Consumers' emotions, cognition and approach/avoidance behaviour in relation to scented food products

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Abstract

This paper explores the mediating factors between consumers' exposure to scented food products and their behavioural response. Based on two schools of thought, the emotion-cognition approach (Zajonc, 1980; Zajonc and Marcus, 1984, 1985) and the cognition-emotion approach (Lazarus, 1991) five competitive hierarchies of effects are developed. The hierarchies are tested by the use of an experimental design manipulating three kinds of scent (congruent scent, non-congruent scent and neutral/no scent) in relation to potato chips. Applying structural equation modelling, it is concluded that the 'scent → emotions → behaviour hierarchy' provides the best fit to data and best explains consumers' reaction to the scented food product.

Key words Cognition - emotions - food - scent - structural equation modelling

Introduction

Marketers have become increasingly interested in the notion that scent may influence consumer decision making. Research has revealed that significant effects may include time spending, type of processing (Mitchell et al., 1995), mood (Bone and Ellen, 1999), cognition (Chebat and Michon, 2003) and approach-avoidance behaviour (Mattila and Wirtz, 2001). While there is agreement in the consumer research literature that scent may impact consumers' emotions, cognition and/or behaviour there is, however, little consistency regarding the (potential) causality of these effects. Basically, two main schools of thought can be detected. The first school of thought, the emotion-cognition approach, is represented by Zajonc (1980) and Zajonc and Marcus (1984, 1985) and suggests that emotions can take place as a direct consequence of consumers' exposure to sensory effects. Zajonc and Marcus do not neglect that emotions can be generated by cognitive events but they do not regard cognition as a necessary condition for emotions to occur. Representing the second school of thought, the cognition-emotion approach, Lazarus (1991) claims, in contrast to Zajonc and Marcus, that cognition is a necessary condition for emotions to take place. According to Lazarus cognitions

is a precursor to emotions. A person cannot have an emotional reaction to a stimulus in the absence of some sort of a cognitive appraisal of that stimulus.

In a study of mall shoppers' emotions, cognition and spending Chebat and Michon (2003) have compared the two schools of thought and found that the cognitive-emotion hierarchy provides the best explanation of mall shoppers' exposure to scented air. In contrast to these results Gulas and Bloch (1995) propose that perceived scent might lead directly to affective responses, which in turn may lead to approach-avoidance behaviour. In partial support of this view Bergenwall (1988) advances that "emotions usually lead to some kind of actions by the individual, i.e. they have some kind of consequences" (p. 14). Other researchers (e.g. Milotic, 2003; Herz and Engen, 1996) suggest that scent can directly affect consumer behavioural responses and that such responses can occur without conscious attention. Thus, as recognized by several authors (e.g., Bone and Ellen, 1999; Ward et al., 2003; Morrin and Ratneshar, 2000) there is a gap in our knowledge regarding the mediating factors associated with olfaction. Based on such insight Bone and Ellen, Ward et al., among many others, call for more research on how cognitive and emotional factors may mediate the relation between olfaction and (possible) behavioural response. For example, Bone and Ellen suggest that "researchers need to explicitly examine whether odour effects on affective and behavioural outcome are direct or are partially or fully mediated by mood state, cognition or other variables" (p. 258). Reflecting such calls, the purpose of this paper is to investigate systematically a range of mediating factors between stimuli (scent) and consumer response behaviour. Retailers, among others, may have a strong interest in gaining insight in whether scented products may (1) affect consumer emotions; (2) affect consumer cognition (e.g., product judgment), and/or (3) affect consumer action (e.g., purchase intentions). *For example*, previous evidence (e.g., Hansen, 2005; Steenkamp, 1989) suggests a positive link between perceived food quality and buying intention. In relation hereto, will scented food products be capable of influencing perceived quality directly or will this – possible link – instead be mediated by consumers' emotions? If the latter is true, a throughout understanding of perceived quality cannot be ascertained without a simultaneous understanding of the possible link between scent and emotions. Based on previous theoretical and empirical insights we develop five competitive hierarchies of effect; each representing a unique path between scent and consumer response. The hierarchies are experimentally tested in relation to a food product (potato chips) and the results are estimated using structural equation modelling.

Types of scent

Scent can be classified into two distinct types according to whether the odour originates from a particular object/product (i.e., nonambient scent) or whether it is generally present in the environment (i.e., ambient scent), for example in a retail store. The nonambient scent type can further be divided into congruent scent (i.e., scent that can naturally be related to the specific product, for example a coffee package scented with a coffee scent) and noncongruent scent (i.e., scent that cannot naturally be related to the specific product, i.e., a coffee package scented with a grape fruit scent) (Mattila and Wirtz, 2001; Bone and Ellen, 1999).

Consumer reactions to scent – types of responses

Behavioural response

Consumers' may react to scent by a simple behavioural response. Scent can be experienced with little, or no, cognitive effort (Erlichman and Halpern, 1988) and may directly evoke desires and wants as olfactory cues are processed in the more primitive parts of the brain (Herz and Engen, 1996). Also, Zabnuttinit (1991) propose that olfactory cues may lead consumers "…to check their quality for guidance of behaviour on the basis of previous encounters" (p. 883). Environmental psychologists have suggested two contrasting forms of behaviour: approach/avoidance (Mehrabian and Russel, 1974). In relation to environmental cues (i.e., store atmospherics, including ambient scent) approach is a desire to stay, explore and affiliate, and avoidance is the opposite (Chebat and Michon, 2003). In connection with a food product, approach may be conceptualized as a desire to eat the product and/or to posses (buy) the product, whereas avoidance is the opposite.

