UNIVERSITY OF PADOVA

Department of General Psychology

Master Degree in Cognitive Neuroscience and Clinical Neuropsychology Final

dissertation

The Influence of Packaging,
Claims, and Social Value Orientation on Consumer Choice of Whole Grain and White Bread: An Eye-Tracking Study

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Academic Year 2023-2024

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Abstract:

This research explores the impact of various packaging elements (surface finish, claims, and whole grain labels) and consumer social value orientation on consumer willingness to pay (WTP) for whole grain bread. The results indicate that sustainable claims on packaging exert the most substantial positive influence on WTP, followed by health-related claims. Intriguingly, the effect of health claims intensifies when consumers focus more on the bread type, especially in the case of whole grain bread. This finding implies that, despite the perception of whole grain bread with health claims as less palatable, consumers exhibit a higher likelihood of purchasing these products when such claims are present. Furthermore, the study reveals that whole grain bread commands a higher WTP compared to other bread types, and it is generally perceived by consumers as healthier, more delicious, and more sustainable. Notably, the study found no significant impact of social value orientation on WTP, suggesting that other factors may play a more crucial role in shaping consumer behavior in this context. In conclusion, this research highlights the importance of packaging elements and consumer social value orientation in shaping consumer perceptions and WTP for whole grain bread.

1.   Introduction

Whole grain foods offer a multitude of health benefits, including reduced risks of obesity, type 2 diabetes, and certain cancers such as colorectal cancer and cardiovascular diseases. Despite these advantages, several barriers impede their widespread adoption and consumption.(Ak, Koo et al. 2015, Aune, Keum et al. 2016, Kyrø and Tjønneland 2016, Seal, Courtin et al. 2021).

Meynier (2020) identified whole grain (WG) product-oriented factors as the most influential facilitators for consumer acceptance across various age groups and nationalities. These factors include sensory appeal, organoleptic properties (e.g., taste, texture, and appearance), and packaging and labeling (Meynier, Chanson-Rollé, et al., 2020).

Ugunesh (2023) applied the Reasoned Action Approach (RAA) model to explore how background factors, such as psychological, demographic, socio-cultural, and environmental variables, affect WG consumption. This is consistent with previous studies that have highlighted the role of these factors in food choices. (Ak, Koo et al. 2015, Yang, Li et al. 2018, Ugunesh, Siau et al. 2023). Moreover, our study extends the literature on Environmentally Sustainable Food Consumption (ESFC) by introducing social value orientation as a key individual factor that may influence consumer preferences for whole grain bread. Social value orientation reflects the degree of concern people have for the welfare of others, and it has been shown to affect perceived social worth, warm glow, and adherence to social norms, which are important determinants of ESFC (Vermeir, Weijters et al. 2020).

"Dis-moi ce que tu manges, je te dirai ce que tu es"

"Tell me what you eat, and I will tell you what you are."

Jean Anthelme Brillat-Savarin

1.1.   Barriers of consuming whole grain products:

The barriers to whole-grain consumption can be attributed to several factors identified in the literature. These barriers include gender differences in perception, lack of awareness of health benefits, and dislike of taste and texture, household eating habits, difficulty in identifying whole-grain foods due to misleading labels, lack of availability, and higher price compared to refined, low level of education, variation in whole grain labels and nutritional content across regions and countries, and early exposure to whole grains and cultural influences on eating habits and perception of whole grains (Meynier, Chanson-Rollé et al. 2020, Ariya, Esmaeilinezhad et al. 2022, Angeles-Agdeppa, Platon-Desnacido et al. 2022). Moreover, these factors are more pronounced among young people, especially adolescents, who have a low level of whole-grain consumption (Barrett, Foster et al. 2020). Furthermore, the lack of knowledge about the health benefits of whole grains and the ways to incorporate them into the diet, as well as the sensory attributes and perceived high cost of whole-grain products, also deter consumers from consuming them (Ugunesh, Siau et al. 2023). Additionally, social norms, lifestyle factors, and dietary patterns, such as the consumption of calorie-dense foods and low intake of fruits, vegetables, and fiber-rich foods, are associated with unhealthy diet patterns, which further hinder whole-grain consumption (Ariya, Esmaeilinezhad et al. 2022).

To overcome these barriers, Meynier (2020) suggested several effective strategies to enhance whole grain (WG) consumption. These include increasing the accessibility and diversity of food options that incorporate whole grains, enhancing the sensory appeal of whole-grain products, lowering the purchasing costs of whole grains, implementing a gradual familiarization period to introduce whole grains to consumers, and enhancing the labeling, communication, and knowledge regarding whole grains. These measures aim to broaden consumers' ability to identify and embrace whole grains in their dietary choices.

Our study is based on an experimental design, where we evaluated the effect of two of these facilitators: sensory appeal (appearance/package features) and labeling (identify WG-containing products) in the lab.

According to the literature, these interventions are among the most successful strategies to enhance consumer selection of WG food products. (Meynier, Chanson-Rollé, et al., 2020).

1.2.   Sensory appeal:

Sensory appeal in packaging and products encompasses a range of elements that engage consumers' senses, including taste, appearance, texture, and smell. These sensory attributes play a crucial role in shaping consumer attitudes and satisfaction , purchase intentions, and overall product acceptance Research has shown that sensory appeal significantly influences consumer preferences and purchase decisions, particularly in the context of food products (Wong, Hsu et al. 2018, Imtiyaz, Soni et al. 2021).

In addition to the intrinsic qualities of food products, such as texture, aroma, and flavor, packaging plays a crucial role in shaping how consumers perceive and choose wholesome cereal items. Packaging is an extrinsic factor that affects the overall attractiveness and decision-making process of consumers at the point of purchase. However, previous research has largely neglected the impact of packaging-related factors on food consumer preferences(Symmank 2019). This study aims to explore the specific influence of packaging features, such as surface finish, claims and labeling, on consumer preferences for whole grain bread.

1.2.1. Surface finish:

Surface finish in packaging refers to the texture and appearance of the outer layer of packaging materials, which can be glossy, matte, or have other specific finishes. While the packaging may not directly reflect the product within, it may influence how natural customers believe the food to be, which is important to modern consumers (Bezawada and Pauwels 2013).

Packaging and labeling strategies have been found to significantly influence consumer purchasing behavior (Sarfraz, Raza et al. 2022). However, research on the specific effects of different finishes on consumer behavior is limited (Kato, Botella-Carrubi et al. 2023). Moreover, it has been observed that packaging plays a crucial role in influencing consumer buying behavior, with some consumers being influenced by the packaging and labeling of products, while others may have demand-driven or need-oriented purchasing behavior(Zhao, Yao et al. 2021).

Matte packaging finishes have been shown to exert stronger effects on consumers' evaluations and purchase intentions compared to glossy finishes (Chen 2021).

According to Ye et al. (2020), consumers tend to link glossy packaging to unhealthy foods, and matte packaging to healthy foods. Since unhealthy foods are often perceived as more delicious than healthy foods (Raghunathan, Naylor et al. 2006), glossy packaging matches the desire to eat tasty foods.

Even though finding in both work of Marckhgott 2019 and Ye 2020 showed the significant influence of the surface finish of packaging (matte or glossy) on consumers' perceptions of the enclosed food products.

Marckhgott's research indicates that food products packaged in matte materials are often perceived as more natural, particularly for products that are inherently artificial. This perception of naturalness induced by matte packaging subsequently enhances the expected

tastiness of the product and increases the likelihood of purchase(Marckhgott and Kamleitner 2019).

In parallel, Ye's research elucidates that consumers are more likely to perceive snack food in a glossy package as less healthy, consume less of it, and take a glossy package when encouraged to indulge in tasty eating. (Ye, Morrin et al. 2020).

According to Ye et al. (2020), consumers expect glossy packaging to be more delicious, while Marckhgott and Kamleitner (2019) find the opposite effect for matte packaging. These results are inconsistent with each other.

Ye et al. (2020) suggest that one reason for this discrepancy could be that Marckhgott and Kamleitner's (2019) studies measured naturalness perceptions before tastiness judgments, which might have influenced the responses(Krishna and Elder 2021).

