women)", "Man 2 Men Gay Cologne (Attracts Men)". These are just some of the names of fragrances sold which contain putative human pheromones. The fragrance industry, and more recently the cosmetic industry have established a strong presence in the human pheromone product market due to "their significant financial attractiveness" (Zaviacic and Sisovsky, 2009). Even though the promise of instant boost in sexual attraction is largely a myth created by the fragrance industry (Berliner, et al, 1991), the true chemical effects of human pheromones, specifically those of 4,16-androstadien-3-one (Androstadienone), on consumer behaviour are not well understood in marketing. The role of Androstadienone in product evaluation, choice and memory has largely been overlooked, while few studies that do exist in marketing (Kirk-Smith, 2005; Waller, 2000) provide inconsistent results due to the omission of some important contextual controls.

Androstadienone is a form of putative male human pheromone, regarded as steroid chemosignal. The bulk of research on Androstadienone comes from psychology suggesting unique modulating effect on human neurological and physiological conditions (Bensafi, 2004; Olsson, et al 2006; Saxton, 2008). The results, however, have considerable implications for marketing due to their potential application within retail environments, print media and personal sales situations. For example, females under the influence of Androstadienone tend to pay greater attention to emotional stimuli (Hummer, and McClintock, 2009), and there is evidence of positive mood enhancement (Jacob and McClintock, 2000). In addition, subjects are often not aware of exposure to Androstadienone; hence its influence may be considered non-conscious. Since, Androstadienone potentially acts as a subliminal mood enhancing agent, understanding its effects is of interest not only to managers, but also consumers and policymakers.

The effects of Androstadienone are complex, and appear to be context dependent. This leads to considerable debate about the consistency of Androstadienone as a behaviour modulating chemical. The aim of this article is to provide a call to research, and review the effects of Androstadienone on consumer behaviour specifically in regards to evaluation, choice and memory; and the contextual conditions which govern this effect. This is done through firstly defining Androstadienone, and clarifying existing inconsistencies within the relevant literatures. Building on these definitions, a conceptual model is proposed to integrate Androstadienone with the contextual moderators within a traditional marketing setting, such as a retail environment, print media or personal sales situation. Using the model we provide a set of propositions to guide further research in this emerging area of consumer behaviour.

Background

A great deal of research in marketing demonstrates the role that emotions play in consumer behaviour. For example, individuals in positive-mood states evaluate stimuli more positively basing their evaluations on their affective states (Bagozzi, et al, 1999), they have superior recall of positive stimuli (Dolan, R. J. (2002), and make choices in order to maintain their mood (Wegener et al, 1995). Despite frequent emotional appeals in marketing the interpersonal aspects of emotional information processing have received less attention in the literature. Nonetheless, emotional reactions rarely occur outside of social interaction. In social contexts, pheromones specifically aid processing of emotional content by conveying

information between individuals and by focusing their attention towards the emotional aspects of the interaction. As such, pheromones may boost the effect of emotional stimuli in advertising, sales, or retail.

The term pheromone was defined as "a chemical substance produced by one individual and received by a second individual of the same species in which a specific reaction is triggered" (Karlson and Luscher, 1959). Pheromones were originally indentified as primers which promote slower and long lasting changes to endocrine state which would elicit an immediate behaviour change (McClintock, 2000). However, such classification was too limited and two other categories were proposed; signaler pheromone that conveys information (Sheperd, 2006) and modulators which affects mood, social cognition, physiological and neurological states. Androstadienone, which is a modulator pheromone, is of particular interest since it changes how individuals behave or react to their current situation by influencing their psychological and neurological state (McClintock, 1999). These steroids do not simply signal information about another person's presence; condition, or status. They affect the mood and attention of the recipient under certain contextual conditions. Androstadienone is naturally found in men's axillary hair (Nixon et al.,1988), semen (Kwan, 1992) and in their blood plasma (Brooksbank et al., 1969). However, due to its commercial value, it has been synthetically reproduced and variations of Androstadienone have been patented and applied by the fragrance industry (Berliner, 1994).

Although commonly used in the fragrance industry, Androstadienone is distinct from odours. Researchers have found differences to how the human brain process Androstadienone in comparison to common odour. For example, females exposed to Androstadienone show a significant change in glucose utilisation within the prefrontal cortex, cingulate cortex, amygdala and hypothalamus which are all consistent with an effect on the neural systems involved in emotion (Savic, et al 2001, Jacob, 2001). There were also significant changes within the visual cortex, partietal cortex, thalamus, basal ganglia, premotor cortex and cerebellum consistent with an effect on attentional systems (Bensafi, et al, 2004, Savic, et al, 2005). Furthermore, exposure to Androstadienone activates the anterior part of the inferior lateral prefrontal cortex and posterior part of the superior temporal cortex (Gulyás et al, 2004) which is the part of the brain shown to be heavily involved in other than olfactory functions, including various aspects of attention, visual perception and recognition and social cognition. These results suggest Androstadienone acts in a way distinct from smell. Hence, existing studies in marketing on the effect of smell in consumer behaviour may not translate to our understanding of Androstadienone. Therefore, more research is needed.