Emotional response

Emotions may be caused by consumers' exposure to specific stimuli. Surprise (an emotion) may for instance be caused by an unexpected gift (Derbaix and Pham, 1991). Retailers, among others, may have a strong interest in gaining insight in whether scented products may (1) affect consumer emotions; (2) affect consumer cognition (e.g., product judgment), and/or (3) affect consumer action (e.g., purchase intentions). *For example*, previous evidence (e.g., Hansen, 2005; Steenkamp, 1989) suggests a positive link between perceived food quality and buying intention. In relation hereto, will scented food products be capable of influencing perceived quality directly or will this – possible link – instead be mediated by consumers' emotions? If the latter is true, a throughout understanding of perceived quality cannot be

ascertained without a simultaneous understanding of the possible link between scent and emotions. Zajonc and Marcus (1984) argue that scent can create emotions without antecedent cognitive processes. Emotions can be generated by biological, sensory (e.g., scent) or cognitive events. Of the five senses, smell can be considered to be the most closely attached to emotional reactions because smell is connected to the limbic system in the brain, which is the seat for immediate human emotions (Michon et al. 2005). In empirical consumer research emotion is typically conceived as two dimensions (Bone and Ellen, 1999): arousal and pleasure. Arousal can be conceptualized as "a feeling state varying along a single dimension ranging from sleep to frantic excitement", whereas pleasure can be conceptualized as "a feeling state that can be assessed readily with self-report, such as semantic differential measures, or with behavioural indicators such as smiles, laughter, and, in general, positive versus negative facial expressions" (Mehrabian and Russell, 1974, pp. 18-19). Mehrabian and Russell also proposed 'dominance' as a third emotional state, which together with 'pleasure' and 'arousal' determines whether a person wishes to remain in a particular environment (i.e., approach-avoidance). 'Dominance' has, however, received only minor attention in subsequent empirical research concerning scent (refer to e.g., Chebat and Michon, 2003).

Cognitive response

Lazarus (1991) posits that emotions are based on the appraisals consumers make to stimuli in the environment. Appraisals are consciously or unconsciously judgments and interpretations of stimuli and these appraisals must be linked to the consumer's own experience and goals for an emotion to occur. Without a personal appraisal (i.e., harm or benefit) there will be no emotion (Chebat and Michon, 2003). Cognitive appraisal is the "process of categorizing an encounter, and its various facets, with respect to its significance for well-being" (Lazarus & Folkman, 1984, p. 31). This process may result in stressfull feelings (e.g., in a complaining context) or feelings of enjoyment, pleasure, etc. (Sweet, 1999). Such a response pattern reflects the principles outlined in the classical 'information perspective'. The information processing perspective presupposes that consumers behave as problem solving cognitive individuals reaching for a reasoned decision (Kassarjian, 1981). The 'Hierarchy of Effects' model (Lavidge and Steiner, 1961; Blackwell et al., 2001) suggests that a stimuli is first processed at its most basic level and then at more abstract levels (Dubois, 2000). Consumers are expected to use their cognitive resources in forming beliefs (cognitive component) toward the attributes of a product, which in turn may result in the development of an overall feeling (affective component) in the sense of liking/disliking a product. Such feelings may in turn

affect the consumer's emotional state, especially if the consumer links the product to her/his overall goals and desires.

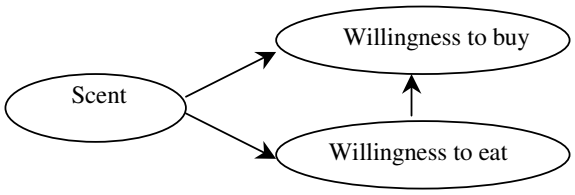
Competitive hierarchies of effects

As outlined above, little agreement exists on what mental processes (if any) may occur as a result of consumers' exposure to scent and in what order these processes may occur. We propose the five competitive hierarchies of effect can be formulated, each of which have been proposed and/or evidenced by previous research.

Hierarchy one: scent → behaviour

Hierarchy 1 suggests that scent is expected to directly influence behaviour and that no mediating variables are present. Hierarchy 1 is shown in Figure 1.

Figure 1. Hierarchy 1 (scent → behaviour) displayed.



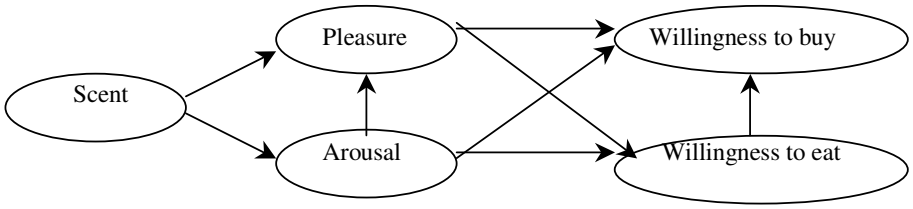
Evidence for hierarchy one: Ward et al. (2003) suggest that "smell can be perceived through pre-attentive processing; and this may lead to a situation where consumers respond to a smell without realizing" (p. 299). Thus according to Ward et al. the central trust is that if "retailers create a corporate scent that is congruent, significant and liked, it will probably result in positive behavioural outcomes that will strengthen retail brand image" (p. 299). Following such considerations perceived scent might directly influence consumers' behaviour; there will be no need (and no possibility) for marketers to investigate potential cognitive and/or emotional mediating variables between scent and response since consumers may not realize such variables. The potential direct influence of odour on behavioural response is supported by Grimes (1999) who found that students agreed to spend more time on voluntary work when they were exposed to a vanilla or lavender odour before the request. In the study, odour did not affect mood. Vanilla odour led to an increase in reported time to volunteer as compared to lavender odour and no odour. In hierarchy 1 a path from willingness to eat to

willingness to buy is expected. This expectation is derived from previous research (e.g., Hansen, 2005) showing that consumers' are more inclined to buy food products having an appetizing appearance. The link between willingness to eat and willingness to buy is also included in hierarchies 2-5.

Hierarchy two: scent → emotions → behaviour

In hierarchy 2, scent is expected to influence behaviour through consumer emotions. Hierarchy 2 is displayed in Figure 2.