This contradictory finding raises the question of which surface finish is optimal for WG product, and how consumers will perceive this product in various types of packaging (Glossy and Matte) and its impact on their willingness to pay. Since there is no existing research that addresses this aspect, we selected package surface finish as one of the variables in our study to answer this question.

1.2.2. Claims:

The Impact of Claims on Consumers Choices:

Claims play a crucial role in bridging the information gap between product manufacturers and potential buyers. Marketing messages serve to inform consumers about a company's offerings, especially those who lack prior knowledge (Fajardo and Townsend 2016).

Product claims featured on packaging whether related to nutrition, environmental impact, or production methods can significantly influence a firm's value by shaping consumers' purchasing decisions(Cousté, Martos-Partal et al. 2012).

Interestingly, research indicates that consumers tend to place greater trust in product claims when they are prominently displayed on the packaging rather than in advertisements (Fajardo and Townsend, 2016). Additionally, label claims have been found to capture visual attention more effectively than plain text (Rihn, Wei et al. 2019).

While Cousté et al. (2012) discovered that multiple claims on the same package are increasingly common and positively impact firm value, Hidalgo et al. (2017) found that a single claim enhances perceptions of organic products. However, additional claims can sometimes negate this effect. Interestingly, messages related to environmental aspects often carry more weight than those focused solely on health (Cousté, Martos-Partal et al. 2012, Hidalgo-Baz, Martos-Partal et al. 2017).

Different types of packaging claims yield varying effects on consumer perceptions and preferences. Explicit claims, for instance, positively influence perceived quality, healthiness, and environmental friendliness of organic products. They also impact purchase intention and willingness to pay. In contrast, implicit claims—those not explicitly stated—tend to have a neutral or negative effect on these variables(Hidalgo-Baz, Martos-Partal et al. 2017).

Interestingly, other factors also influence consumer trust in product claims. Recent research highlights the impact of packaging material and design. For instance, the choice between glass, paper-based materials, or transparent packaging affects how consumers perceive claims in terms of healthiness and eco-friendliness.(Bou-Mitri, Abdessater et al. 2020, Cammarelle, Bimbo et al. 2021).

In another study by Chandon and Cadario (2023), the cultural context plays a significant role in shaping consumers' preferences and associations related to claims. In France, there was a strong alignment between marketers' claim use and what consumers preferred. For instance, if a cereal claimed to be "whole" or "clean," French consumers perceived it as such. However, in the United States, there was a significant mismatch. Marketers' claim use didn't align with what consumers preferred. Some claims that were popular among marketers didn't resonate well with consumers(Chandon and Cadario 2023).

Health Claim:

Consumers place significant value on healthiness as a key attribute of food products, second only to taste (Grunert 2005). Unlike taste, which can be directly perceived by our senses, healthiness is an abstract quality that necessitates trust. Communicating health information effectively to consumers is crucial, and the effectiveness of this communication can vary in terms of believability and persuasiveness. Consumers may interpret health claims correctly or draw different conclusions based on their own mental frameworks (Grunert and Lähteenmäki 2012).

Health claims play a pivotal role in shaping consumers' knowledge, perceptions, attitudes, and purchasing decisions related to food products(Pothoulaki and Chryssochoidis 2009). However, an interesting paradox emerges when examining the impact of health and nutrition claims on

consumer judgments. While these claims have little effect on perceived food healthfulness, they significantly influence sensory expectations and purchase intentions. Remarkably, this effect remains consistent for both misleading and approved claims. Thus, consumers are not easily misled by claims, but their pre-existing beliefs about health and taste can lead to misguided conclusions(Orquin and Scholderer 2015).

These findings align with previous research by Hoefkens and Verbeke (2013), who explored the impact of health claims on consumer perceptions. Their study revealed that health claims can enhance consumers' perceived healthiness and product quality. However, there is a trade-off: such claims may simultaneously diminish perceived naturalness and taste expectations. The specific effects depend on various factors, including the type of health claim (general, specific, or disease risk reduction), the product category (e.g., dairy, cereal, juice), and individual consumer characteristics (such as health involvement, nutrition knowledge, or skepticism) (Hoefkens and Verbeke 2013).

Numerous studies have investigated consumer responses to health claims, employing diverse methodologies, tools, and materials. Among the most prevalent approaches, researchers present various health claims to consumers and solicit their opinions using rating scales. These scales gauge consumers' perceptions of healthiness, benefit, believability, trustworthiness, attractiveness, and enjoyment associated with products featuring health claims. However, scant attention has been devoted to assessing consumers' comprehension of these claims. Additionally, to gauge behavioral intentions, researchers often inquire about consumers' likelihood or willingness to use a product. This approach proves particularly relevant when examining products not widely available in the market or when studying fictitious products created for research purposes (Lähteenmäki 2013).

In our own experiment, we similarly asked participants to rate their perception of a health claim. However, our primary objective was to assess the impact of health claims on consumers' willingness to pay for the product.

Sustainable Claim:

Whole grains are widely endorsed for their health benefits and sustainability implications(Seal, Courtin et al. 2021).

An essential form of informational intervention centers around conveying the environmental impact of food products at the point of purchase, often through product packaging. This intervention encompasses the use of "green claims" and "eco-labels." Green claims denote environmentally friendly attributes associated with a product, and consumers tend to favor products with such claims over neutral alternatives. Interestingly, emotional green claims tend to outperform rational ones, although this effect is contingent on participants' environmental commitment, cognitive processing abilities, and potential distractions (Aagerup, Frank et al. 2019).

Eco-labels play a pivotal role in shaping the behavior of both producers and consumers toward sustainability. Employing the Analytic Hierarchy Process (AHP), researchers have evaluated the impact of eco-labels across various dimensions of sustainable production and consumption, including environmental, social, economic, and institutional aspects. Notably, eco-labels exert a positive and significant influence across all dimensions, with the most pronounced effect observed in the environmental domain and the least impact on the institutional dimension (Wojnarowska, Sołtysik et al. 2021).

Verbal claims explicitly stating a product's sustainability are straightforward and easily comprehensible. However, they are susceptible to skepticism. Interestingly, consumers with low environmental concern exhibit a preference for packages that align visually with verbal sustainability claims, while reacting negatively to incongruent elements. In contrast, consumers with high environmental concern do not display a preference for congruence or incongruence; instead, they react positively to all packages featuring sustainable attributes ((Magnier and Schoormans 2015).. In another research by same authors they found, the interaction between material type and claim significantly influenced the perceived credibility and effectiveness of product packaging. Specifically, when the packaging material was fiber-based rather than plastic, the claim was more credible and effective. Additionally, the environmental concern of consumers played a moderating role in shaping their evaluations. Consumers with low environmental concern were particularly sensitive to the alignment or misalignment of design and communication elements, while those with high environmental concern responded positively to all packages featuring sustainable attributes(Magnier and Schoormans 2017).

Tasty Claim:

The unhealthy-tasty intuition is the tendency to assume that foods with unhealthy names are more delicious than foods with healthy names. This intuition is based on the implicit inference that the lower the health value of a food, the higher its taste value. This intuition influences consumers' hedonic evaluations and choices of foods, regardless of their actual healthiness or tastiness (Raghunathan, Naylor et al. 2006). However, this intuition is not universal and may be moderated by several factors, such as food pleasure orientation, health consciousness, gender, and culture.

Food pleasure orientation refers to the extent to which consumers derive pleasure from food and eating. Huang and Wu (2016) found that food pleasure orientation weakened or reversed the unhealthy-tasty intuition. Specifically, low-pleasure consumers showed a preference for unhealthy-named foods and a higher likelihood of choosing high-calorie desserts, while high-pleasure consumers exhibited a liking for healthy-named foods and no difference in dessert choices(Huang and Wu 2016).

Health consciousness is the degree to which consumers are concerned about their health and well-being. Mai and Hoffmann (2015) examined how health consciousness affected the perception of food healthiness and tastiness when the food composition was known or unknown. They found that health consciousness did not influence the perception when the food composition was known, but it did influence the perception when the food was labeled as healthy or unhealthy. Specifically, health-conscious consumers perceived healthy-labeled foods as healthier and tastier than unhealthy-labeled foods, while non-health-conscious consumers perceived the opposite (Mai and Hoffmann 2015).