Particularly, effects of Androstadienone appear to be non-conscious and follow sexual orientation of the individual. Numerous experimental results (e.g.: Chopra, et al, 2008; Lundström, et al, 2003) suggest that when the substance is below the human olfactory minimum detection threshold, there still appears to be significant behaviour and mood altering effects in females (Jacob and McClintock, 2000). These effects are measured through changes in heart rate, digestion, respiration rate, perspiration and sexual arousal.

However, the effects of Androstadienone are also complex as demonstrated by the apparent inconsistencies in the extant empirical findings. For example in laboratory conditions, female subjects exposed to Androstadienone appeared to experience decreased respiratory, cardiac frequency and skin conductance while also showing increased body temperature, which signified a calming effect (Grosser, et al, 2000). In contrast, Jacob, Hayreh, and McClintock (2001) discovered that female exposure to Androstadienone decreased their hand temperature and at the same time increased their level of skin conductance which signified an arousing

effect. Similar result was observed by Bensafi et al (2003), who found that high concentrations of Androstadienone induced small but significant effects on physiological arousal in a sex-specific manner, increasing arousal in females but decreasing it in males. Despite the fact that exposure to Androstadienone appeared to display a significant effect towards the autonomic nervous system, there appear to be conflicting results on whether the effect is arousing or calming.

The most prominently demonstrated effect of Androstadienone is its ability for positive mood maintenance (Jacob and McClintock, 2000, Grosser et al, 2000, Bensafi et al, 2004, Lundström & Olsson, 2005, Hummer & McClintock, 2009) and reduction in negative mood (Grosser et al, 2000, Jacob et al, 2002) on female subjects. However, contradictory findings also exist. A study conducted Hummer & McClintock, (2009) found that an increase in attention to emotional information did not translate to an increase in positive mood as reported by previous researches. Furthermore, in the study by Ebster and Kirk-Smith (2005), male subjects evaluated male-oriented products (products that are viewed as mainly related to males through usage or through social image) more favourably in comparison to female and gender neutral products; but no significant effect was found for females. This is intriguing because, according to prior research in psychology, male pheromones such as Androstadienone should have either no or negative effect on male subjects' mood.

The effect of Androstadienone also appears to be based on sexual orientation rather than gender. For example, homosexual male's brain processing of Androstadienone appeared similar with that of heterosexual females specifically towards social cognition and attention in sexually orientated context (Savic et al, 2005). Yet, contrary to these neurological findings, Hummer & McClintock, (2009) identified that the passive inhalation of the Androstadienone augments attention specifically to emotional information with little or no effect on social cognition. Hence, the results from the brain function analysis, which indicate an increase in social cognition, did not appear to translate to actual behaviour.

The apparent inconsistency of empirical findings has sparked a search for potential contextual conditions that might explain the variation of results between the studies. Specifically, Jacob et al (2001) reports that female's responses to Androstadienone were observed only in the sessions run by the male tester. In contrast, male's responses were not affected by this difference in experimental condition. Furthermore, Villemure and Bushnell (2007) found that Androstadienone mood effects (increased negative mood in males, and maintained positive mood in females) resulted only in films that prominently featured human beings. Based on these findings, it appears that the direction of the effect of Androstadienone may depend on the presence of a person or onscreen model.

This social context effect may further explain Hummer and McClintock (2009)'s discovery of the lack of effect Androstadienone on positive mood and attention to cognitive information. In their experiment, subjects were tested alone in a room with no distractions, and no interactions with other human beings. A similar control was utilised by Lundström, and Olsson, (2005) who found that when women rated attractiveness of male faces on a computer screen in a quiet room with no distractions, Androstadienone did not alter their ratings. However, these findings were not present in Saxton, et al, (2008) research, who tested female subjects during a live social interaction (speed dating); those female subjects rated attractiveness of male faces higher. Hence, it appears that the effect of Androstadienone may also be governed by the complexity of the social environment. Complex social situations are common in marketing settings. In such settings, the magnitude of the effect of

Androstadienone may in fact rely on consumer's limited attention to the stimulus, yet this aspect has not been investigated previously in marketing.