Figure 2. Hierarchy 2 (scent → emotions → behaviour) displayed.



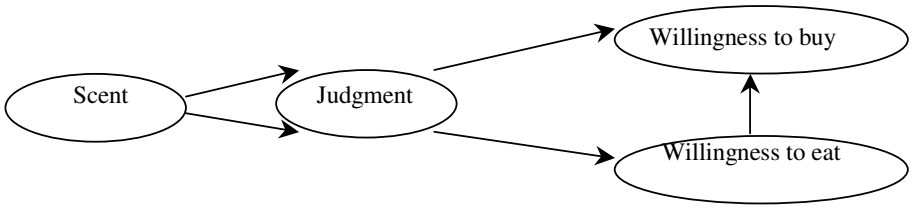
Evidence for hierarchy two: Several researchers (e.g., Frijda, 1986; Bergenwall, 1998) link consumer emotion to consumer action. Bergenwall (1998) suggests that "emotions usually lead to some kind of actions by the individual, i.e. they have some kind of consequences" (p. 14). As an example, the experience of a rude employee of a service company may lead to some internal reactions, e.g. 'displeasure' (affect). These internal reactions may lead to complaining actions by the consumer (Bergenwall, 1998). In line with this view Zajonc (1980) and Zajonc & Markus (1982) suggest that an individual can take action based on an emotional feeling, that is without or with just a low level of cognitive activity. This suggestion is in line with Mehrabian and Russell (1974) who proposed that emotions intervene environmental stimuli and approach/avoidance intentions. Also, within the field of retailing research it is well established that retailers manipulate the physical environment to create specific emotional reactions among customers. The reason is that positive emotions might positively affect consumer purchase behaviour (Kotler, 1974; Barbin & Darden, 1996). Vroon (1995) posits that a person's response to a perceived scent may follow a non-cognitive pattern. Like taste, scent is most often perceived in the human brain holistically and may not be subject to cognition unless unexpected stimuli are perceived. According to Vroon the fact that we lack an adequate language to describe odours (and tastes) indicate that cognition is

seldom involved. An individual's perception of a scent may therefore differ from the words the individual may choose to describe it. Because of a lack of vocabulary there is a tendency to refer to odours on the basis of objects found in the 'real' world (Milotic, 2003). In a study of mall shoppers Baron (1997) found that the propensity to help a same-sex stranger (retrieving a pen or providing change for a dollar) was significantly larger when these helping opportunities took place in the presence of pleasant ambient odours (e.g., baking cookies, roasting coffee) than in the absence of such odours. At the same time, respondents also reported significantly higher levels of positive affect in the presence of pleasant odours. In hierarchy 2, a path from arousal to pleasure is expected. This expectation is based on previous research (e.g., Chebat and Michon, 2003), which has shown that arousal may stimulate pleasure. The link between arousal and pleasure is also included in hierarchies 4-5.

Hierarchy three: scent → cognition → behaviour

Hierarchy three proposes that scent influence behaviour through consumer cognition. Figure 3 displays hierarchy 3.

Figure 3. Hierarchy 3 (scent → cognition → behaviour) displayed.



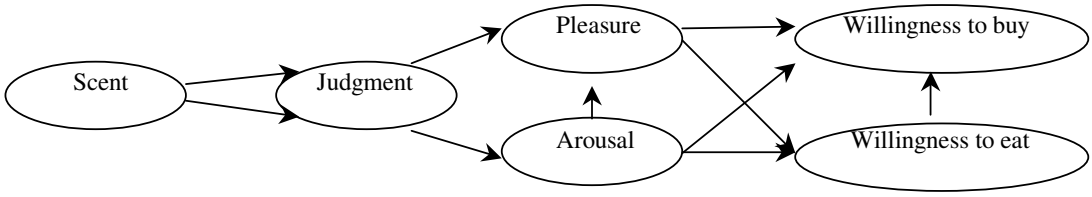
Evidence for hierarchy three: The view that cognitions may take place as a result of exposure to scent receives support from Baron and Bronfen (1994) who found an increase in the performances of difficult cognitive tasks when diffusing a pleasant perfume. Laird (1932) found that scent directly affected female consumers' perception of a product's quality. In an experimental setting 50% of subjects preferred narcissus scented socks while only 8% preferred the unscented socks. In another study, simulating a driving task, Baron and Kalsher (1998) found that in the absence of other sources of positive affect, exposure to a pleasant fragrance can enhance some aspects of driving performance. Theoretical support for hierarchy 3 can also be derived from cue utilization theory (Olson & Jacoby, 1972; Richardson et al., 1994). Consumers are frequently faced with judging the quality of various products (i.e., a

cognitive task), when determing what to buy, in what amount. It may, however, be difficult for consumers to assess the importance of various quality-aspects in relation to each other and in relation to requirements rooted in the intended use of the products. Therefore, consumers are often faced with uncertainty when making judgments of the quality of products. However, the consumer may neither have the time nor the motivation to engage in extensive comparisons of the considered products. According to cue utilization theory consumers may try to overcome their uncertainty and the lack of information by selecting one or more indicators (e.g., price, country-of-origin, and *scent*) as a basis for their assessment of the quality of the product.

Hierarchy four: scent → cognition → emotion → behaviour

Hierarchy four suggests that scent influences consumer cognition, which in turn influences emotion, which in turn influences behavioural response. Hierarchy 4 is displayed in Figure 4.

Figure 4. Hierarchy 4 (scent → cognition → emotions → behaviour) displayed.