Gender is another factor that may affect the unhealthy-tasty intuition. Paakki, Kantola et al. (2022) found that the unhealthy-tasty belief was stronger among men and people who enjoyed food, and weaker among people who cared about health. They also found that the unhealthy-tasty belief predicted consumers' willingness to pay for unhealthy foods and their consumption of unhealthy snacks(Paakki, Kantola et al. 2022).

Culture is another important moderator of the unhealthy-tasty intuition. Werle, Trendel et al. (2013) compared the implicit associations between food healthiness and tastiness among French and American consumers. They found that, contrary to the American intuition that unhealthy food is tastier, the French intuition is that healthy food is tastier. They also found

that this intuition influenced how the French consumers rated the taste, pleasure, and quality of a neutral food that was described as either healthy or unhealthy(Werle, Trendel et al. 2013).

These studies suggest that the unhealthy-tasty intuition is not a fixed and universal phenomenon, but rather a context-dependent and variable one. Therefore, it is important to consider the potential moderators of this intuition when designing and marketing food products. One possible strategy is to use claims that emphasize both the healthiness and tastiness of foods, as Skala, Gaćeša et al. (2023) showed that this could improve the choice of healthy food (Skala, Gaćeša et al. 2023). However, more research is needed to explore the role of such claims in different food categories, such as whole grain bread, which is generally considered as a healthy product. It is unclear whether the unhealthy-tasty intuition would affect the perception and choice of whole grain bread with or without a tasty label.

1.3.   labeling (identify WG-containing products):

Using non-complex labeling for whole grain foods significantly impacts consumers' ability to identify and choose these products. Research has highlighted the challenges faced by consumers in accurately identifying whole grain foods, particularly when product descriptions such as "multi-grain" and "stone-ground wheat" can lead to confusion and misinterpretation, with some consumers mistakenly believing that dark brown colored foods are whole grain (Violette, Kantor et al. 2016).

This difficulty in identifying whole grain foods has been a recurring issue discussed by several authors, indicating the need for clearer and more straightforward labeling to assist consumers in making informed choices. Additionally, the study of older adults' ability to determine whether common food items were whole grain revealed that the ingredient list was the most frequently cited information used in their decision-making process, emphasizing the importance of clear and easily accessible information on packaging to aid consumers in

identifying whole grain products (Violette, Kantor et al. 2016). Therefore, the use of simple and unambiguous labeling for whole grain foods is crucial in empowering consumers to make informed and accurate choices, contributing to increased consumption of whole grains.

1.4.   Social value orientation:

Social value orientation (SVO) is a personality trait that reflects how much an individual values their own and others' outcomes in interdependent situations(Murphy and Ackermann 2014). SVO reveals the underlying social preferences or motives of an individual, as it indicates their willingness to trade off their own welfare for the welfare of others. SVO is a widely studied individual difference variable in various disciplines, such as social psychology, economics, sociology, and biology, where it is also known as social preferences, other-regarding preferences, welfare tradeoff ratios, and social motives (Murphy, Ackermann et al. 2011).

SVO has been linked to various behaviors and decision-making processes, especially in the context of pro-environmental behavior. Pro-selves consider as individuals who are self-interested and less concerned about climate issues (Corner and Randall 2011) and pro-socials consider as individuals who are socially conscious and committed to the sustainability agendato act pro-environmentally(Balliet, Parks et al. 2009).

Van Horen et al. (2018) explained pro-socials were intrinsically motivated to act pro-environmentally, while pro-selves were extrinsically motivated by incentives (regardless of the pro-environmental aspect)(Van Horen, van der Wal et al. 2018, Vermeir, Weijters et al. 2020). As WG product can consider as a sustainable food in daily diet (Poutanen, Kårlund et al. 2022), we predict that SVO as a psychological features can predict consumer willingness to pay for different type of bread.

1.5.   Eye-tracker:

A famous saying is "we eat with our eyes. "How food is presented and packaged can influence how we perceive and choose it, as well as what we think about it. People use the features of the package (e.g., the hue, the texture, the form, and the style) as signals to form opinions and make judgments about their food(Chan and Zhang 2022).

The structure of the eye limits high acuity vision to a small portion of the visual field (called the fovea; see Anatomy of the eyes section, below). As a result, there is a strong motivation to move the eyes so that the fovea is pointed at whatever stimulus we are currently thinking about or processing. This is known as the eye-mind link(Just and Carpenter 1980, Rayner and Reingold 2015), and makes eye tracking a reliable tool for exploring questions concerning the allocation of visual attention.

Where we look, and for how long, is influenced by cognitive processes beyond attention, such as perception, memory, language, and decision making. While the link between eye and mind is not absolute (Anderson, Bothell et al. 2004, Pickering, Frisson et al. 2004, Reichle, Reineberg et al. 2010, Murray, Fischer et al. 2013, Steindorf and Rummel 2020) it is true that the eyes reflect mental processing of whatever we are looking at in any given moment(Carter and Luke 2020).

Numerous research endeavors have employed eye tracking technology to explore how consumers engage with packaging and label design (Graham, Orquin et al. 2012, Ares, Giménez et al. 2013, Piqueras-Fiszman, Velasco et al. 2013, Ares, Mawad et al. 2014, Varela, Antúnez et al. 2014, Mawad, Trías et al. 2015, Oliveira, Machín et al. 2016, Motoki, Saito et al. 2019, Leon, Spers et al. 2020, Ma, Zhuang et al. 2020, Motoki, Saito et al. 2021).

The fixation duration, as measured by eye tracking, has been widely used to study attention and cognitive processes (Negi and Mitra 2020). Fixation durations have been considered as a subtle measure of attention and ongoing perceptual and cognitive processes during scene viewing (Henderson and Smith 2009). It has been suggested that fixation duration reflects attentional engagement and language processing (Henderson, Choi et al. 2015). Furthermore, individual differences in fixation duration have been linked to attentional control in adults(Papageorgiou, Smith et al. 2014). The role of fixation duration in attention allocation has also been studied in infants, where it was found that fixation durations interact with selective attention abilities (van Renswoude, Visser et al. 2019). Additionally, fixation duration has been used to investigate attention to food cues, with studies measuring fixation duration as a proxy for attention to food stimuli(Brand, Carlson et al. 2022).

In the context of willingness to pay for products such as bread, eye tracking has been used to measure consumers' attention and preferences. Studies have utilized eye tracking to investigate consumers' willingness to pay for environmentally friendly packaging (Popovic, Bossink et al. 2020), liquid foods in environmentally friendly packaging (López-Galán and de-Magistris 2020) and food with nutritional claims(Biondi and Camanzi 2020). Eye tracking has also been employed to examine the effect of front-of-pack messages on consumers' perception and purchase intention of food products (Zhou and Xue 2021). Furthermore, eye tracking has been used to explore the impact of visual branding strategies on viewers' visual attention and attitude toward the brand.

In summary, fixation duration measured through eye tracking serves as a valuable tool for studying attention and cognitive processes, as well as for understanding consumers' attention and preferences, including their willingness to pay for products such as bread.

1.6. Current Study:

In the realm of consumer behavior research, our investigation centers on the intricate interplay between specific package elements and individual Social Value Orientations. Our primary objective is to discern how these packaging-related factors namely, "Surface Finish," "Claims," and "Written Bread Type" impact consumers' willingness to pay for two different type of bread, white and whole grain.

To illuminate these dynamics, we delve into the concept of total fixation duration as a crucial moderator within our analytical framework. We posit that the extent of attention devoted to each packaging feature serves as a tangible indicator of consumer engagement. Moreover, heightened attention levels may act as a moderating force, influencing the effects of other variables.

Our research contributes significantly to the understanding of consumer behavior, particularly within the context of whole grain food choices. By meticulously examining the interplay between packaging attributes (sensory apple and labeling) and individual social value orientation, we endeavor to offer pragmatic guidelines for package design. Moreover, our aspiration extends to identifying an innovative consumer target. Ultimately, this endeavor aims to bolster the adoption of whole grain products, fostering a healthier dietary landscape.

2.   Method:

2.1.   Participants:

A total of forty-five female individuals with a mean age of 30.2 ± 10.3 years and fourteen male participants with a mean age of 26.6 ± 4.7 years participated in the experiment. All participants possessed a minimum of high-school education and had either normal eyesight or eyesight that had been corrected to a normal level.

