






Invited review

Packaging, perception, and acceptability: a comprehensive exploration of extrinsic attributes and consumer behaviours in novel food product systems

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Summary In today's global markets, the constant arrival of new products represents a challenge for the food industry to offer distinct choices to consumers, primarily due to the parallel sensory attributes and pricing structures of the available food options. Innovators must employ methodologies beyond traditional sensory analysis to ensure the product's success. Researchers must, therefore, explore the entire product experience to understand its influence on consumer behaviours. Food choices are multifaceted, influenced by various factors, including individual physiological and psychological characteristics and intrinsic and extrinsic product attributes. As a result, consumers' decisions are shaped by the multisensory information derived from products they encounter in supermarkets. This review aims to comprehensively examine the factors influencing consumer food choices, from initial product encounters to consumption. The review explores the impact of repetitive tasting on the consumer's attitudes and intentions towards novel products. Additionally, the review investigates which extrinsic attributes capture consumer attention in supermarket settings. It also delves into the effects of extrinsic product attributes on both explicit and implicit emotions and expectations raised about the sensory properties of the product and, ultimately, their purchasing behaviours.

Keywords Consumer behaviour, emotions, food choices, intrinsic attributes, packaging material, price tags.

Introduction

Food choice behaviour is a multifaceted phenomenon influenced by individual's physiological (Manippa *et al.*, 2019), psychological (Babic-Zielińska, 2006; Gutjar *et al.*, 2015), and socioeconomic factors (Marsola *et al.*, 2020; Vos *et al.*, 2022) (Fig. 1). The complex interactions among products' intrinsic/extrinsic characteristics, psychological factors, and contextual elements affect food choices significantly. The interplay of these factors needs a multidisciplinary approach to comprehensively understand food choices, a fundamental aspect of human behaviours. Product experience is influenced by extrinsic (packaging colour, packaging material, country-of-origin logo, and price tags) (Heide & Olsen, 2017; Tijssen *et al.*, 2017; Thøgersen *et al.*, 2019; Thomas *et al.*, 2021) and intrinsic factors (such as taste, appearance, and texture)

(Lutter & Nestler, 2009; Hoppert *et al.*, 2012; Santagiuliana *et al.*, 2019), which impact consumer food choices and acceptance.

When consumers are faced with novel products for the first time, they often make decisions based on the visual cues before tasting them (Velasco & Spence, 2019; Bryła, 2021; Baptista & Schifferstein, 2023). Thus, packaging material, colour, and nutritional information significantly influence purchase decisions (Piqueras-Fiszman & Spence, 2015; Luo *et al.*, 2019; Naranjo-Guevara *et al.*, 2023). However, these factors alone do not guarantee repeated purchases of the novel products. Instead, decision-making and acceptance are shaped by multisensory information perceived from the product attributes (Hoppert *et al.*, 2012). This is known as cross-modal correspondence, which refers to how various stimuli and environments influence consumer perception and mental simulation by setting expectations, ultimately impacting food

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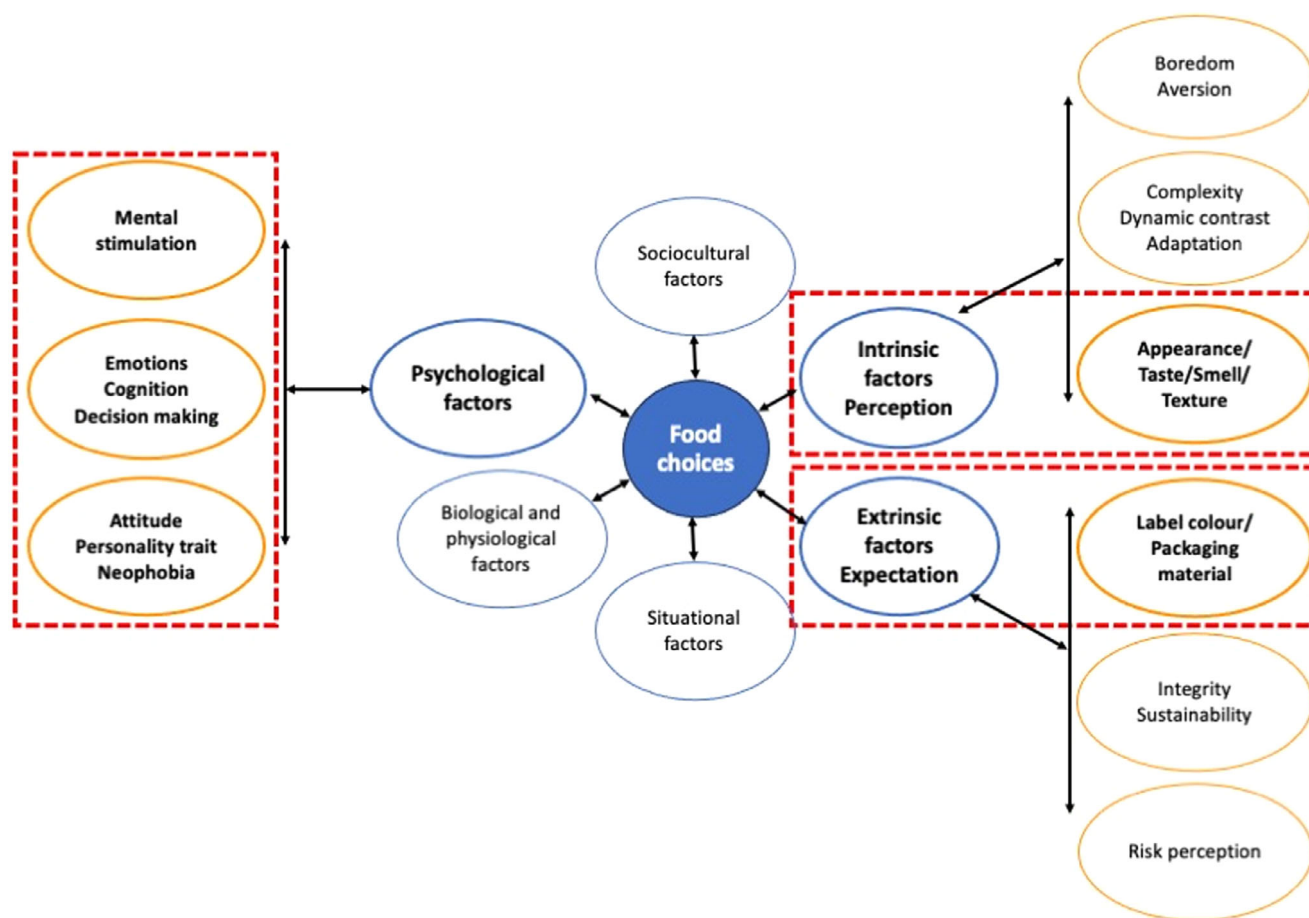


Figure 1 A layout of a consumer food choice behaviour. Adapted from (Ares & Varela, 2018).

choice behaviour and purchase intention (Knoeflerle *et al.*, 2015). Mental stimulation is associated with emotions and affective responses of consumers when they encounter a product. These affective responses can influence the overall product perception, affecting their likelihood to purchase and their expectations for the product's performance.