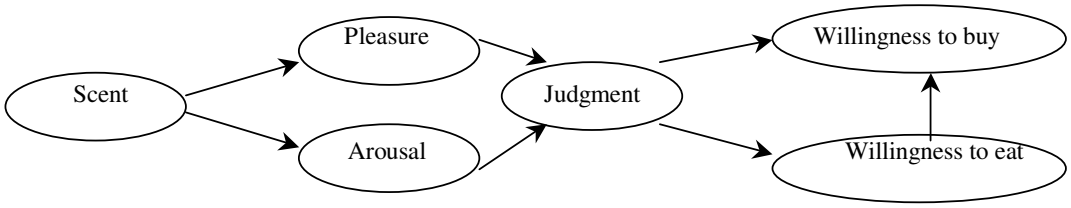


Evidence for hierarchy four: Chebat and Michon (2003) test the capability of two competitive causal theories in explaining the impact of ambient odours on mall shoppers' emotions, cognition, and spending (behaviour). The first theory (conceptualized as a emotion-cognition-behaviour hierarchy) is based on the propositions made by Zanjonc and Marcus (1984). The second theory (conceptualized as a cognition-emotion-behaviour hierarchy) is supported by Lazarus' (1991) cognitive theory of emotions. The findings obtained by Chebat and Michon suggest that the cognitive-emotion-behaviour hierarchy provides the best fit to the data and best explains the effect of ambient scent. In the study, odours had a significant influence on mall shoppers' perceptions of the cognitive constructs 'product quality' and 'shopping environment' which in turn affected shoppers' emotions. Chebat and Michon also found that emotion significantly affected shoppers' spending behaviour although this effect was relatively weak.

Hierarchy five: scent → emotions → cognitions → behaviour

Hierarchy five posits that scent influences consumer emotions, which in turn influences cognition, which in turn influences behavioural response. Figure 5 displays hierarchy 5.

Figure 5. Hierarchy 5 (scent → emotions → cognition → behaviour) displayed.



Evidence for hierarchy five: Positive feelings can make one kinder, more generous, more resistant to temptation, and more willing to delay self-rewards (Swinyard, 1993). Also, previous research (Isen et al., 1978; Srull, 1983) suggests that individuals in positive-mood states evaluate (cognition) stimuli more positively than individuals in neutral- or negative-mood states.

Research questions

Lin (2004) proposes that "the debate among researchers regarding whether cognition precedes emotion or emotion precedes cognition in individuals' evaluation process still remains unresolved and ambiguous" (p. 163). In fact, evidence for several hierarchies of effect can be detected in the literature as emphasized above. In this paper, the purpose is to investigate which of the five developed hierarchies best explains consumer response to scented food products. The specific research questions to be explored are outlined below:

Research questions

RQ1a: To what degrees will the five hierarchies of effects outlined above reflect consumer mental and behavioural responses to a scented food product?

RQ1b: Will one, or some, of the five hierarchies of effects outlined above be superior to its competing hierarchies (i.e., provide a better fit to the data)?

As noted by Guégen and Petr (2005), scent appears to be relevant in relation to two forms of consumption: product evaluation (for example scented products) and sale's environment (for example ambient aroma). This study deals with a (experimentally manipulated) scented food product. Because the purpose of this paper is to explore the causal effects of scent, we want to ensure that the effect of scent will step forward if it occurs. It was therefore important that we could effectively control all other factors than the manipulated in order to avoid the effect of scent to be moderated by other atmospheric elements.

Methodology

Experimental design

241 graduate students at a large Danish business school participated in the experiment. In the experiment, scent type was manipulated as a between subjects factor, with subjects randomly assigned to either a congruent (n=80), an incongruent (n=77) or an unscented (n=84) condition. The product used in the experiment was potato chips. In the experiment, the congruent scent was a 'potato chips odour' and the incongruent scent was a 'grape fruit odour' (which is known to be pleasant to most people). An expert in the field developed both odours, which during the experiment were sprayed homogeneously on the package of the potato chips. Each respondent was exposed to a new package. Several criteria guided the selection of the food product: (1) At the time of the experiment, the product ('Kims Indian Summer Chips') was at the introductory stage in the Danish marketplace and was not well known among consumers. We wished to avoid well known and established product-brands in the study since respondents may already have gained experiences towards such brands and may therefore 'know' the performance of the products in advance (Andrews & Valenzi, 1971; Render & O'Connor, 1976; Dodds, 1991). (2) The product should not require any complex cooking procedures so that the manipulated odours could realistically be transferred to a desire (or no desire) to eat the product (i.e., approach/avoidance). (3) The product used should have a product-specific odour. That is, most consumers should relate the (congruent) odour to the product and not to other kinds of products. (4) Respondents should be presented to a product, which has the potential of evoking both cognitive and emotional reactions. As suggested by Zajonc and Marcus (1982) this condition is fulfilled with a food product: "one of the clearest manifestations of the puzzling interplay of cognitive and affective influences is found in food preferences" (p. 123).

Procedure

One at the time subjects were welcomed and were guided to a neutral room containing two chairs, one table with a package of chips (either congruent scented, non-congruent scented or not scented), and a shelf comprising additional ten packages of chips. The package was sprayed (for the congruent and non-congruent scent conditions) before the respondent entered the room so that s/he would not be alert to the role of scent in the experiment. Before a new respondent entered the room in which the experiments were conducted, the room was very carefully aired to ensure homogeneous input treatments across respondents. After the respondent was seated s/he was asked to take a look at the package of chips found on the table. Like in a potential buying situation the respondent was allowed to touch the package. A new package of chips was utilized for every new respondent to ensure homogenous treatments within experimental cells. After evaluating the chips product, the respondent was asked to complete a questionnaire comprising the constructs applied in this study. During the completion of the questionnaire the respondent was seated with the manipulated chips package in front of her/him, to ensure that the respondent was continuously exposed to the manipulated odour.

Measurements

Multiple-item scales were constructed for all the latent metric variables (emotions, cognition, and behaviour) applied in this study.