Some participants were students at the University of Ghent, while others were university employees who all voluntarily agreed to take part in the experiment.

Before experimenting, all participants provided their written consent. The study excluded individuals with a prior medical history of epilepsy, panic episodes, or asthma for safety reasons.

2.2.   Study design:

The study utilized a 2 (type of bread: white and whole grain) x 2 (surface finish: matte and glossy) x 4 (claims: healthy, sustainable, tasty, and control).

In our study, we conducted 16 experimental trials to investigate the influence of specific package elements on consumer behavior. These elements included distinctive features such as "claims," "bread type," and "surface finish." However, our focus extended beyond these features alone.

To mitigate the potential impact of package color, we employed a strategic approach. Specifically, we utilized four different colors (blue, green, brown, and red) across various combinations of features. Each color was associated with a specific package attribute. For instance, individuals encountering the "healthy claim" consistently encountered a red package. However, for other participants, this same claim might manifest in green, brown, or red packaging. (feagure1)

By employing this color variation strategy, we aimed to neutralize the influence of package color and isolate the effects of the distinct features under investigation.

The dependent variable of willingness to pay was assessed following the display of each trial. Eye-tracker was also used to evaluate the total fixation duration as a moderator variable while the trials were being presented.

2.3. Materials:

Eye-tracking task (bread images shot)

The eye-tracking task involved presenting16 images of bread, each measuring 1052x2404 pixels. These images comprised 8 whole grain breads, each associated with 4 different claims, and presented in 2 different surface finishes (matte and glossy). Additionally, there were 8 white breads with identical features (see Figure 1).

To mitigate the impact of package colors, we deliberately selected 4 distinct colors (blue, green, red, and brown) the effects of low-arousal (green/blue) and high-arousal (red) and brown (neutral) colors (Theben, Gerards et al. 2020). The bread colors randomly varied among participants. For instance, the sustainability claim was paired with red in 25% of the cases, and similar randomization applied to other claims and colors.

To achieve a matte appearance, we meticulously edited the glossy packaging by eliminating all reflections. This process utilized the matte mask provided by Adobe Photoshop version 24.4 (Marckhgott and Kamleitner 2019).

Identifying whole grain bread remains a significant challenge. Efforts should focus on enhancing the clarity of whole grain labeling and avoiding overwhelming or vague cereal-

related terms (Meynier, Chanson-Rollé et al. 2020) . Our claims labels and bread descriptions were intentionally kept simple and easily understandable.

Willingness to Pay:

To determine the participants' willingness to pay, we presented a straightforward question after showing them all the bread products." What is your maximum willingness to pay (in euros) for the Bread you just saw?" To assess the level of reliability of individuals' responses, we employed two questionnaires.

The "Comparison Shopping (Check Prices)" scale, developed by Putrevu and Ratchford, is divided into two sub-scales: "price tag checking" and "in-store promotion hunting". The former includes statements such as "I read the price tags of the grocery items I buy", "I verify the prices of the grocery items I purchase", and "I check the price before purchasing a product". The latter includes statements like "I search for special deals in the store before purchasing grocery items", "I look for unadvertised specials offered by supermarkets", and "I search for special displays in supermarkets". All these items are evaluated using a 7-point Likert scale, where 1 signifies agreement and 7 signifies disagreement.(Putrevu and Ratchford 1997).

The "Grocery Market Knowledge (Price)" scale, formulated by Urbany et al., comprises three items: "I am knowledgeable about (city name) grocery stores", "I am aware of which stores offer the best prices", and "I know which stores have the best price specials". These items are also measured using a 7-point Likert scale, where 1 indicates agreement and 7 indicates disagreement.(Urbany, Dickson et al. 1996).

Social value orientation:

The Social Value Orientation (SVO) Slider Measure, developed by Murphy, Ackermann, and Handgraaf (2011), is a tool designed to quantify the degree of concern individuals have for others, a concept referred to as social value orientation. The measure comprises two types of items: primary and secondary. The primary items, six in each version (A and B) of the measure, capture the fundamental aspects of an individual's social value orientation. The secondary items, nine in each version, provide additional context to the primary items, refining and elaborating on the insights derived from them. Evaluation of these items involves calculating the meaning of the payoffs a subject allocates to themselves and another person across the six primary items. In this study, we use just the primary item, version A, to evaluate the individual's social value orientation(Prosocial Vs Proself) (Murphy, Ackermann et al. 2011).

The Balanced Inventory of Desirable Responding Short Form (BIDR-16):

The Balanced Inventory of Desirable Responding Short Form (BIDR-16), developed by Hart, Ritchie, Hepper, and Gebauer, is a condensed version of the original 40-item Balanced Inventory of Desirable Responding (BIDR). The BIDR-16 measures two dimensions of socially desirable responding: Self-Deceptive Enhancement (SDE), which assesses honest but overly positive responding, and Impression Management (IM), which assesses bias towards

pleasing others(Hart, Ritchie et al. 2015). We used this this scale to evaluate validity and
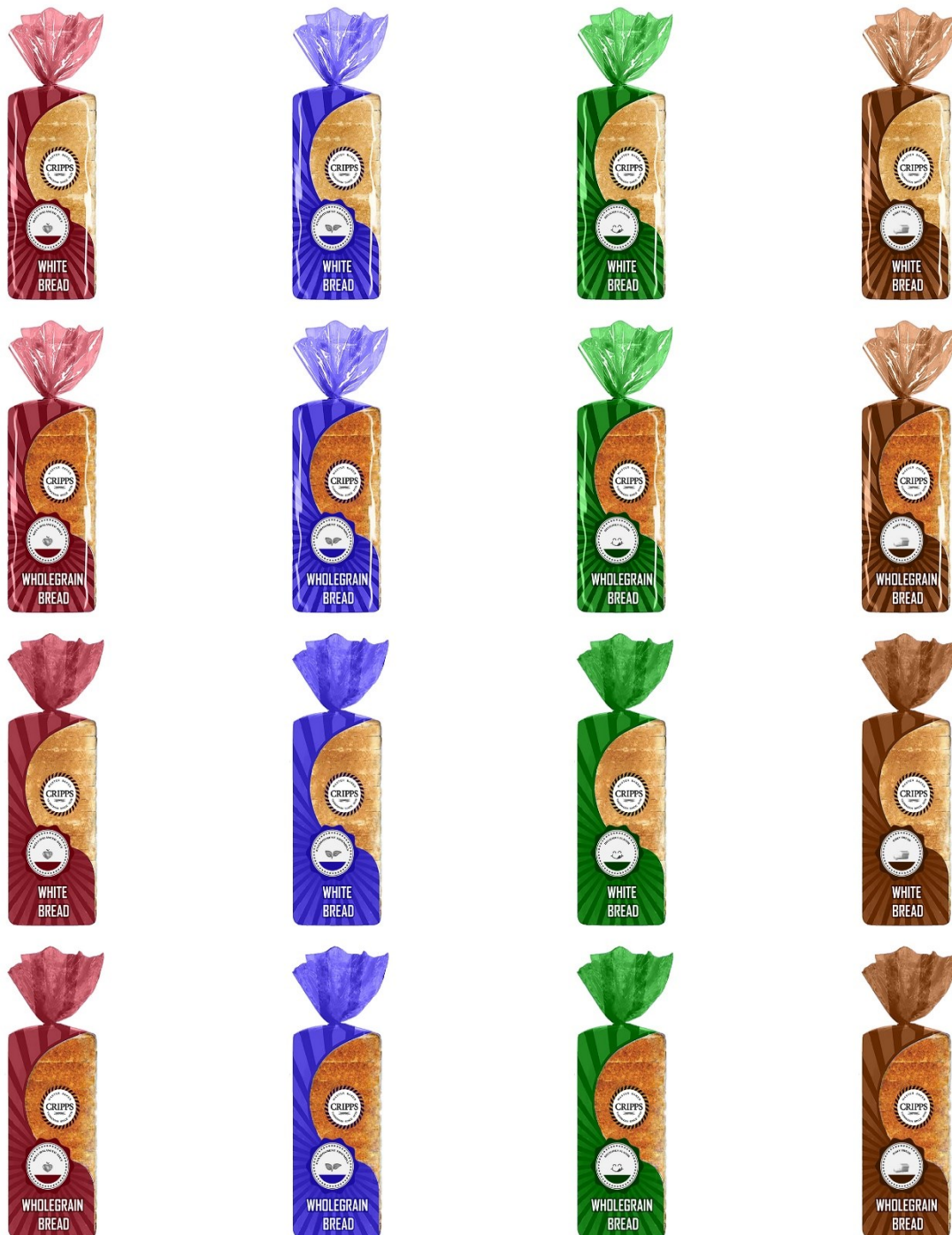reliability of self-report measures(Tracey 2016).