According to the predictive coding theory of cognition (PCT) (Gładziejewski, 2016), consumers develop expectations based on various product attributes such as colour, material, shape, size, and context. When consumers encounter new food products, their brains recall memories associated with similar products. Then, those memories are compared with the characteristics of the new products. This cognitive process leads to the formation of expectations for the future food experience. The expectations created can significantly influence the consumers' product perception, which affects the overall sensory experience and subsequent behaviours. The relationship between

expectations and flavour perception had been explored in a previous study (Spence *et al.*, 2012). However, many questions remain unanswered, and in-depth research is required to understand the underlying mechanism of perception and behaviours.

The psychology of consumer behaviours towards novel products provides profound insights and an understanding of the factors influencing purchasing decisions. Various approaches within psychology have been employed to comprehend the decision-making process. This approach emphasises the role of mental processes such as perception, memory, attitude, and problem-solving in shaping the decision-making process. The cognitive approach, a prominent facet of cognitive psychology, assigns observed actions (behaviours) to intrapersonal cognition (Bray, 2008). The Theory of Planned Behaviour (D'Souza, 2022) and the Theory of Reasoned Action (Lada *et al.*, 2009) are prominent cognitive models widely used in consumer prospective behavioural studies.

Emotions are multidimensional feelings linked to cognitive appraisals, which drive consumer decision-making (Achar *et al.*, 2016). While Gibson (2006) described emotions as 'short-term affective responses to the appraisal of particular stimuli'. The notion of emotions as drivers for food choices and acceptance is not a novel or contentious concept (Achar *et al.*, 2016). Food-related emotions reflect the same dimensions as liking, such as pleasantness and satisfaction. Food-evoked emotions offer more detailed insights than mere liking; they differentiate products more effectively based on emotional profiles (Prescott, 2017).

The nature of emotions, whether conscious or unconscious, is still debated in emotion theory (Meiselman, 2021). Berridge & Winkielman (2003) stated that emotions are conscious subjective experiences accompanying affective states created by bodily sensations. In contrast, Kihlstrom *et al.* (2000) argued that unconscious emotional responses manifest in experiences, thoughts, and actions without a person's conscious awareness of the state. In consumer science and research, emotions are measured by explicit and implicit methods (Lagast *et al.*, 2017; Spinelli *et al.*, 2019; Spinelli & Jaeger, 2019). Implicit emotions are unconsciously elicited by consumers while interacting with the product and are continuously recorded as the consumer engages with the product. This method involves monitoring non-verbal and indirect indicators such as facial expressions, respiratory patterns, cardiovascular responses, and pupillary reactions (Bradley *et al.*, 2008; Babiker *et al.*, 2013; Jerath & Beveridge, 2020; Mehta *et al.*, 2021). In contrast, explicit responses are not only verbal and self-reported but also susceptible to cognitive biases (Braunstein *et al.*, 2017). For instance, individuals may respond in ways that please the researchers, making the samples have favourable responses (Schouteten, 2021). Capturing facial expressions along with self-reported emotions can be beneficial for obtaining a comprehensive understanding of consumer emotional responses. Facial expressions provide an objective and immediate measure of non-conscious reactions, revealing spontaneous emotions that self-reports may miss. Combining these two methods offers richer insights (Schouteten, 2021), as self-reports capture conscious, reflective feelings (Cardello & Jaeger, 2021), while facial expressions highlight instinctive responses. This dual approach enhances product development and marketing strategies, ultimately leading to more effective and appealing products. Recent studies (Samant *et al.*, 2017; Mehta *et al.*, 2021) have proved that combining emotional measurements of facial expressions with a questionnaire (EsSense25[®]) has increased the predictability of consumer preferences.

Food neophobia represents a personality trait that acts as a psychological barrier that inhibits consumers

from experimenting with novel products. Additional personality traits such as sensation-seeking, sensitivity to core disgust, and food technology phobias are undoubtedly relevant in the broader context of psychological factors. However, our review specifically centres on exploring food neophobia related to novel products derived from waste materials. While these additional traits are important and require further investigation, they lie beyond the scope of our current study. Consequently, comprehending how neophobia influences the acceptance of unfamiliar products has been connected to the sensory perception of foods. Previous research has indicated a negative correlation between food neophobia and food choices linked with repetitive purchasing behaviours (Jaeger *et al.*, 2017, 2021). Therefore, the present study incorporates food neophobia as an additional construct within the Theory of Planned Behaviour framework. Hence, this review aims to comprehensively examine the determinants of consumer choices, such as extrinsic and intrinsic factors, psychological factors, and emotions towards novel products from initial product encounters to consumption.

Before collecting studies relevant to consumer behaviours towards food choices, a detailed search strategy was developed and reviewed. The relevant research articles were gathered from common digital scientific search engines such as Google Scholar, ScienceDirect, and Springer Link. A search string comprising pertinent keywords related to our research questions was utilised, with minor modifications made to adhere to the search protocols of each digital library.

Intrinsic–extrinsic factors and food choices

A product's extrinsic and intrinsic attributes affect consumers' expectations (Acebron & Dopico, 2000; Piqueras-Fiszman & Spence, 2014). Extrinsic cues pertain to elements related to the product but are not physically a part of the product, such as packaging material, colour, country of origin information, and price (Li *et al.*, 2015; Liang *et al.*, 2023). On the other hand, intrinsic factors, such as taste, flavour, and texture, are inherent to the product and cannot be altered without changing the product's physical properties (Brečić *et al.*, 2017). Both extrinsic and intrinsic characteristics significantly influence consumer attitudes and behaviours towards the product's liking and acceptability (Kiloes *et al.*, 2022; Valero-Cases *et al.*, 2023). Additionally, other extrinsic factors, including consumer experiences, needs, and environmental context, play a crucial role in food choices. Future studies can further investigate these factors to provide a more comprehensive understanding.

The influence of extrinsic attributes on sensory perception, liking, and approach-based consumer

behaviours has been the subject of extensive research over the past years (Piqueras-Fiszman & Spence, 2015; Spence, 2018; Thøgersen, 2023). Although food companies heavily invest in designing their product packaging, relatively few studies have been published that measure the effects of packaging characteristics on consumer expectations towards food products. This section critically reviews the studies (Acebron & Dopico, 2000; Ares & Deliza, 2010; Piqueras-Fiszman & Spence, 2015; Husić-Mehmedović *et al.*, 2017; Carvalho & Spence, 2019, 2021; Spence *et al.*, 2019; Bogomolova *et al.*, 2020; Altheimer *et al.*, 2021) that comprehensively understand the impact of the packaging colour, material, country of origin, and price information on food choices. These factors are crucial because they are the first elements consumers notice and interact with when purchasing.

Packaging colour and typography

Consumers often derive sensory and hedonic characteristics about products from their packaging. Besides, consumers often develop brand familiarity with products by forming associations with their packaging features (Gorn *et al.*, 1997; Underwood, 2003; Labrecque & Milne, 2012; Kauppinen-Räsänen, 2014). In this regard, packaging colour is an extrinsic attribute strongly associated with brand awareness. The influence of colour on product perception and consumer behaviour is a multidimensional phenomenon deeply grounded in sensory psychology and consumer research. Colour is a fundamental driver of emotional responses, significantly influencing consumer behaviour and purchase decisions (Bagchi & Cheema, 2013; Schnurr *et al.*, 2017). Colour is an integral component of brand personality (Labrecque & Milne, 2013; Mai *et al.*, 2016), which helps consumers recognise and remember the brand. Various factors, such as contextual appeal, brand name, label design, and font style, are vital in shaping consumers' sensory experiences and preferences. The diverse array of studies summarised in Table 1 underscores the pivotal role of colour (contextual and receptacle) in shaping multisensory flavour perception of food products.