Emotions: Consumer research has produced a number of scales for the measuring of consumer emotions, among these Izard's (1977) Differential Emotions Scale (DES) which includes ten emotional emotions (interest, enjoyment, surprise, distress, anger, disgust, contempt, fear, shame/shyness, and guilt) and Mehrabian and Russel's (1974) PAD-Scale which includes three, more general emotional dimensions: pleasure, arousal, and dominance. In the present study the pleasure and arousal dimensions of Mehrabian and Russel's PAD-Scale were used to represent emotions. Other researchers (e.g., Chebat and Michon, 2003) have recently used these dimensions of the PAD-Scale successfully in relation to experiments dealing with manipulations of scent.

Cognition: It was important that the measurement apparatus employed reflected cognition and not emotions. A cognitive construct can be understood as one that reflects persons' ability and/or propensity to perceive, analyze, evaluate and memorize. Product quality has been

viewed by many researchers (e.g., Steenkamp, 1989) as a cognitive, evaluative construct. Chebat and Michon (2003) have used 'product quality' to represent a cognitive construct in their study of consumers' reactions to ambient scent. Guided by such suggestions, as well as by the notion that cognition implies thinking (opinions) and judgment, we developed a latent variable (labelled 'product judgment') to represent consumer cognitive response to the manipulated chips product. Three items measured product judgment: (a) *Perceived quality* (measured on a 7-point Likert scale). (b) *Product evaluation* (measured by exposing respondents to the following statement: 'In my opinion this products is…' Respondents' response was measured on a 7-point semantic scale with end-points 'very bad' and 'very good', respectively). (c) Respondents exposure to the following statement: 'When compared to similar products I find this product…' measured *relative product evaluation*. A 7-point semantic scale ranging from 'much worse' to 'much better' captured respondents' response.

Approach-avoidance behaviour: Behavioural response was split into two types: (a) willingness to eat the food product and (b) willingness to buy the food product. Three items, each measured on a 7-point Likert scale, captured *willingness to eat*: 'I would like to eat this product', 'this product has an appetizing appearance', and 'this product has a good taste'. *Willingness to buy* was measured by three items: 'I would like to buy this product' (measured on a 7-point Likert scale). 'When compared to snack products in general it is …[(1) much more unlikely to (7) much more likely]…that I would buy this product. 'When compared to other kinds of chips products is…[(1) much more unlikely to (7) much more likely]…that I would buy this product.

Pretest

Olfactory stimuli are likely to follow an inverted U-shape function; as odours get more intense, reactions tend to become more negative (Spangenberg et al., 1996; Henion, 1971; Chebat and Michon, 2003; Bone and Ellen, 1999). That is, an odour in low concentrations may invoke a pleasant feeling while the same odour in high concentrations may be considered nauseating. It was therefore important that the concentration of scent used in the experiments was balanced so that it would reach the olfactory system - but not to a degree where it might cause negative reactions. The following precautions were taken to ensure this. First, an expert in the field (an experienced developer of odours) developed both odours (chips-scent and grapefruit-scent) and provided guidance as to what concentration would be appropriate (during the experiments the scents were sprayed homogeneously on the packages of the

potato chips using an advanced instrument). Second, a pre-test involving ten additional students (unrelated to the main sample and instructed not to reveal their participation) were exposed to the suggested concentration of chips-scent and grape-fruit scent, respectively, and asked for their opinions. All respondents were capable of sensing the concentrations when sprayed on the chips-package, and also agreed that the concentrations were fairly low and unlikely to invoke negative feelings.

Results

Each of the five hierarchies outlined above were translated into a structural equation model consisting of a measurement part (confirmatory factor analysis) and a structural equation part (simultaneous linear regression). Structural equation modelling was chosen because it can estimate simultaneously interrelated variables and mediating effects and thus is suitable for testing the causal effects included in the developed hierarchies. Furthermore, structural equation modelling can account for measurement error in the estimation process while MANOVA and regression analysis cannot (Hair et al., 1998). For the purpose of keeping the number of items to a manageable size (Mehrabian and Russell's operationalizations of pleasure-feeling and arousal comprise each six items), exploratory factor analysis was initially conducted in order to detect the most relevant items (indicator variables) to be included in the structural models.

Exploratory factor analysis

The exploratory factor analysis helped reducing each of the applied scales to a maximum of three items, which is considered suitable for structural equation modelling (e.g., Hair et al., 1998). The result of the exploratory factor analysis indicates that pleasure-feeling and arousal could each be represented by three items in the study (Table 1).

Table 1. Exploratory factor analysis – scale items and factor loadings

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Pleasure-feeling					
Unhappy/happy		**,843**			
Unsatisfied/satisfied		**,855**		,200	
Annoyed/pleased		**,768**		,106	
Arousal					
Calm/excited		,331		**,824**	
Wide-awake/sleepy				**,910**	
Relaxed/stimulated		,495	-,113	**,542**	
Willingness to buy					
Compared to snacks in general	**,874**		,185		,211
Compared to other kinds of chips	**,917**				,217
Willingness to eat					
Good taste	**,505**		**,713**		
Appetizing appearance	,279		**,861**		,134
Like to eat	,264		**,847**	,117	,128
Product judgment					
Low/high quality	,149		,117		**,916**
Good/bad product	,510		,346		**,610**
Better/worse than similar products	,408		,154		**,787**

Notes
For each construct, the three (if possible) largest loadings (>0.5) have been selected.
Loadings <0.10 are suppressed.

Because of a detected low item-total correlation 'willingness to buy' was reduced to two items. 'Willingness to eat' and 'product judgment' are both represented by three items although one item (good taste) loads high on both 'willingness to buy' and 'willingness to eat'. However, since the highest loading is on 'willingness to eat' (as expected) we do not regard this to be a problem, which could invalidate discriminant validity in the subsequent analysis. A separate test of discriminant validity is conducted below.