Figure 1:These 16 bread images served as stimuli during the study and were presented to the participants. The color of the breads was randomly varied among the subjects.

2.4. Apparatus:

Eye movements were captured using an Eye Tracker Tobii Pro Nano operating at a sampling frequency of 60 Hz. The eye tracker employed a sampling interval of 16.67 milliseconds (ms). Visual stimuli were presented on an LCD screen monitor manufactured by Dell, with a resolution of 1920×1080 pixels and a refresh rate of 60 Hz. The entire system was integrated with iMotions version 9.2.0 software. Additionally, a standard keyboard and mouse were positioned at a convenient distance from the participant.

2.5. Procedure:

2.5.1. Preparation phase:

Upon receiving their participation number, they were instructed to proceed to room number one. Where they received initial instructions regarding the experimental procedure. Subsequently, participants were prompted to enter their assigned participant numbers into the Qualtrics web page, specifically designed for this phase of the experiment. During the subsequent stages, participants engaged in tasks like stimulus presentation, willingness-to-pay assessments, and responding to follow-up questions, all under the experimenter's supervision. Towards the conclusion of the session, participants were questioned about any vision-related issues, including color blindness or uncorrected-to-normal vision, to ensure compatibility with data collection via eye tracking. Finally, after providing essential information about the experiment and reiterating their right to withdraw at any point, participants were asked for their explicit consent to proceed with the study.

2.5.2. Eye-tracker task:

In the experimental phase, participants were directed to room number two and positioned in front of a display at an approximate distance of 60 cm. Prior to commencing the task, they entered their participant number. Subsequently, a nine-point manual calibration in the IMotions software was conducted to ensure that the eye tracker was accurately recording eye position. Following calibration, participants received instructions to minimize head movement during the subsequent task.

Next, a white screen with a central black cross was presented for 1000 ms. Afterward, individual images of Breads were shown for 3000 ms each, followed by two web pages. The first page posed a question about participants' maximum willingness to pay for the presented bread, while the second page included three questions related to the product they had recently viewed.

Participants were previously informed that the bread prices in market ranged from 1 (€) to 5, with 10-cent increments. To enter their willingness to pay (WTP), they used the numeric keypad.

The subsequent three questions evaluated participants' perceptions of taste, healthiness, and sustainability regarding the product. These questions were included to assess the accuracy of perceiving the claim's labels on the bread packages.

The duration of stimuli presentation in milliseconds (ms) varies significantly based on the research question, task complexity, and experimental design. For packaging tasks, it typically falls within the range of 2500 ms to 4000 ms. (Piqueras-Fiszman, Velasco et al. 2013)(Motoki, Saito et al. 2019).We chose exposure time for the images of a 3000 ms, aligns with the average duration consumers typically spend examining product packaging in a supermarket aisle. This approach ensures ecological validity and relevance to real-world scenarios(Spinner, Gass et al. 2013).

2.5.3. Questioners:

Subsequently, participants were directed to the final room. In this phase, they provided responses to three distinct questionnaires. These questionnaires included the Social Value Orientation (SVO) Slider Measure, the Comparison Shopping (Check Prices) scale and the Grocery Market Knowledge (Price) scale and participants completed The Balanced Inventory of Desirable Responding Short Form.

We intentionally conducted this part of the experiment last to mitigate any potential influence on their willingness-to-pay (WTP) due to the questionnaire questions.

3. Result:

Our study is designed to examine the predictive relationship between four independent variables (claims, surface finish, bread type, and social orientation value) and a dependent variable, Willingness-to-Pay (WTP). We utilize a general regression model to predict the variance in WTP based on these independent variables.

We also introduce total fixation duration as a moderator variable. This allows us to investigate not only the direct effects of the independent variables on WTP, but also their interaction effects with the moderator variable. In other words, we examine how the relationship between each independent variable and WTP changes at different levels of total fixation duration on various Areas of Interest (AOIs).

The AOIs, defined based on specific design elements that were part of the label and package, include: (1) The name of the bread brand, which was consistent across all types of breads (AOI of Logo); (2) The label of claims (AOI of Claims); (3) The type of bread (AOI of Bread Type); and (4) The total surface of the product package (AOI of Surface Finish).

Given the diverse geographical backgrounds of our participants, we have implemented a normalization process for the WTP values. This accounts for potential disparities in WTP that may arise due to economic and cultural differences among participants from various countries. By normalizing these values, we ensure a more accurate and fair comparison, thereby enhancing the validity of our findings. This methodological step allows us to focus on the effects of our independent variables and the moderator variable without the confounding influence of geographical disparities in WTP.

This comprehensive approach enables us to unravel the complex dynamics influencing WTP and provides a more nuanced understanding of the factors at play.

Figure 2:The example of one of our stimuli with the selected AOIs, AOI1: AOI of Logo, AOI2: AOI of Claims, AOI3: AOI of Bread Type, AOI4: AOI of Surface Finish

3.1.　　Statistical Analyses:

The entirety of our statistical analyses was executed utilizing the R Studio software, version 2022.12.0, with the application of Generalized Linear Models (GLMs).

In terms of model specifications, we constructed four distinct GLMs. Each of these models incorporated the same set of independent variables. However, the interaction term was uniquely defined as the Total Fixation Duration across four specific Areas of Interest, denoted as AOI1, AOI2, AOI3, and AOI4. This approach allowed us to explore the nuanced relationships between these variables.

Model One:

In the initial model (Model 1), a systematic examination was conducted to explore the primary influences of independent variables, including claims, surface finish, social value orientation (SVO), and types of bread, on the dependent variable: normalized willingness-to-pay (WTP). Also, interaction terms were explored, specifically focusing on Area of Interest 1 (AOI1) related to a logo's presence.

The empirical analysis indicates that surface finish ($\beta = 0.14$, $P = 0.249$), tasty claim ($\beta = 0.23$, $P = 0.192$), and SVO ($\beta = 0.15$, $P = 0.358$) do not exhibit statistically significant effects on participant WTP within this model. However, the type of bread ($\beta = 0.98$, $P < 0.001$), healthy claim ($\beta = 0.46$, $P = 0.004$), sustainable claim ($\beta = 0.64$, $P < 0.001$), and the total fixation duration on the logo (AOI1) ($P = 0.018$) demonstrate statistically significant associations. Notably, the interaction effect of independent variables with fixation duration on the logo does not contribute significantly to our model. Furthermore, it is relevant to highlight that this model accounts for 22 percent of the variance in willingness to pay ($R^2 = 0.22$) (see Table 1).

Table 1: Generalized Linear Models results for model 1:

Predictors	WTP_n		
	Estimates	CI	p
(Intercept)	-1.11	-1.50 – -0.72	**<0.001**
Surface Finish [Matte]	0.14	-0.10 – 0.37	0.249
BreadType [whole]	0.98	0.74 – 1.21	**<0.001**
Claim [healthy]	0.46	0.14 – 0.77	**0.004**
Claim [sustainable]	0.64	0.30 – 0.98	**<0.001**
Claim [tasty]	0.23	-0.12 – 0.59	0.192
SVO [Prosocial]	0.15	-0.17 – 0.47	0.358
TFD logo	0.00	0.00 – 0.00	**0.018**
Surface Finish [Matte] × TFD logo	-0.00	-0.00 – 0.00	0.523
BreadType [whole] × TFD logo	-0.00	-0.00 – 0.00	0.193
Claim [healthy] × TFD logo	-0.00	-0.00 – 0.00	0.326
Claim [sustainable] × TFD logo	-0.00	-0.00 – 0.00	0.237
Claim [tasty] × TFD logo	-0.00	-0.00 – 0.00	0.763
SVO [Prosocial] × TFD logo	-0.00	-0.00 – 0.00	0.309
Observations	944		
R^2	0.224		

Results of the Generalized Linear Models (GLMs) examining the relationship between the independent variables (claims, surface finish, bread type, and social orientation value) and the dependent variable (Willingness-to-Pay). The interaction term represents the Total Fixation Duration across AOI1(logo AOI).