Packaging colour is a visually prominent design element. Packaging colour is often one of the first attributes consumers notice before perceiving other verbal or graphic cues on the packaging. This makes packaging colour a powerful and immediate tool for capturing consumers' attention and shaping the initial perceptions of the product. In one of the earliest studies, Deliza (1996) examined the influence of packaging colour on flavour perception, revealing that orange packaging was linked to a sweeter taste, while white packaging was associated with the perception of fresh and refreshing flavour. Ares & Deliza (2010) conducted a study to

investigate the combined effects of packaging shape (round and angular) and colour (black, white, and yellow) on consumer expectations of milk desserts. Based on word association and conjoint analysis, the participants in Ares & Deliza (2010) study associated terms such as 'sweet', 'delicious', and 'vanilla' with the yellow packaging, 'bitter', 'dark coloured', and 'disgusting taste' with the black packaging, 'runny' with the round package, and 'thick' and 'low calorie' with the square packaging. The participants formed these associations solely based on visual cues from the packaging, without confirming them through the actual tasting of the product. Therefore, further studies were recommended to comprehensively explore the relationship between extrinsic and intrinsic product attributes and their collective influence on consumer product perception.

Huang & Lu (2015) conducted a study examining consumers' inferences regarding the sweetness and healthiness of four food products (ice cream, yoghurt, iced tea, and cereal) based on the packaging colour (red, blue, and green). The results indicated that consumers often associate products in red packaging with sweetness and unhealthiness compared to blue or green packaging products. Interestingly, this influence of packaging colour on product perception was more pronounced among individuals categorised as high external eaters (Brignell *et al.*, 2009).

Packaging comes in a spectrum of distinctive colours, which are composed of three primary components: hue (the broad colour category, such as blue, green, or red), brightness (the amount of black or white in the hue), and saturation (the intensity of the hue) (Wexner, 1954; Wright & Rainwater, 1962; Clarke & Costall, 2008; Kauppinen-Räsänen & Luomala, 2010). Minor variations in any of these components can lead to changes in consumer's perceptions of the product, as demonstrated in the subsequent studies (Schulte-Holierhoek *et al.*, 2017; Tijssen *et al.*, 2017, 2019).

Tijssen *et al.* (2017) delved into the impact of packaging hue (green, blue, and red), brightness, and saturation on consumer's expected and perceived perceptions of the healthiness, attractiveness, and sensory properties of products (low-sugar dairy drinks and low-fat sausage). The study revealed that all dimensions of colour (hue, brightness, and saturation) jointly affected product perception. Participants expected low-sugar yoghurt to be sweeter and creamier from red packaging than from blue packaging. At the same time, low-fat sausages were anticipated to be fattier and more flavourful in red packaging. The reduction in brightness was associated with an increased perception of sweetness, a finding also supported by Schulte-Holierhoek *et al.* (2017).

Various other studies have also reported cross-modal correspondence between the colour and product

Table 1 Effect of colour on consumer perception of the product

Author(s) (year)	Product	Receptacle	Methods	Features	Findings
da Fonseca <i>et al.</i> (2023)	Plant-based hamburgers	Packaging	Survey Word-association methodology	Neutral colours (black and white), cool (green, blue and lilac), warm (red, yellow, and magenta) Shape and colour	Green, yellow, and white packaging attracted maximum attention and raised emotions related to health, nature, quality, and nutritional value
Veften <i>et al.</i> (2023)	Cheese	Packaging	Online survey		The mild taste was associated with round shape, high colour brightness, and low saturation while sharp taste was associated with triangular shape and low colour brightness
Sant'Anna <i>et al.</i> (2022)	Coffee	Packaging	Free word associations	Warm colours (black, red, green, and dark blue) and cool colours (white, light blue, pink, and yellow)	The consumers preferred black, red, and green colour for the coffee packaging while pink, light, and dark blue were rejected for coffee packaging
Carvalho & Spence (2021)	Brazilian coffee and Kenyan coffee	Cups	10-cm visual analogue scales (VAS) anchored at 0 (not at all) and 10 (very)	Metallic-coated ceramic cups (white, platinum, bronze, and gold)	High sensory and hedonic liking of Brazilian coffee from a bronze cup and Kenyan coffee from a gold cup Experts perceived both coffees to be sweet from a bronze cup Experts and consumers prefer Brazilian coffee from a bronze cup based on elegance Kenyan coffee was perceived as more elegant if served in white cups (by experts) and gold cups (by consumers)
Martinez <i>et al.</i> (2021)	Chocolate and soap	Supermarket	Attractiveness and purchase intention (7-point Likert scale)	Orange, blue, red, and beige background	Red and orange colours were preferred for both the products
Kpessa & Lick (2020)	Macarons (green, pink, light brown, dark brown, yellow and off-white)	Plates	9-point hedonic scale (hedonic properties) 11-point probability scale (purchase intention)	White and black	The perception of sensory attributes, hedonic liking, and purchase intention was higher in the tasting session than in the expectation session Participants perceived dark brown macaron greasier on a white plate in both sessions
Li <i>et al.</i> (2020)	Green tea	Teaware	7-point Likert scale	White British tea set and Chinese tea set with blue floral design on white	Pink and light brown macarons were perceived to be greasier on a black plate in the expectation session than in the tasting session No significant difference in purchase intention based on plate ware The tea ware influenced the expected astringency and bitterness of tea
Carvalho & Spence (2019)	Brazilian coffee (sweet) and Kenyan coffee (acidic)	Cups	10-cm visual analogue scale anchored at 0 (not at all) and 10 (very)	White, pink, yellow, and green	Tea ware affected the pleasantness Price information had eliminated the teaware effect In the pre-tasting session, participants rated coffee as sweet from a pink cup and sour from a green cup In the post-tasting session, the participants found Kenyan coffee to be more acidic from a pink cup, resulting in less liking Kenyan coffee from an incongruent combination

Table 1 (Continued)