Measurement models

The five developed effect hierarchies imply that four measurement models should be tested: one model containing the latent behaviour variables (hierarchy one), one model containing the latent variables behaviour and emotion (hierarchy two), one model containing the latent variables cognition and behaviour (hierarchy three), and one model containing the latent variables cognition, emotion, and behaviour (hierarchies four and five). Scent type is treated as dummy variables and is therefore not included in the analyses of the measurement models. Bagozzi (1994) and Bagozzi and Yi (1989) have suggested the use of dummy variables with

structural equation models in experimental designs. The technique has recently been used by e.g. Chebat and Michon (2003) and Michon et al. (2005) in relation to experimental data concerning scent. The results of the measurements models, including the standardized factor loadings, construct reliabilities, and proportion of extracted variance, are displayed in Table 2.

Table 2. Confirmatory analyses results

		Standardized Factor Loading [a]				Construct Reliability [b]				Extracted Variance [c]			
		M1	M2	M3	M4	M1	M2	M3	M4	M1	M2	M3	M4
Construct/Indicator													
Willingness to buy						.92	.92	.92	.93	.85	.85	.86	.87
	X1	.97	.96	.95	.96								
	X2	.87	.88	.90	.91								
Willingness to eat						.83	.83	.83	.83	.62	.62	.62	.61
	X3	.77	.78	.78	.77								
	X4	.81	.81	.80	.80								
	X5	.78	.78	.78	.78								
Pleasure							.81		.81		.59		.60
	X6		.75		.75								
	X7		.91		.93								
	X8		.61		.61								
Arousal							.77		.78		.54		.55
	X9		.90		.90								
	X10		.54		.55								
	X11		.72		.73								
Product judgment								.76	.76			.53	.53
	X12			.53	.53								
	X13			.69	.69								
	X14			.91	.91								

Notes

[a] The first item for each construct was set to 1. All factor loadings were significant at the 0.01 level.

[b] Calculated as $\frac{\sum(\text{Std. Loadings})^2}{\sum(\text{Std. Loadings})^2 + \sum\xi_i}$

[c] Calculated as $\frac{\sum\text{Std. Loadings}^2}{\sum\text{Std. Loadings}^2 + \sum\xi_i}$

M1 represents hierarchy 1, M2 represents hierarchy 2, M3 represents hierarchy 3, M4 represents hierarchies 4 and 5.

All factor loadings were significant ($p<0.01$), which demonstrated that the chosen generic questions for each latent variable reflect a single underlying construct. The reliabilities and variance extracted for each variable indicated that the model was reliable and valid. All composite reliabilities exceeded 0.70 and the variance-extracted estimates were all above 0.50. The reliabilities and variance were computed using indicator standardized loadings and

measurement errors (Hair et al., 1998; Shim et al., 2000). All items loaded significantly (t-value>1.96) on their corresponding latent construct, which indicated that convergent validity was obtained. These initial model considerations indicate that the constructs do exist and that they are tapped by the measures used. The measurement models fit well to the data. The comparative fit index was for all measurement models above the recommended threshold of 0.90 for a satisfactory goodness of fit (Bentler, 1992). Also, the point estimates of RMSEA were in all cases <0.08, which is below the recommended level of 0.08. Hence, we can conclude that the unidimensionality criterion is satisfied (Frambach et al., 2003).

Discriminant validity of the applied constructs was tested applying the approach proposed by Fornell and Larcker (1981). In Table 3 the diagonals represent the variance extracted for each construct (represented by measurement model 4) as reported in Table 2.

Table 3. Discriminant validity of constructs

Construct	1	2	3	4	5
1. Willingness to buy	0.87				
2. Willingness to eat	0.45	0.61			
3. Pleasure	<0.01	<0.01	0.60		
4. Arousal	<0.01	<0.01	0.29	0.55	
5. Product judgment	0.38	0.27	<0.01	<0.01	0.53

Notes
Diagonals represent average amount of extracted variance for each construct
(M4, refer to Table 2, is used as a representative for the extracted variance).
Non-diagonals represent the shared variance between constructs
(calculated as the squares of correlations between constructs).

The other entries represent the squares of correlations among constructs. An examination of the matrix displayed in Table 3 shows that all non-diagonal entries do not exceed the diagonals of the specific constructs and we therefore conclude that sufficient discriminant validity exists between constructs.

Fit of the structural models

The results of the structural equation modeling revealed that the maximum likelihood estimated χ^2 for all the estimated models (models 1-5, representing hierarchies 1-5) had a p-value <0.01 indicating that the models fail to fit in an absolute sense. However, primarily

because of the categorical variables non-normality was detected in the dataset. The effect of violating the assumption of non-normality is that the chi-square is too large (so too many models are rejected). Hence, the Bollen-Stine bootstrap was performed to correct for non-normality in the underlying dataset. This method does not require distributional assumptions (although it does require independent observations). When corrected for non-normality, the obtained *p*-values of overall model fit were 0.044 (model 1), 0.063 (model 2), <0.01 (model 3), 0.042 (model 4), and 0.047 (model 5) (Table 4).

Table 4. Model Comparisons and Fit Measures

Model	Average χ^2	Df	χ^2/DF	GFI	CFI	RMSEA
Hierarchy 1 (scent→behaviour)	10.10	10	1.01	0.93	0.93	0.152
Hierarchy 2 (scent→emotions→behaviour)	96.99	56	1.73	0.91	0.93	0.077
Hierarchy 3 (scent →cognition→behaviour)	38.12	31	1.23	0.89	0.90	0.124
Hierarchy 4 (scent→cognition→emotions→beh.)	103.47	95	1.09	0.87	0.88	0.115
Hierarchy 5 (scent→emotions→cognition→beh.)	106.30	95	1.12	0.88	0.91	0.082

These results indicate that only model 2 ($p>0.05$) fits well to the data. However, since the χ^2-test is very powerful, even a good fitting model (i.e., a model with just small discrepancies between observed and predicted covariances) could be rejected. Thus, several writers (e.g., Hair et al., 1998) recommend that the chi-square measure should be complemented with other goodness-of-fit measures.