Model Two:

The results obtained from the second model indicate that several variables, including surface finish (β = 0.06, P = 0.618), healthy claim (β = -0.11, P = 0.489), sustainable claim (β = -0.01, P = 0.967), tasty claim (β = -0.00, P = 0.997), and social value orientation (SVO) (β = -0.04, P = 0.756), do not exhibit significant main effects on willingness-to-pay (WTP). However, the main effect of bread type (β = 0.99, P < 0.001) and the interaction effects of healthy claim (P = 0.003) and sustainable claim (P = 0.001) with total fixation duration on claim labels (AOI2)

are statistically significant (Figure3). Furthermore, our model demonstrates the ability to predict 23 percent of the variation in participants' WTP ($R^2 = 0.23$) (see Table 2).

Table 2: Generalized Linear Models results for model 2:

Predictors	Estimates	CI	p
		WTP_n	
(Intercept)	-0.51	-0.85 – -0.17	**0.004**
Surface Finish [Matte]	0.06	-0.16 – 0.27	0.618
BreadType [whole]	0.99	0.77 – 1.21	**<0.001**
Claim [healthy]	-0.11	-0.41 – 0.20	0.489
Claim [sustainable]	-0.01	-0.31 – 0.30	0.967
Claim [tasty]	-0.00	-0.32 – 0.32	0.997
SVO [Prosocial]	-0.04	-0.31 – 0.23	0.756
TFD claim	-0.00	-0.00 – 0.00	0.223
Surface Finish [Matte] × TFD claim	0.00	-0.00 – 0.00	0.772
BreadType [whole] × TFD claim	-0.00	-0.00 – 0.00	0.098
Claim [healthy] × TFD claim	0.00	0.00 – 0.00	**0.003**
Claim [sustainable] × TFD claim	0.00	0.00 – 0.00	**0.001**
Claim [tasty] × TFD claim	0.00	-0.00 – 0.00	0.181
SVO [Prosocial] × TFD claim	0.00	-0.00 – 0.00	0.830
Observations	944		
R^2	0.234		

Results of the Generalized Linear Models (GLMs) examining the relationship between the independent variables (claims, surface finish, bread type, and social orientation value) and the dependent variable (Willingness-to-Pay). The interaction term represents the Total Fixation Duration across AOI2(claim AOI).
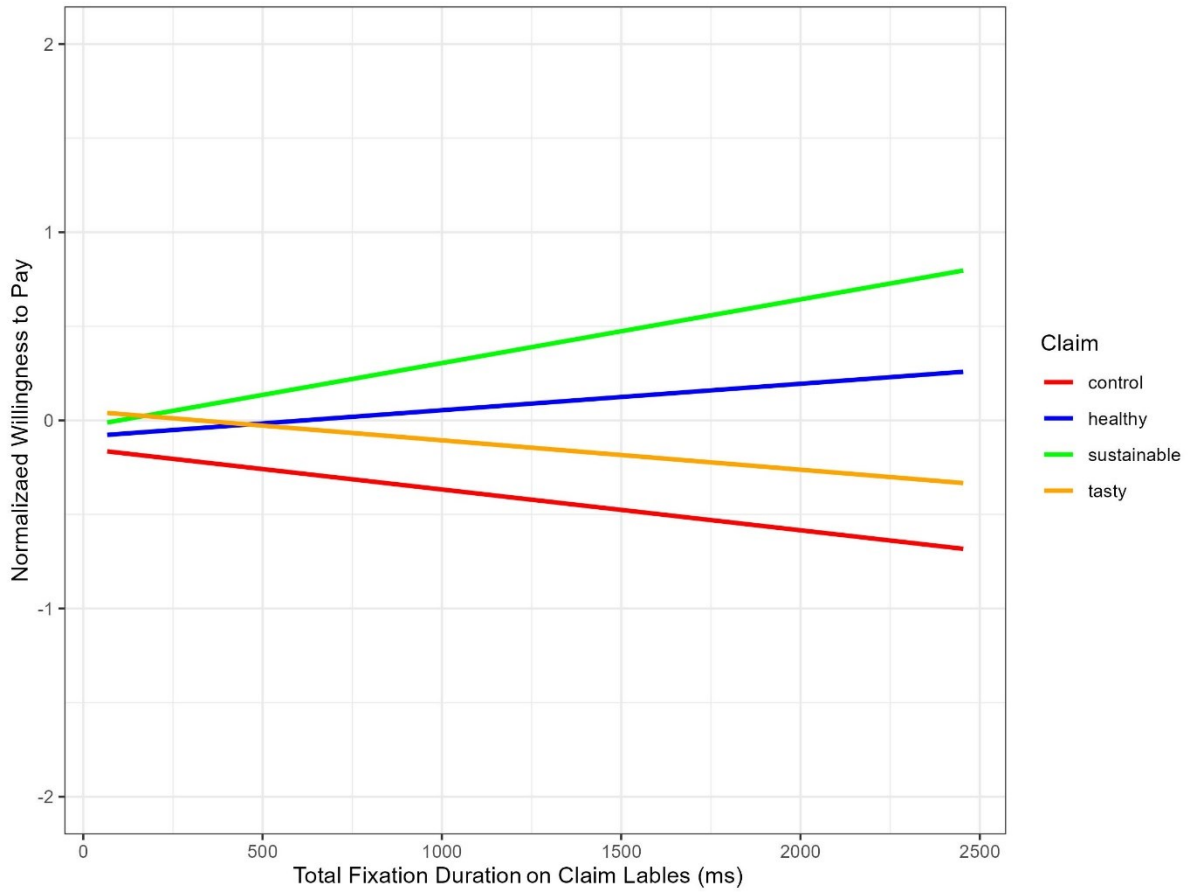
Figure 3: It represents a linear chart that illustrates the moderating effect of Total Fixation Duration (TFD) on the Willingness to Pay (WTP). The chart demonstrates that participants' WTP increases over time when they view claims related to sustainability and health.

Model Three:

The results presented in Table 3 reveal that surface finish (β = -0.06, P = 0.495) and social value orientation (SVO) (β = 0.08, P = 0.517), along with total fixation duration (TFD) on the written bread type displayed on the packaging (P = 0.830), do not exhibit significant main effects on willingness-to-pay (WTP). However, the type of bread (β = 0.67, P < 0.001), health claim (β = 0.51, P < 0.001), sustainable claim (β = 0.65, P < 0.001), tasty claim (β = 0.35, P = 0.009), and the interaction effects of bread type (P = 0.025) (Figure 4), healthy claim (P = 0.040) and sustainable claim (P= 0.050) (Figure 5)with TFD related to bread type (AOI3) are statistically significant. Furthermore, our model demonstrates the ability to predict 23 percent of the variance in participants' WTP (see Table 3).