Author(s) (year)	Product	Receptacle	Methods	Features	Findings
Merlo et al. (2019a)	Hamburgers	Packaging	Temporal dominance of emotions	Red, white, and green	Packaging colour have a significant influence on the dynamic perception of emotions during 'packaging-consumer' interaction
Mielby et al. (2018)	Non-alcoholic beer (grapefruit, lemon, or raspberry)	Plastic cups	9-point hedonic scale	Red and black	Overall liking and carbonation were perceived more from the red cup than from the black cup
Rebollar et al. (2017)	Yoghurt	Supermarket	Sensory (sweet), non-sensory attributes (healthy, natural, and quality) and willingness to buy (7-point Likert scale)	Low and high illumination	In low illumination, the product was perceived as healthier In high illumination, the product was perceived to be sweeter by female participants
Tu et al. (2016)	Spicy bean curd	Plates	9-point rating scale	Red, yellow, green, or white	Participants expected spicy bean curd to be spicier from red and yellow plates
Risso et al. (2015)	Mineral water (natural, slightly carbonated, and carbonated)	Plastic cups	150 mm long visual analogue scale (VAS)	White, red, and blue	The participants perceived mineral water to be more carbonated in a red or blue cup than in a white cup In the expectation session, water was perceived as fresh when served from a white cup In the tasting session, participants prefer a white cup for still water and a red or blue cup for carbonated water
Van Doorn et al. (2014)	Café latte	Mug	10-cm-long visual analogue scales	Transparent, white, and blue	The flavour intensity and sweetness were perceived more when served in a white mug No significant difference in sensory properties was found in the case of the transparent and blue mug

category (Clydesdale *et al.*, 1992; Gilbert *et al.*, 1996; Zellner & Durlach, 2002). Consumers often associate the packaging colour with the product's taste, such as brown to chocolate or caramel and red to cinnamon (Gilbert *et al.*, 1996). Zellner *et al.* (2018) found that the colour of foil paper used in the packaging influenced flavour expectations. Participants consistently associated orange foil with orange flavour and red with cherry flavour across various product categories. However, responses varied for green, participants expected mint flavour for candy but anticipated lemony or lime flavour for beverages in green packaging.

In a study by Baptista *et al.* (2021), the impact of different packaging colours on the sensory expectations and overall liking of milk and dark chocolates in France and Brazil was investigated. The survey results revealed that the consumers perceived chocolate as sweet, fruity, and less bitter when presented in pink and yellow packages. Conversely, the chocolate in black packages was perceived as bitter. These findings align with the concept of congruency between the product and packaging colour, where chocolate in brown packaging was perceived to be sweet, less bitter, and highly liked. The study's findings also agreed with previous studies (Deliza *et al.*, 2003; Hutchings, 2003), emphasising the role of packaging colour in shaping consumer expectations.

Typography undoubtedly constitutes a crucial element of multisensory packaging design. It assumes diverse forms and imparts information about the product that extends beyond the actual semantic context of the text (Velasco *et al.*, 2015b; Spence *et al.*, 2019). In the context of consumer behaviour, consumers tend to perceive fonts to be more fitting to a product when the product and font share the same connotative meaning, as assessed through the semantic differential technique (Osgood *et al.*, 1957). Moreover, semantic appropriateness and congruency significantly affect consumer preferences and decision-making behaviour. Numerous studies have focused on the connection between various font styles and sensory properties (Ngo *et al.*, 2012; Barnett *et al.*, 2016; Schroll *et al.*, 2018), but no research has been conducted to understand the impact of font colour on the sensory properties and overall liking of the product. Ngo *et al.* (2012) proposed that the typeface's effect extends beyond the words' semantic content. It communicates information about the product's sensory properties, influencing brand perception and liking (Velasco *et al.*, 2014).

Previous studies have evaluated the association between typeface and sensory properties. For instance, rounded typefaces were associated with the perception of sweetness, whereas angular typefaces were linked with perceptions of sourness (Velasco *et al.*, 2014, 2015a). However, in the case of mate soft drinks (Machiels, 2018) and coffee (de Sousa *et al.*, 2020), no

such associations between round typefaces and sweetness were identified, which contradicted the earlier findings. It is worth noting that a hand-written typeface fosters greater emotional attachment than a machine-written typeface, which can lead to higher purchase intentions (Schroll *et al.*, 2018). All these findings collectively suggest the importance of conducting more comprehensive research into typography (such as colour as an independent variable) that can significantly influence the product perception and purchase decisions.

Packaging material and shapes

Packaging materials and shapes are important attributes that profoundly influence consumers' purchasing decisions (Delić *et al.*, 2018; Poslon *et al.*, 2021; Liang *et al.*, 2023). Food packaging performs essential functions, such as containment, storage, transportation, and protection (Yam & Lee, 2012). Food packaging can be a decisive factor in swaying consumers towards purchasing. Limited studies have been conducted to understand the effects of packaging materials on attracting consumer attention and heightening their expectations in supermarket environments. Recent advancements in packaging technology, including biodegradable food packaging (Aduri *et al.*, 2019; Hasanin *et al.*, 2023; Khandeparkar *et al.*, 2024), nano-materials active food packaging (Barage *et al.*, 2022; Hasanin & Youssef, 2022; Hashem *et al.*, 2023; Peng *et al.*, 2024) and intelligent packaging (Crosby & Netravali, 2022; Hakami *et al.*, 2022; Cunha & Mazieri, 2024; Hasanin & Abdelkhalek, 2024; Hasanin *et al.*, 2024), are making significant strides in the competitive market. However, these innovative packaging solutions are not the focus of the current review. This review specifically addresses the conventional packaging materials commonly used in the beverage industry. It delves into how these traditional packaging options influence consumer perceptions and expectations, particularly regarding sensory attributes. Future research is needed to assess the impact of these emerging packaging technologies on product quality, consumer preferences, and overall sustainability.

In a study conducted by Kobayashi *et al.* (2015), two different types of packaging materials were examined in the context of coffee products: refill packets and glass bottles with different shapes and colours. The study revealed a significant impact of packaging material on purchase intention, indicating a preference for glass jars with cylindrical shapes over other packaging. However, the study also considered other attributes such as price, colour, shape, and brand identity. The study's findings primarily focused on the collective impact of all these parameters rather than specifically isolating the influence of a single packaging parameter.

Similarly, another study evaluated the effects of beer packaging on participants' acceptability. Beer samples

were served from two packaging materials, a glass bottle, and an aluminium can. Participants were asked to evaluate the taste and overall liking in informed (with the addition of the packaging information) and blind (no packaging information was included) sessions (Barnett *et al.*, 2016). Beer samples poured from a glass bottle were more acceptable to consumers than canned samples. On the other hand, no differences in taste were reported when tasting the same beers in the blind session. The impact of different packaging materials [glass, paperboard, translucent HDPE (high-density polyethylene), white HDPE, yellow HDPE, and white PET (polyethylene terephthalate)] on the consumer approach-based behaviours was studied in milk products (Clark *et al.*, 2021). This study reported that emotions were the discriminating factor in separating consumer's liking and purchase intention. A drawback of this study was that tasting was not conducted; therefore, the connection between taste and consumer packaging perception was not measured.

Lefebvre & Orłowski (2019) conducted a study investigating the impact of beverage packaging materials on sensory properties and overall liking in both virtual environments and controlled laboratory settings. The findings revealed that, following the exposure to images of various beverage vessels, consumers had lower expectations for the taste when the product was presented in aluminium packaging compared to other types of vessels. A similar pattern was observed in the tasting session, where participants exhibited a lower liking of the beverage after tasting from the aluminium can compared to that of the glass bottle and the cup. A drawback of this experiment is that participants did not physically interact with the packaging. Consumers typically have tactile contact with the packaging before tasting the products. This aspect is essential for future studies since haptic-tactile sensations influence taste perception (Spence & Van Doorn, 2017).