The moderating conditions may in addition explain, Ebster and Kirk-Smith, (2005) finding of an effect of Androstadienone on males instead of females; which is contrary to all previous research. The introduction of product gender may have moderated the effect of Androstadienone. The possible change in the direction of Androstadienone effect due to the effect of product gender has not been investigated, yet it remains relevant for marketers since many common retail contexts involve gender laden products. So far no research has attempted to integrate these contextual conditions into one controlled study, and to investigate the effect of Androstadienone in relation to marketing outcomes, such as consumer's product evaluation, choice and memory.

Conceptual Model

Findings from existing literatures are diverse, but due to numerous conflicting results, they universally fail to provide a robust, theory-based model of the effect of Androstadienone towards product evaluation, choice and memory. Nonetheless, existing literature suggests certain parameters that may narrow the search for such a model, namely:

- Emotion and cognition have separate and partially independent effects in relation to Androstadienone
- The direction of the effect of Androstadienone appears to depend on the social context. (Jacob, Hayreh, et al, 2001, Villemure and Bushnell, 2007)
- The effect of Androstadienone is governed by the complexity of the social environment and occurs in environments where consumer's attention is distracted. (Hummer & McClintock, 2009, Olsson, 2005)
- Product gender potentially moderates Androstadienone's effect on consumer evaluation. (Ebster and Kirk-Smith, 2005)

Proposed marketing outcomes: It has been shown that the exposure of Androstadienone will reduce negative emotion and increase positive emotion for females (Jacob and McClintock, 2000, Grosser, Monti-Bloch, et al, 2000) which means that during the product evaluation phase, female customers may value products more positively when exposed to Androstadienone. Enhanced positive mood due to exposure to Androstadienone may also be helpful for product memory both during the encoding and the retrieval stage. Finally, the influence of Androstadienone should result in an increased use of emotional information in judgment and mental heuristics, which in turn can result in higher preference for emotional-based products.

Propositions:

Proposition 1 (Social context): The presence of a male experimenter (Jacob and McClintock, 2000) or a male model in a movie (Villemure and Bushnell, 2007) combined with the application of Androstadienone appears to modulate the mood of female subjects in a positive direction. In a marketing context, the application of Androstadienone on product messaging containing a male model or on male sales staff will enhance their image for female consumers.

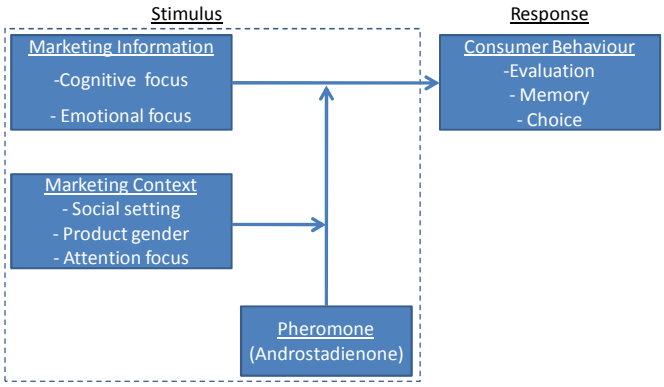
Proposition 2 (Limited attention): In situations where the consumer's attention is disrupted, the effect of the pheromone strengthens relative to no disruption (Hummer & McClintock,

2009, Olsson, 2005). Similar to the social context effect, attention distraction is a reflection of Androstadienone functioning as a social chemosignal. Androstadienone will only function under a complex social context where the attention of the subject exposed to Androstadienone is divided.

Proposition 3 (Product gender): The gender orientation of the product can be divided down to male, female and neutral. Studies indicate that male subjects exposed to Androstadienone will increase their preference for male products in comparison to gender neutral and female products. The same effect did not appear to occur with the female subjects (Kirk-Smith, 2005). The shift in preferences for gender laden products can be especially useful for marketers to increase the appeal of products that have existing product gender.

These points are formalized in the conceptual model illustrated in figure 1.

Figure 1. Proposed conceptual model



Discussion and Future Research

The role of pheromone Androstadienone in product evaluation, choice and memory has largely been overlooked, while few studies that do exist in marketing (Kirk-Smith, 2005; Waller, 2000) provide inconsistent results due to the omission of some important contextual controls. This article provides a call to research and a concise review of the diverse research from multiple disciplines on Androstadienone suggesting its implications for consumer behaviour. We argue that complex contextual conditions moderate the effect of Androstadienone on consumer behaviour and provide a set of propositions to guide future investigation of those conditions in marketing. To demonstrate the testable nature of these propositions, we integrate the variables in a proposed conceptual model. Since, Androstadienone is widely used in the industry with the intent of acting as a subliminal mood enhancing agent, understanding its effects according to our proposed model is of interest not only to managers, but also consumers and policymakers.

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