Table 3: Generalized Linear Models results for model 3:

Predictors	WTP_n		
	Estimates	CI	p
(Intercept)	-0.72	-1.10 – -0.34	**<0.001**
Surface Finish [Matte]	-0.00	-0.24 – 0.23	0.969
BreadType [whole]	0.56	0.32 – 0.79	**<0.001**
Claim [healthy]	0.58	0.26 – 0.89	**<0.001**
Claim [sustainable]	0.72	0.39 – 1.04	**<0.001**
Claim [tasty]	0.34	0.02 – 0.66	**0.038**
SVO [Prosocial]	0.07	-0.25 – 0.39	0.670
TFD bread type	0.00	0.00 – 0.00	0.973
Surface Finish [Matte] × TFD bread type	0.00	-0.00 – 0.00	0.226
BreadType [whole] × TFD bread type	0.00	0.00 – 0.00	**0.009**
Claim [healthy] × TFD bread type	0.00	0.00 – 0.00	**0.030**
Claim [sustainable] × TFD bread type	0.00	0.00 – 0.00	**0.050**
Claim [tasty] × TFD bread type	0.00	0.00 – 0.00	0.174
SVO [Prosocial] × TFD bread type	-0.00	-0.00 – 0.00	0.523
Observations	944		
R^2	0.229		

Results of the Generalized Linear Models (GLMs) examining the relationship between the independent variables (claims, surface finish, bread type, and social orientation value) and the dependent variable (Willingness-to-Pay). The interaction term represents the Total Fixation Duration across AOI3(bread type AOI).
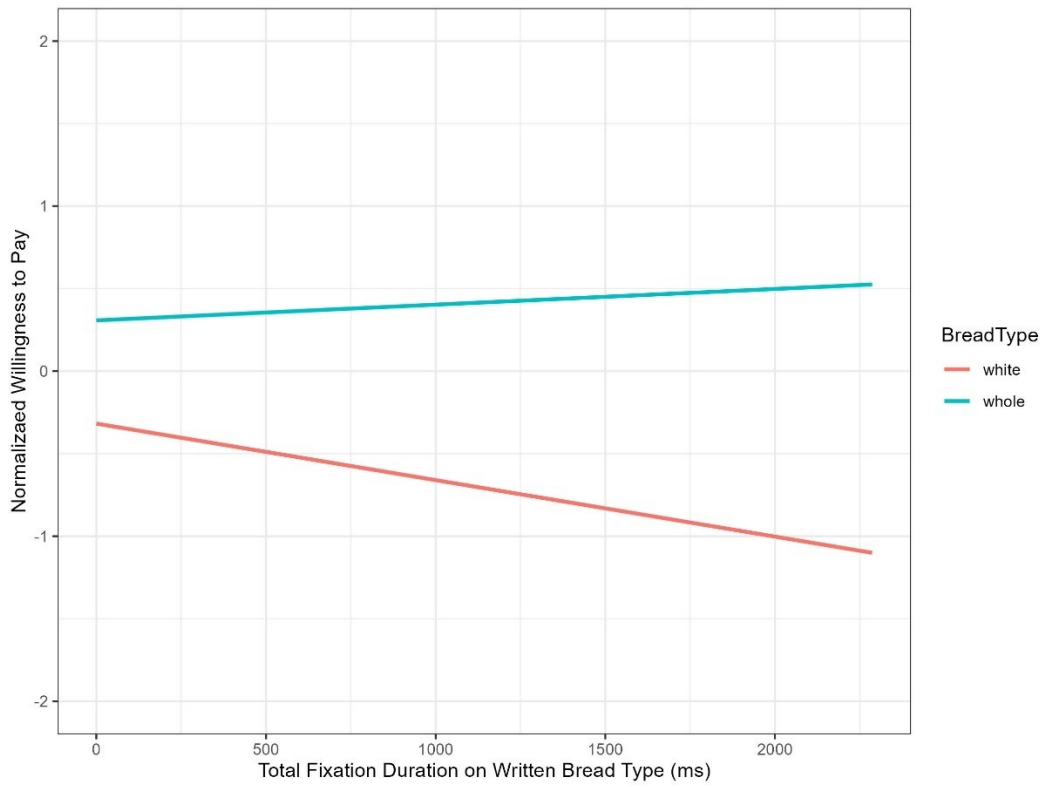
Figure 4: Linear Chart of the moderator effect of TFD on Written Bread type on WTP. Increasing WTP for whole grain bread and decrease for white bread.
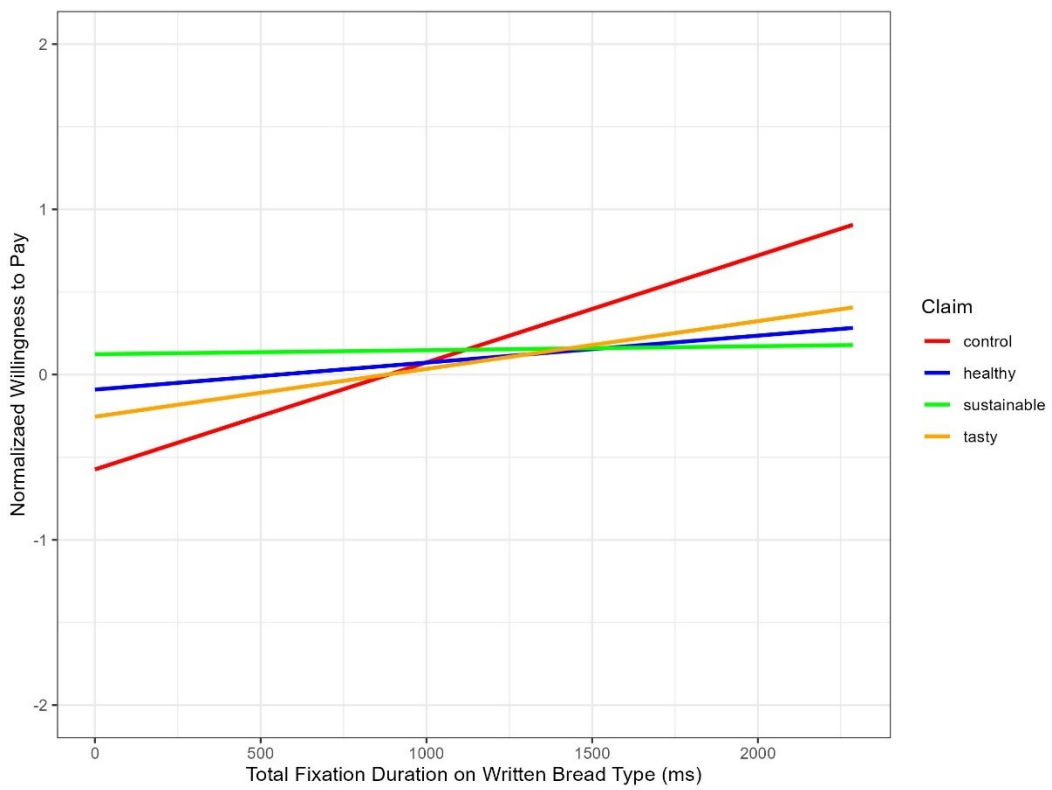

Figure 5: This is a linear graph demonstrating how Total Fixation Duration (TFD) influences the Willingness to Pay (WTP). It shows how claims about sustainability and health can boost WTP when individuals read about Whole grain bread.

Model Four:

In the fourth model, the analysis revealed that despite the non-significance of tasty claim (β = 0.14, P = 0.213) and social value orientation (SVO) (β = -0.12, P = 0.308), certain factors exhibited statistically significant effects on willingness-to-pay (WTP). Specifically: Surface finish (β = 0.18, P = 0.021), Bread type (β = 0.70, P < 0.001), Healthy claim (β = 0.35, P = 0.002), and Sustainable claim (β = 0.58, P < 0.001).

Furthermore, the interaction effects of surface finish on total fixation duration on surface finish (P = 0.034) (Figure 6) and bread type on total fixation duration on package surface finish (P = 0.014) (Figure 7) were also found to be significant. Notably, this model demonstrates the ability to predict approximately 22 percent of the variance in willingness to pay (R^2 = 0.22) (see Table 4).