The values of the goodness of fit index (GFI) were for two of the five estimated models (models 1 and 2) above 0.90, which for these models indicate a good absolute model fit (Bollen and Long, 1993). The values of the comparative fit index (CFI) were above or equal to 0.90 for all the estimated models, with the exception of model 4. However, the point estimate of RMSEA was only for model 2 below the 0.08 threshold (RMSEA=0.077), which for this model indicates a reasonable fit of the model in relation to the degrees of freedom (Bollen and Long, 1993). The value of RMSEA was however close to 0.08 for model 5 (RMSEA=0.082). For the three remaining models, the values of RMSEA were in all cases >0.11, suggesting an unsatisfactory fit in relation to the degrees of freedom for these models.

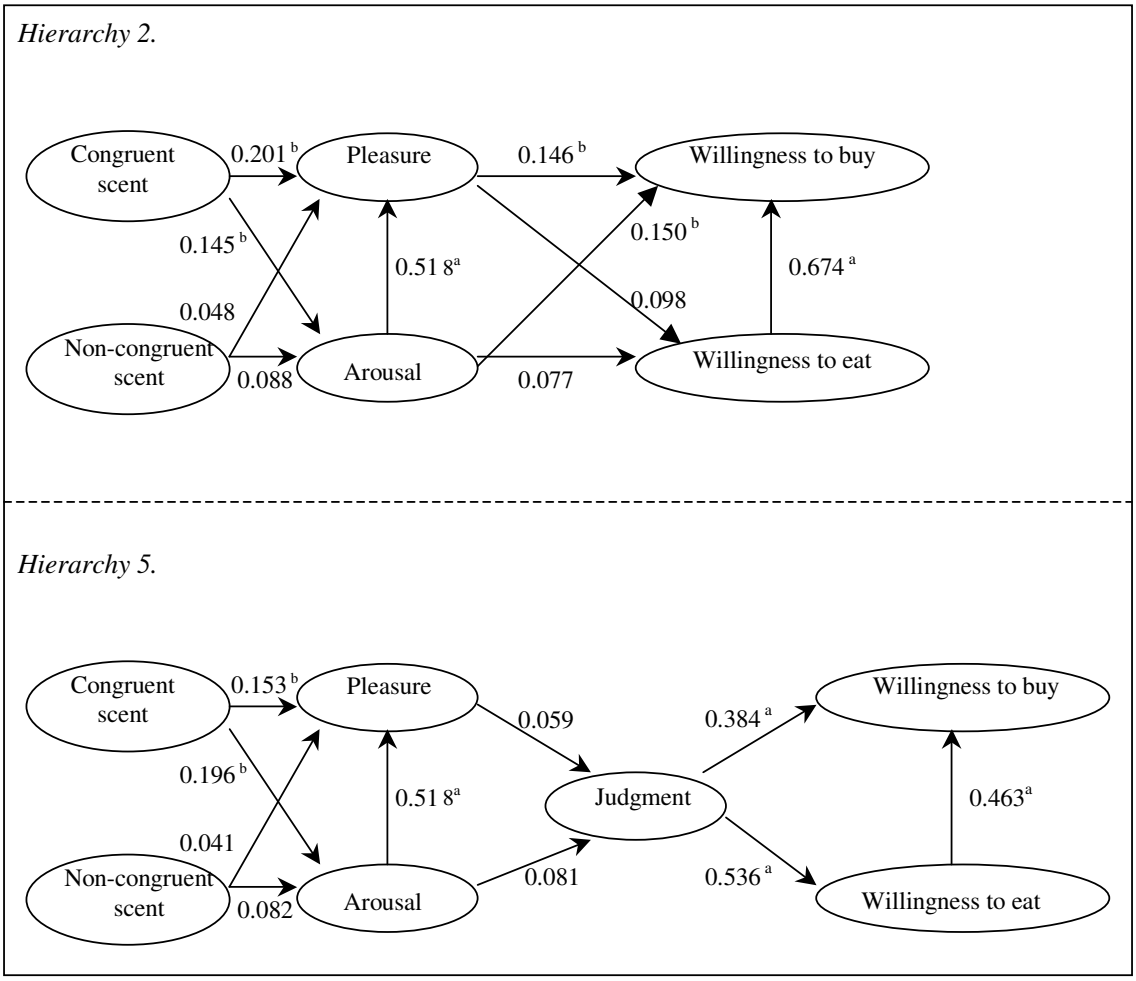
Only model 2 satisfies all the employed criteria for evaluating the structural model fit. However, because model 5 is close to satisfying the criteria we will investigate this model further along with model 2. Since model 2 and 5 are non-nested (i.e., model 2 cannot be

considered to be a special case of model 5 as the latter contains a latent variable, product judgment, which is not included in model 2) a chi-square difference test of the two competing models cannot be applied. Instead, non-nested models may be compared descriptively by examining descriptive model fit statistics such as Akaike's (1970) Information Criterion (AIC) or the Bayesian Information Criterion (BIC); where models with smaller AIC and BIC values fit better. The AIC criterion has previously been used in marketing for the purpose of selecting the model that best describes the structure underlying a dataset (see Kumar and Sashi, 1989). In comparison with AIC, BIC assigns a greater penalty to model complexity, and so has a greater tendency to pick parsimonious models. The values of AIC and BIC for model 2 were 225.00 and 437.32 respectively, while the values of AIC and BIC for model 5 were remarkably larger, namely 334.31 and 591.54, respectively.

These results – along with the evaluation of the p-values related to the Bollen-Stine bootstrap and of the GFI, CFI and RMSEA fit measures - suggest that *model 2* (representing hierarchy 2, refer to Figure 2) provides the best fit to the data and also that this model is more parsimonious than model 5 (representing hierarchy 5).