Country of origin logo

Country of origin label (COOL) is associated with the country or region where products originated or were produced. It has been recognised as an essential factor in consumer behaviour and product acceptance, as suggested by Dichter (1962). Over the years, various studies have been conducted to explore the influence of COOL on consumers' attitudes, preferences, acceptance, and food choices (Moon & Jain, 2002; Lim *et al.*, 2013; Balcombe *et al.*, 2016; Aizaki & Sato, 2020). In recent years, several socio-economic factors have contributed to the consumers' increased consciousness regarding the association between COOL and product quality. For instance, the COVID-19 pandemic has significantly impacted consumer attitudes, particularly in increasing the importance of locally

produced and high-quality products (Pedersen & Hansson, 2021). The pandemic has led to a heightened awareness of the origin and sourcing of products due to food safety concerns and supply chain disruptions. Recent studies have indicated that the COOL information in products can be seen as an assurance of quality based on origin, such as Italian olive oil (Bimbo *et al.*, 2020; Carzedda *et al.*, 2021), French wine (Valentin *et al.*, 2021), speciality coffee (Teuber & Herrmann, 2012) and meat (Holdershaw & Konopka, 2023). Table 2 shows the studies focused on the impact of COOL on consumer preferences.

These methodological approaches have provided valuable insights into the influence of COOL on consumer perception, product sensory properties, and the willingness to purchase. Research has shown that when consumers voluntarily pay attention to COOL attributes, it enhances the predictive power of purchase intentions (Gao *et al.*, 2014; Liu *et al.*, 2022). However, consumers interact with products in a complex shopping environment, encompassing extrinsic cues and factors such as packaging materials, labelling, branding, and pricing.

Price tag

The pricing of a product significantly shapes consumer behaviours and purchase intentions. Price tags are extrinsic attributes that affect how consumers perceive product quality, guiding them in the purchasing decision-making (Petrescu *et al.*, 2020; Boccia *et al.*, 2023). In supermarkets, pricing information is strategically placed on products or shelves, employing various design elements to capture consumer attention. For instance, Bogomolova *et al.* (2020) explored how the design factors of unit price labels (position, font, signposting, and colour) influence consumers' attention during grocery shopping using eye-tracking technologies. The findings revealed that enhanced label design increased eye fixations, especially among less price-conscious consumers, particularly when unit prices were colour-highlighted. However, these increased fixations did not result in changes in product choice. Similarly, Helmert *et al.* (2017) stated that designing price tags of suboptimal foods in bright red or green colour led to prolonged fixation durations and enhanced purchase decisions. These studies highlight the intricate relationship between pricing, visual design, and consumer behaviours in retail environments.

Price information is beneficial for consumers to distinguish between various products, both within and across brands. Rödiger & Hamm (2020) stated that consumers, regardless of their organic food preferences, had higher fixation counts (visual attention) on price tags of organic products after an initial glance. Interestingly, conventional food consumers focussed more on prices, but their

Table 2 Effect of country-of-origin logo on consumer perception of product (2023-onwards)

Author(s) (year)	Product	Country	Methods	Features	Findings
Cardona <i>et al.</i> (2023)	Minced meat, hamburgers	Spain	Free listing task, rating, conjoint analysis	Expiration date, COOL, price, animal welfare label	In the free listing task, all the factors were considered In the rating test, the expiration date got the highest mean, followed by price and COOL
Kassas <i>et al.</i> (2023)	Tomatoes	Mexico and Florida	Supermarket study	COOL	The consumer fails to notice COO label in supermarket despite expressing preference for it
Kuff <i>et al.</i> (2023)	Cricket flour	Brazil	Online survey	COOL	Neophobia diminishes the effect of COOL
Onozaka <i>et al.</i> (2023)	Salmon	USA, France, Japan	Discreet choice model and latent class analysis	COOL	Two-thirds of the market preferred domestic farmed salmon Rest preferred salmon from Norway
Valentin <i>et al.</i> (2021)	Wine	South Africa and France	Word association task	COOL, sensory attributes and emotions	COOL information influences French participants more than South Africans
Foroudi <i>et al.</i> (2020)	Wine	France, Argentina, Switzerland, Brazil	Survey	COOL	COOL is an important attribute Participants build relations with non-traditional wine based on the country's image
Banovic <i>et al.</i> (2019)	Fresh (chilled), canned and smoked aquaculture products	France, Germany, Italy, Spain and UK	Online survey	Health and nutritional claims, COOL and eco labels	The COO labels along with eco-labels have significant effect on the consumer choice
Norris & Cranfield (2019)	Dairy products	Canada	Survey	Price, COOL, production method, brand, and traceability	The COO label emerged as the primary driver of purchase intention compared to other factors
Thøgersen <i>et al.</i> (2019)	Drinking milk, pork chops	Germany, France, Denmark, Thailand, China	Choice-based conjoint (CBC)	COOL, organic label, price	Organic labels are favoured over conventional COOL is important after price Ethnocentrism
Balcombe <i>et al.</i> (2017)	Pepperoni pizza	UK	Eye tracking	COOL, price, product quality	High visual attention on COOL
Balcombe <i>et al.</i> (2016)	Fresh and processed meat products	UK	Survey	COOL, price, product quality	COOL is valued more for fresh meat than processed products
Frez-Muñoz <i>et al.</i> (2016)	Canned whole tomatoes	Chile, Netherlands, Italy	Focus group, conjoint analysis	COOL, Sensory properties	Dutch and Chileans preferred glass and cans with easy opening Italians preferred COOL information
Gao <i>et al.</i> (2014)	Fresh fruit	France	Online consumer survey	COOL, WTB	WTB depends on the COOL Ethnocentrism
Lagerkvist <i>et al.</i> (2014)	Beef	Sweden	Survey	COOL, EU/non-EU labels	COOL was preferred over EU/non-EU labels

fixation durations on organic and conventional product information significantly predicted their choices. This suggests that factors beyond price are pivotal in influencing consumer decisions, even among those who initially prioritise conventional options. Many consumers acknowledge price as a crucial aspect of packaging design, yet the extent to which this attribute captures attention during supermarket shopping remains uncertain. In a different study, Van Loo *et al.* (2015) established a positive relationship between visual attention to

sustainability labels and the importance consumers attach to attributes (sustainability and price) influencing their willingness to pay (WTP).

Intrinsic factors

Flavour perception is influenced by a complex interplay of multisensory experiences, primarily guided by interoceptive cues, which are stimulated when a person consumes food or drink, encompassing sensations such as

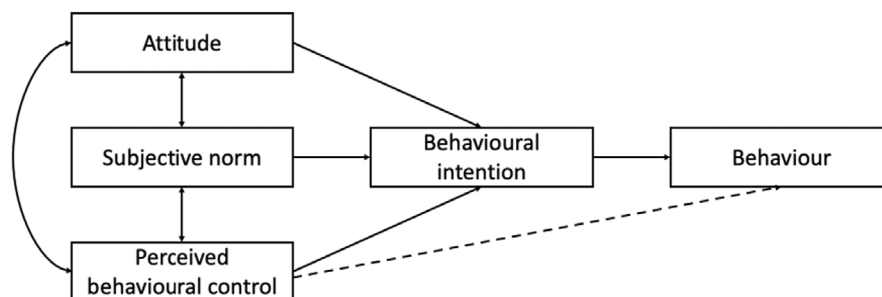


Figure 2 The original model of the Theory of Planned Behaviour, adopted from Ajzen (1991).

taste, retro-nasal aroma, or any sound produced during mastication, and exteroceptive cues, which are stimulated before consuming food or beverages, involving sensory inputs such as vision, orthonasal olfaction, and auditory attributes (Spence, 2012; Dabas *et al.*, 2023). The confirmation and disconfirmation of expectations set by exteroceptive cues play a pivotal role in shaping the acceptance and perception of the product.

Additionally, interoceptive cues, including food texture, significantly influence consumers' preferences, and acceptance of novel products. An example is the new development of plant-based yoghurts, which have significant texture variations that can affect consumers' acceptability. In this regard, Greis *et al.* (2022) found that similar mouthfeel profiles in dairy and plant-based yoghurts can mask significant viscoelastic distinctions, impacting consumer acceptance and liking. Similar findings were reported by Mehta *et al.* (2023). Sensory sensitivity, which denotes the ability to perceive small sensory changes, can substantially impact food choices. Both adults and children can reject novel food based on textural properties (Ross, 2023), with tactile or mouthfeel sensitivity leading to the dislike of soft and slimy textures, resulting in product rejection. Therefore, understanding the sensory profile of novel products, especially mouthfeel and textural properties, is crucial before launching them into the competitive market.

Psychological factors and food choices

Attitude, intention, and behaviour (theory of planned behaviour)

The Theory of Planned Behaviour (TPB) and the Theory of Reasoned Action (TRA) are widely used theoretical models to predict behaviour. Developed by Ajzen (1991), the TPB evolved from the TRA, aiming to predict human behaviour, which depends on the deliberate consideration of the consequences resulted from the actions. The Theory of Planned Behaviour extended TRA by introducing additional constructs that account for the real and perceived barriers

consumers face when engaging in a particular behaviour. Consequently, TPB is a psychological model encompassing three fundamental aspects of human behaviour: attitude, subjective norm, and perceived behavioural control. These three constructs collectively predict an individual's intention to engage in a specific behaviour, as shown in Fig. 2.

The TPB primarily underscores the role of rational thinking and how cognition affects behaviour and future actions. The TPB serves as a foundation for a wide array of studies focusing on food preferences and approach-based behaviour studies towards novel food products such as insect and insect-based food (Menozzi *et al.*, 2017; Bae & Choi, 2021), game meats (Bannor *et al.*, 2022; D'Souza, 2022), hemp products (Metcalf *et al.*, 2021; Nichols *et al.*, 2021), functional food (Nystrand & Olsen, 2020; Salmani *et al.*, 2020), alternative grains (Gosine & McSweeney, 2019), and organic foods (Maloney *et al.*, 2014). The predictive capability of TPB has been validated in numerous social sciences studies.

The waste-to-value-added foods represent a novel product category that promotes sustainability and a circular economy by transforming waste materials into value-added products. The market has witnessed a proliferation of such value-added products, driven by increased consumer demand and the changing nutritional requirements of consumers. One such category is the utilisation of SCOBY in kombucha fermentation, generating substantial SCOBY waste with each fermentation cycle.

SCOBY is a three-dimensional bacterial cellulose mat formed through the symbiotic relationship between acetic acid bacteria and osmophilic yeast species. SCOBY exhibits high water absorption, mechanical strength, and porosity, making it suitable for edible packaging and food fortification. Commercialising SCOBY waste could provide a viable approach to transforming this discarded residue into value-added foods, thereby promoting sustainable practices. Incorporating SCOBY into widely consumed food products, such as ice cream, aligns with sustainability goals and provides

valuable insights into consumer choices and their willingness to try novel products. The essential factor influencing the acceptance of these products lies in understanding the psychological behaviour of consumers, such as attitudes, emotions, personality, and neophobia, which consistently shape food choices. Coderoni & Perito (2021) revealed that food neophobia reduces consumers' willingness to purchase upcycled products. Conversely, increasing consumer knowledge and awareness about the upcycled product's benefits increases the willingness to buy, particularly in comparison to conventional products (Bhatt *et al.*, 2020). However, there is a notable gap in studies examining consumer behaviour specifically towards SCOBY products. Therefore, gaining a deeper understanding of consumer attitudes, emotions, food neophobia, and intended behaviour towards this novel product category is essential. Understanding these dynamics, starting from consumer awareness to the actual tasting experience is essential for shaping the future success and acceptance of SCOBY-based value-added foods.

Emotions and food choices

Food companies routinely conduct sensory acceptance tests in their product development process. However, these tests alone cannot predict the totality of consumer food choices (Thomson, 2010). Additional approaches, such as evaluating emotions, are necessary to gain deeper insights into consumers' moods, attitudes, and preferences within a context (Bagozzi *et al.*, 1999; Huang, 2001). Numerous studies have reported the relationship between product sensory properties and emotions in different products, such as coffee (Bhumiratana *et al.*, 2014), chocolates/coffee (Torrice *et al.*, 2021; Isac-Torrente *et al.*, 2023), sponge cakes (Poonnakasem *et al.*, 2016), sauces (Sukkwai *et al.*, 2017, 2018), eggs (Wardy *et al.*, 2015), fermented rice noodles with cricket and mango peel (Maw *et al.*, 2022), energy drinks (Mehta *et al.*, 2021), gluten-free products (Jack, 2016; Wardy *et al.*, 2017; Aguiar *et al.*, 2022), and wines (Torrice *et al.*, 2020). Emotions tied to the sensory properties can vary within each consumption experience and offer insights into product liking (Jager *et al.*, 2014; Halagarda & Suwała, 2018; Kaneko *et al.*, 2018). Consumers often select products in supermarkets based on their aesthetic attributes rather than solely relying on sensory properties. Therefore, understanding the emotions evoked by a product's extrinsic attributes is critical to understanding purchase decisions.

In supermarket shopping, where consumers often make decisions influenced by emotions rather than rational choices, understanding the emotional responses to extrinsic cues such as colour, packaging materials, and logos is crucial for evaluating their approach-based behaviours. Limited research has been conducted to

understand the influence of extrinsic attributes on emotional responses and consumer acceptance. Merlo *et al.* (2019) showed the impact of packaging on the emotions and the overall product acceptance. Emotions evoked from packaging can provide discernment in understanding the food choices made by consumers; hence, more research is needed to uncover this connection (Liao *et al.*, 2015).

Colour is one of the most essential extrinsic attributes that attract significant consumer attention in supermarket settings, often without conscious awareness. The impact of colour is multifaceted, encompassing physiological, cultural, and associated effects. For example, red colour is commonly associated with arousal and excitement (Labrecque & Milne, 2012), while white tends to evoke feelings of calmness (Spence, 2018). Dark colours, in contrast, can be linked with the sensation of disgust (Ares & Deliza, 2010). Likewise, various other extrinsic cues such as country of origin logo (Knowles *et al.*, 2022; Liu *et al.*, 2022), nutritional information (Lagerkvist *et al.*, 2016; Pambo *et al.*, 2018), packaging materials (Koenig-Lewis *et al.*, 2014; Clark *et al.*, 2021), and pricing (Peine *et al.*, 2009), also exert significant influence in eliciting emotional responses among consumers, shaping consumer perception and decisions. Emotions evoked from visual cues also raise expectations regarding launched new products (Halagarda & Suwała, 2018). Comparing the emotional responses before and after consumption provides valuable information about expectations and overall product experience and helps product differentiation.