Figure 6 displays the path diagram for model 2 and (for comparison purposes) also for model 5. To ensure stable probability estimates a large number of bootstrap samples (=3000) were utilized in calculating parameter estimates. Two dummy variables were applied when estimating the structural models. The first dummy variable (labelled congruent scent) was coded as 1 when the chips odour was present and 0 when otherwise. The second dummy variable (labelled non-congruent scent) was coded as 1 when the grape fruit odour was present and 0 when otherwise.

Figure 6. Path results for hierarchies 2 and 5 (standardized coefficients)



Notes
[a] Significant at the 0.01 level.
[b] Significant at the 0.05 level.

In both hierarchies 2 and 5, six of the ten explored relations between constructs turned out to be significant. In *hierarchy 2*, chips-scent (congruent scent) was positively related to arousal (standardized coefficient of 0.145, p-value=0.040) and to pleasure (standardized coefficient of 0.201, p-value=0.013). Arousal positively influenced pleasure (standardized coefficient of 0.518, p-value<0.001) as suggested by previous research. Both arousal (standardized coefficient of 0.150, p-value=0.033) and pleasure (standardized coefficient of 0.146, p-value=0.041) positively influenced willingness to buy but neither of the constructs affected willingness to eat. Also, as expected from previous research, willingness to eat positively

affected willingness to buy (standardized coefficient of 0.674, p-value<0.001). In *hierarchy 5*, chips-scent had positive effects on arousal (standardized coefficient of 0.153, p-value=0.032) and on pleasure (standardized coefficient of 0.196, p-value=0.015). Also, arousal positively affected pleasure (standardized coefficient of 0.518, p-value<0.001). However, neither arousal nor pleasure affected product judgment implying that the emotional and cognitive processes are unrelated. Product judgment showed positive effects on both willingness to buy (standardized coefficient of 0.384, p-value<0.001) and willingness to eat (standardized coefficient of 0.536, p-value<0.001). In hierarchy 5, willingness to eat also positively affected willingness to buy (standardized coefficient of 0.463, p-value<0.001).

Discussion and conclusions

The result from both hierarchies 2 and 5 suggest that only chips scent (congruent scent) has the potential of influencing consumers' pleasure an arousal level. These results receive support from other researchers (e.g., Fiore et al., 2000; Mitchell et al., 1995) who propose that to be effective, odours should be consistent with whatever product is presently under evaluation by the consumer. Thus, the results also confirms the proposition made by other authors (e.g., Bone and Ellen, 1999) that odour will not be perceived by consumers separated from the origin of the odour. In the study, hierarchy 2 turned out to be superior to the other four hierarchies of effect giving support to Mehrabian and Russell (1974) who proposed that intervening between the environmental stimuli and approach/avoidance behaviour are consumers' emotional states. The results of this study suggest that scent, through emotion, can influence a consumer's willingness to make a purchase. The behavioural influence evoked by scent on food products confirms the results obtained by other researchers. For example, Hirsh (1991) found that scent could increase a bakery's sales by as much as 300%.

While the results of this study rejected the propositions derived from Lazarus (1991), they partly supported the emotion-cognition approach proposed by Zajonc (1980) and Zajonc and Marcus (1984, 1985) since Zajonc and Marcus do not regard cognition as a necessary consequence of emotion. It is important to note that hierarchy 2, of course, does not provide a complete list of the aspects that may influence consumers' product approach/avoidance behaviour. This was not our intention. Instead, we propose that hierarchy 2 offers the best explanation (of the explored hierarchies of effect) of the reactions caused by consumers' exposure to a scented food product. Scent showed no effect on the cognitive, evaluative

construct used in this study: product judgment, although product judgment showed significant effects on both willingness to eat and willingness to buy.

These results suggest that respondents may have used other stimuli (e.g., the shape of the package, the brand) when evaluating the product. According to 'cue utilization theory' (Olson & Jacoby, 1972; Richardson et al., 1994) consumers may use one or more indicators (cues/stimuli) as a basis for judging the quality of the product if the quality cannot be assessed directly. Research on cue utilization theory has revealed a number of cues, which may be used by consumers as indicators of quality, including 'country-of-origin' (Eliot & Cameron, 1994; Peterson & Jolibert, 1995), 'product composition' (Olson, 1972), 'brand name' (Dodds, 1991), 'store name' (Dodds, 1991; Dodds, 1995), and 'price' (Leavitt, 1954; Shapiro, 1973; Brooker et al., 1986). But the results of the present study suggest that 'scent' should not be added to the list of cues that potentially would affect perceived quality/product judgment, neither indirectly through emotions (refer to hierarchy 5) nor directly (refer to the rejection of hierarchies 3 and 4).

Limitations

As a consequence of the purpose of this paper (to investigate possible causal effects of scent on consumer emotions, cognition and behaviour), this paper prioritizes internal validity at the expense of external validity. This means that when transferred to a more 'real-life' setting the results obtained in this paper may be moderated by the presence of other stimuli. For example, in a study of the influence of ambient scent and retail density Michon et al. (2005) discovered that the relationship between ambient odours and mall perception adopts an inverted U shape. Ambient odours positively influence shoppers' perceptions only under the medium retail density condition.

This research concentrated on analysing one food product, potato chips. This could mean that the results may suffer from a lack of generalizability. A large cross-section of products ought to be studied to improve the generalizability of the results. It may also be argued that the respondents were not randomly sampled from a 'true' population of consumers and that the results therefore suffer from a lack of external validity. However, it should be recalled that external validity can hardly be achieved in a single study (Derbaix and Pham, 1991). Also, Sternthal et al. (1994) argue that when one is interested in detecting causal relationships "a

homogeneous sample [e.g., students] is the prefered option…this increases the likelihood that the causal relations of interest will be observed when they exist" (pp. 208-209).

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