Emotions play a substantial role in determining the acceptance or rejection of novel or unfamiliar foods. Disgust and anxiety are the two primary emotions which play a significant role in food aversion or avoidance behaviours (Fox *et al.*, 2018; Harris *et al.*, 2019). Maratos & Staples (2015) reported that anxiety towards unfamiliar foods is associated with lower liking and an increased tendency to reject foods among children. These findings align with previous studies that showed that individuals with higher levels of food neophobia exhibit heightened physiological responses, such as increased pulse and respiration, when presented with novel or unfamiliar food products (Raudenbush & Capiola, 2012; Torrice *et al.*, 2019).

Torrice *et al.* (2019) reported changes in consumers' physiological responses and emotions (Asian and Western) when exposed to ten familiar and unfamiliar food products. Asian participants displayed elevated body temperatures and negative emotions, while Western participants exhibited higher positive emotions when encountering familiar food. The increased emotional responses can explain the negative relationship between food neophobia and product liking (Jaeger *et al.*, 2022).

Many studies have emphasised emotional responses during product tasting, and it is crucial to understand the role of emotional reactions on product liking and approach-based consumer behaviours, spanning from the initial interaction to the repeated tasting of the product. Examining the evolution of emotions through repeated exposure to novel foods can offer valuable insights into how consumers adapt to and potentially develop preferences for these foods over time.

Food neophobia

Food neophobia is not solely a personality trait but has also been explored as a distinct behavioural phenomenon (Guidetti *et al.*, 2018). The success or failure of new products in the market depends on consumer's positive or negative behavioural responses to the product. Food neophobia represents a reluctance to try new foods due to sensory aversion (Coulthard *et al.*, 2022), concerns about food safety (Toti *et al.*, 2020), lack of knowledge (Torricco *et al.*, 2019), and psychological factors (Chen *et al.*, 2013; Muhammad *et al.*, 2016). Due to neophobia, various innovative products introduced to the market often fail to meet consumer expectations.

Jaeger *et al.* (2005) conducted a study indicating that New Zealand consumers are more comfortable purchasing familiar fruits like Kiwi fruit and Nashi than trying novel fruits like Pawpaw, Grapes, and Kiwano when launched in the market. Familiarity often develops from previous brand exposure or memories associated with those experiences. The degree of familiarity with foods can vary among ethnic groups (Torricco *et al.*, 2015) and cultural differences or lack of knowledge about the product's value and benefits affect the product's acceptability. Torricco *et al.* (2019) evaluated ten food products based on familiarity and liking within two cultural groups (Westerners vs Asians). The findings suggest that acceptability ratings for these products in both cultural groups were significantly influenced by familiarity, which in turn impacted consumer's purchasing behaviours.

The literature on consumer behaviour and acceptance towards waste-to-value-added products is limited due to the novelty of this research area. Fewer studies have examined consumer behaviours towards novel products (Aschemann-Witzel & Peschel, 2019; Coderoni & Perito, 2020). Aschemann-Witzel & Peschel (2019) studied consumer attitudes towards plant-based cocoa drinks containing grass or potato protein, both with and without accompanying communication. The findings suggest that the cocoa drink from an unknown brand containing either type of protein received a higher liking from consumers. Moreover, communication positively improved liking and attitudes, a trend reported by Cavaliere & Ventura (2018).

Coderoni & Perito (2020) studied the impact of food neophobia on sustainability and consumers' willingness to purchase waste-to-value-added foods enriched with ingredients that would otherwise go to waste. The results revealed that both food neophobia and food technology neophobia negatively impact the willingness to buy waste-to-value-added products. However, consumers who invest time reading product labels for sustainability and health benefits information exhibit a greater interest in purchasing these products. It is worth noting that most studies have primarily assessed consumer behaviours through questionnaires without conducting actual tasting tests to confirm their behaviours.

Repeated tasting exposures and food choices

Food neophobia, the aversion to unfamiliar foods, protects consumers against potential harm from unknown substances. Food Neophobia is observed in humans from early childhood (Nor *et al.*, 2021) and continues into adulthood (La Barbera *et al.*, 2018; Sogari *et al.*, 2019). Scientific studies have highlighted the impact of continuous exposure to novel or unfamiliar foods on individual acceptance and liking. Notably, Hetherington *et al.* (2000) have found that repeated exposure to an unfamiliar product does not affect food liking. In contrast, Chow *et al.* (2021) demonstrated that repeated exposure to a novel product could either positively or negatively affect liking and food acceptance—the number of exposures required to increase liking varied across different studies. For example, Lakkakula *et al.* (2010) stated that ten exposures to healthy vegetables led to increased liking and acceptance among school children, while Wardle *et al.* (2003) proved that eight exposures were sufficient to enhance the liking of bell peppers. Despite the extensive research on the effects of repeated exposure on food liking, there has been limited exploration into how this exposure impacts the consumer's purchasing behaviour regarding novel foods.

Mental simulation and food choices

Repeated exposure to the stimuli creates memories that impact future actions, a process often called mental simulation. Mental simulation is the 'imitative episodic mental representations of one or a series of events' (Taylor *et al.*, 1998). The theory of grounded cognition of desire, also called mental simulation, states that a consumer's choices and behaviours depend on the simulations of previous experiences stored in the memory, which could be retrieved with relevant cues and contexts (Papies *et al.*, 2017). A person perceives, feels, and cognises an object or a situation, which is stored in the brain as a memory through

the process referred to as 'situated conceptualisation' (Barsalou, 2016). For example, when eating pasta in a fine dining restaurant, the neural system will produce a continuous stream of perceptual experiences referred to as 'local' information. On the other hand, the neural system also keeps processing perceptual experiences of the restaurant's surroundings (furniture and people), which is referred to as 'global' information. The combined local and global conceptualisation of a situation stored in the memory is referred to as 'situated conceptualisation'. The local and global elements activate the matching 'situated conceptualisation' already stored in the memory in a Bayesian manner. This is referred to as *pattern completion inferences* (Papies *et al.*, 2017). Barsalou (2005) stated that mental simulation is a multimodal experience that activates our gustatory, perceptual, and motor activities (Elder & Krishna, 2012). Recent studies have explored the impact of mental simulation on food choices, such as process simulation (short-term goals), which stimulates the preference of vice products, and outcome simulation (long-term goals) which stimulates the preference of virtue products (Muñoz-Vilches *et al.*, 2019) and ambivalent products (Muñoz-Vilches *et al.*, 2020). Based on the grounded cognition theory, for indulgent foods (e.g. chips), pictures and words trigger eating simulation (Papies, 2013), and also affect consumer choices (Robinson *et al.*, 2011).

In supermarkets, food choice is mainly based on the extrinsic cues of the product such as packaging, colour, labels, and the surrounding environment. Packaging colours and labels influence the consumer's product expectations. Many studies have proven that the labels' linguistic of the products affect the expectations and behaviours of consumers (Carnevale *et al.*, 2017; Khan & Lee, 2020). One such study shows that the labelling of ice cream as 'savoury' reduces the liking of the product, as consumers usually expect ice cream to be sweet and flavourful (Yeomans *et al.*, 2008). Similar results were observed during the tasting of 'indulgent' labelled shakes, and 'sensible' labelled shakes; despite being the same product, the ghrelin dropped drastically in the case of the 'indulgent' labelled shake as compared to the 'sensible' labelled shake (Crum *et al.*, 2011).

In addition to behavioural studies, neuroimaging studies also support the effect of mental simulation on consumer food choices. Hilke *et al.* (2008) suggested that labelling wine as expensive increased hedonic liking and acceptability by activating the reward simulation mechanism. Therefore, it is proven that product labels linguistically influence consumer experiences stored in memory. Similarly, other haptic, olfactory, and sound cues can also affect product liking. For example, cutlery's shape, size, and colour influenced the sensory expectations and liking of the yoghurt

(Harrar & Spence, 2013). Advertisements emphasising multiple senses have been shown to impact product liking positively or negatively (Elder & Krishna, 2010).

Behavioural studies indicate that visual product depictions triggering spontaneous mental simulation can increase purchase intentions (Elder & Krishna, 2012). Online advertisements often align visual depictions with the dominant side of the brain, activating motor activities and increasing the desire to purchase. The impact of mental simulation on purchase intention in retail settings remains relatively unexplored. The product placement and different packaging attributes might influence mental simulation, potentially affecting purchase intentions and consumer food choices. Non-invasive methods such as eye tracking and facial expression analysis are widely employed to comprehend consumer behaviour in natural and controlled environments. These methods can shed light on the influence of mental simulation in the retail environment, providing valuable insights into consumer decision-making processes.

Visual attention and food choices

Supermarket shopping is typically characterised as a low-involvement and time-constrained process (Pieters & Warlop, 1999; Vermeir & Van Kenhove, 2005; Spanjaard *et al.*, 2014; Yang *et al.*, 2024) and decisions made by consumers often deviate from purely rational choices. The study of consumer behaviour in supermarkets employs various methods, including surveys, observations, in-depth interviews, and string analysis techniques. More recently, novel techniques have emerged that measure the consumer's gaze and visual attention to gain insights into the factors capturing their attention and potentially influencing approach-based consumer behaviours. However, it is essential to acknowledge that these techniques do not explicitly consider the emotional factors inherent in the decision-making process but have seen a link between the gaze pattern and the food choices (van der Laan *et al.*, 2015; Danner *et al.*, 2016; Melendrez-Ruiz *et al.*, 2022).

Visual attention is intricately related to the eye movement and can be assessed through various indicators, such as fixation, saccade, smooth pursuit movement, pupil dilation, blinking, and microsaccades. In sensory and consumer behaviour studies, fixation is the most frequently examined parameter. The research community has debated about the interrelationship between the fixations and behaviours. Some studies suggest a connection between the first fixation and subsequent food choices (Duerrschmid & Danner, 2018), while other researchers disagree (van der Laan *et al.*, 2015; Danner *et al.*, 2016). The researchers claim that salient packaging attributes primarily influence the first fixation

location, which may not necessarily translate into food choices (Gere *et al.*, 2020). Gere *et al.* (2020) further propose that factors such as the number of stimuli, presentation, and size significantly impact gaze behaviours. Danner *et al.* (2016) also reported that a higher number of fixation counts, dwell counts, and total dwell duration correlates with food choices.

The desire to comprehend what captures consumers' attention and the necessity to engage their visual focus during the point of purchase have long been driving forces in marketing research. Chandon *et al.* (2009) explored the influence of visual attention in a natural shopping environment and determined the impact of the number of facings on product evaluation. Similarly, Van der Lans *et al.* (2008) found that perceptual features such as colour, luminance, and edges significantly affect brand salience in in-store marketing. Research in a real-life retail environment poses challenges due to various confounding factors such as noise, advertisements, and other environmental cues. Therefore, to mitigate these distractions and enhance ecological validity, researchers started using virtual environments to investigate the connection between gaze behaviour and food choices (Hartmann & Siegrist, 2019; Melendrez-Ruiz *et al.*, 2022). In a study by Melendrez-Ruiz *et al.* (2022), a food-choice task was administered to $N = 99$ participants in four motivational scenarios (health, environment, hedonic, and every day). The results revealed a strong correlation between product choices and fixation duration, depending on the scenario and product category. Most of these studies presented participants with more than six to eight stimuli and asked them to select the most appealing product without considering specific visual features such as package material, design, nutritional labels, and price information.

As a significant visual marketing tool, package design notably influences approach-based consumer behaviours (Gidlöf *et al.*, 2017). Product packaging design is important in grabbing consumers' attention, conveying essential product information, and holding a prominent place at the point of sale (Clement, 2007). In an era of information overload, it is increasingly important to discern the elements that can effectively break through the clutter and engage consumer attention (Pieters *et al.*, 2002). Hence, there is an increasing demand for a more comprehensive understanding of the multifaceted aspects of packaging design and how they impact consumer behaviour and food choices. Additional research is necessary to determine which specific packaging features capture the most attention and whether this attention ultimately leads to purchase decisions.

Numerous studies have been conducted to identify the relevant factors that attract visual attention, such as bottom-up or top-down factors. Bottom-up factors pertain to packaging attributes such as colour, shape, and size, which managers can control. In contrast,

top-down factors relate to elements such as familiarity and expectations. Bialkova *et al.* (2013) explored how information density on front-of-pack design influences consumer attention to nutrition labels. The findings suggest that increased additional design elements and proximity of the label slowed visual search performance. Similar findings were also reported by Visschers *et al.* (2010), who noted that only health-conscious consumers paid attention to nutritional labels, while others focused on different package information. Torrico *et al.* (2018) assessed baby formula labels with colour transitions in the brand name and figures and found that consumers prefer figures. Figures attracted more fixations and longer fixation duration, especially when colour transitions were involved. Besides colour, the package material also captures consumer attention (Piqueras-Fiszman *et al.*, 2013), impacting their food choices.

Country of origin and price labels are important attributes influencing consumer food choices. Price labels are always on the packaging or supermarket shelves in the supermarket environment. Helmert *et al.* (2017) studied the impact of using different coloured price tags of suboptimal fresh produce. The findings suggest that willingness to purchase suboptimal items increased when different coloured price labels were used.

Conclusions

This review sheds light on the complex dynamics that drive consumer food choices, emphasising the significant role of extrinsic factors and consumers' attitudes towards novel products. Combining explicit and implicit methodologies offers a better understanding of how these factors influence consumer perception and decision-making processes throughout the product journey. Advanced technological methods such as eye-tracking or virtual reality simulations will further refine the understanding of consumer attention and perception in the retail environment. However, a notable gap persists in understanding the impact of extrinsic attributes of the product on visual attention and sensory expectations and how these factors subsequently influence purchasing behaviour throughout the product journey. The study also explored the impact of novel product introduction, repeated exposure, product texture, and mouthfeel perception on consumer behaviour and product liking, providing crucial understanding regarding product development and marketing strategies.

Conflict of interest statement

The authors declare that there are no conflicts of interest.

Ethical approval

Ethics approval was not required for this research.

Author contributions

Annu Mehta: Conceptualization; investigation; writing – original draft; writing – review and editing. **Luca Serventi:** Writing – review and editing; conceptualization; supervision. **Lokesh Kumar:** Conceptualization; writing – review and editing; supervision. **James D. Morton:** Conceptualization; writing – review and editing; supervision. **Damir D. Torrico:** Conceptualization; investigation; funding acquisition; writing – original draft; writing – review and editing; project administration; supervision; resources.

Data availability statement

Data sharing is not applicable to this article as no new data were created or analysed in this review.

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