Table 4:Generalized Linear Models results for model 4:

Predictors	Estimates	CI	p
	WTP_n		
(Intercept)	-0.57	-0.84 – -0.30	**<0.001**
Surface Finish [Matte]	0.18	0.03 – 0.34	**0.021**
BreadType [whole]	0.70	0.54 – 0.85	**<0.001**
Claim [healthy]	0.35	0.13 – 0.57	**0.002**
Claim [sustainable]	0.58	0.36 – 0.81	**<0.001**
Claim [tasty]	0.14	-0.08 – 0.36	0.213
SVO [Prosocial]	-0.12	-0.34 – 0.11	0.308
TFD surface finish	-0.00	-0.00 – 0.00	0.312
Surface Finish [Matte] × TFD surface finish	-0.00	-0.00 – -0.00	**0.034**
BreadType [whole] × TFD surface finish	0.00	0.00 – 0.00	**0.014**
Claim [healthy] × TFD surface finish	-0.00	-0.00 – 0.00	0.326
Claim [sustainable] × TFD surface finish	-0.00	-0.00 – 0.00	0.084
Claim [tasty] × TFD surface finish	0.00	-0.00 – 0.00	0.740
SVO [Prosocial] × TFD surface finish	0.00	-0.00 – 0.00	0.216
Observations	944		
R^2	0.232		

Results of the Generalized Linear Models (GLMs) examining the relationship between the independent variables (claims, surface finish, bread type, and social orientation value) and the dependent variable (Willingness-to-Pay). The interaction term represents the Total Fixation Duration across AOI4(surface finish AOI).
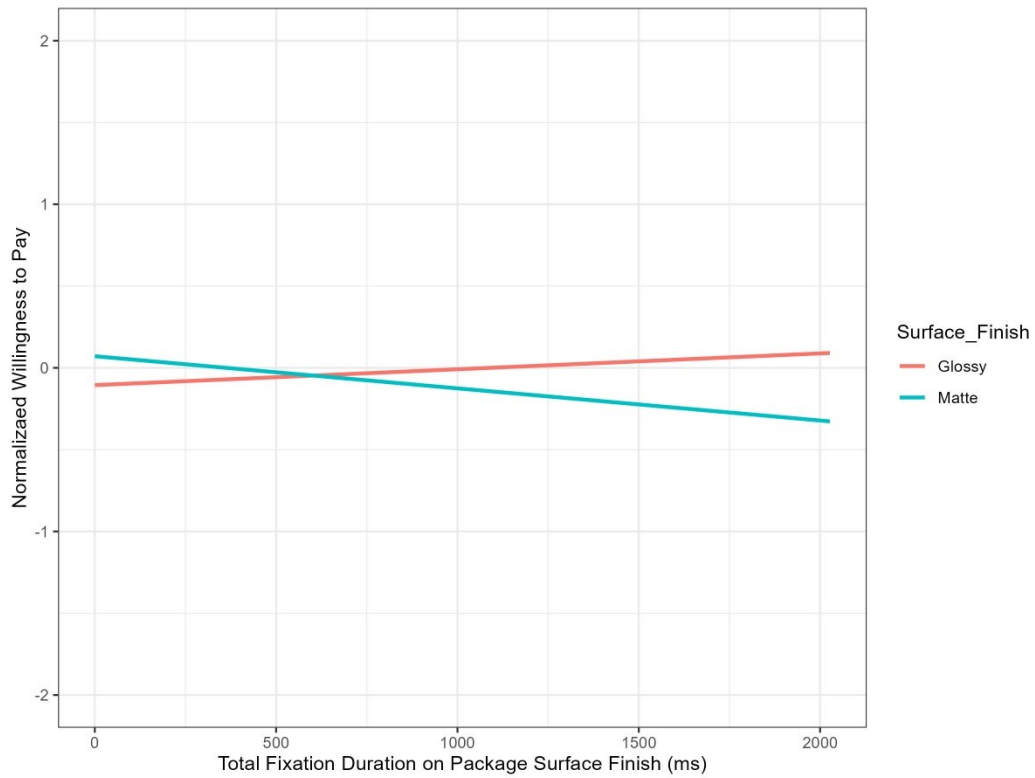
Figure 6: This linear graph depicts the Total Fixation Duration (TFD) of the bread's surface finish in terms of Willingness to Pay (WTP). It shows that a glossy surface finish enhances WTP, while a matte surface finish reduces it.
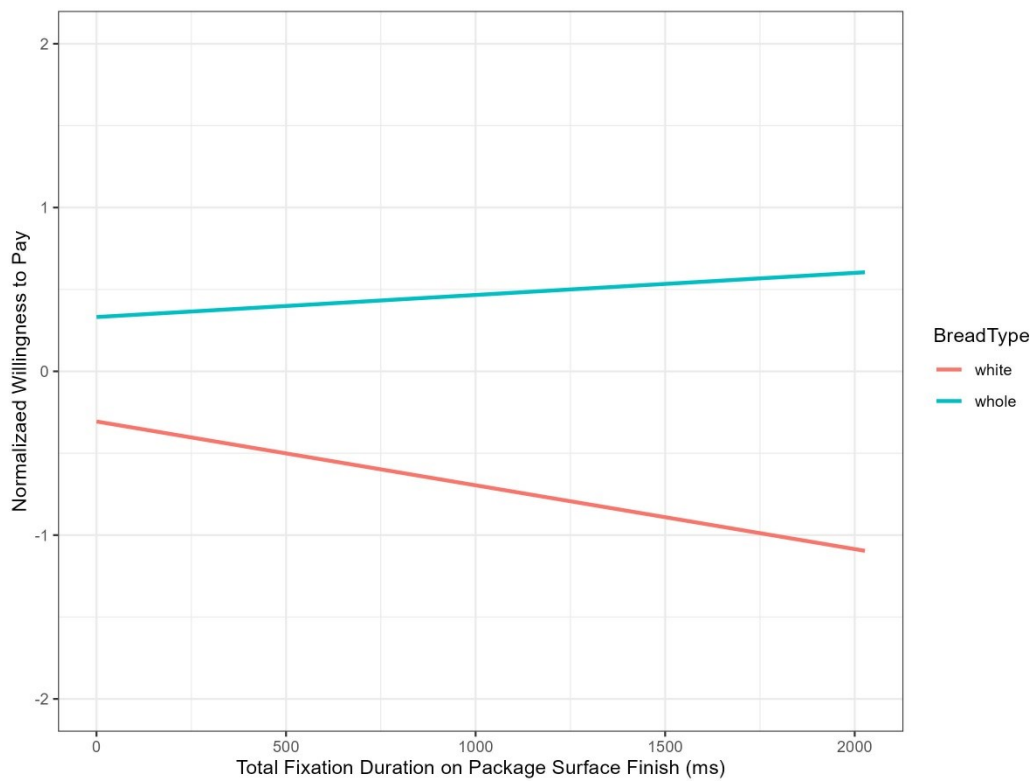

Figure 7: The influence of Total Fixation Duration (TFD) on the surface finish of white bread versus whole grain bread is significant. Paying attention to the surface finish increases the Willingness to Pay (WTP) for whole grain bread, while it decreases the WTP for white bread.

Model Comparison:

The Akaike Information Criterion (AIC) was employed to compare and select the most suitable model among four candidate models. The AIC values for each model were as follows: model 1 = 2401.180, model 2 = 2388.673, model 3 = 2392.907, and model 4 = 2391.139. Based on these AIC values, it was determined that model 2 is the best-fitting model among all four.

3.2.   Perceiving of Claim labels:

As previously stated, we employed a set of three questions following each stimulus. These questions encompassed: "To what extent do you perceive the bread you just observed as sustainable?", "How would you rate the tastiness of the bread you just viewed?" and "How healthy do you deem the bread you just saw?". The sequence of these questions was randomized to mitigate any potential biases, and responses were gauged on a Likert scale ranging from 1 (indicating not at all sustainable, tasty, or healthy) to 7 (signifying very sustainable, tasty, or healthy).

Sustainability:

We conducted an ANOVA test to compare the scores of each question across different claims, the mean diffrence were significant (F-value= 24.75 and P<0.01). then we conduct a Tukey's Honest Significant Difference (HSD) test to explore pairwise differences between group means. The mean difference in participant scores in response to sustainability questions was statistically significant when they were presented with a sustainable claim on the packaging, in comparison to all other stimuli with tasty, healthy, and control labels ($P < 0.01$). However, this

difference was not significant when comparing any other claim labels (refer to Table 5 and Figure 8 for further details).

Table 5: The Tukey test results for the sustainable question across various labels:

Comparison	Diff	Lower Bound (Lwr)	Upper Bound (Upr)	p-value (p adj)
Healthy-Control	0.17	-0.18	0.51	0.61
Sustainable-Control	1.03	0.69	1.38	0.00
Tasty-Control	0.14	-0.21	0.49	0.72
Sustainable-Healthy	0.87	0.52	1.21	0.00
Tasty-Healthy	-0.03	-0.37	0.32	0.99
Tasty-Sustainable	-0.89	-1.24	-0.55	0.00

This table delineates the results of a Tukey conducted to examine the mean differences in sustainability scores across four diverse claim labels.
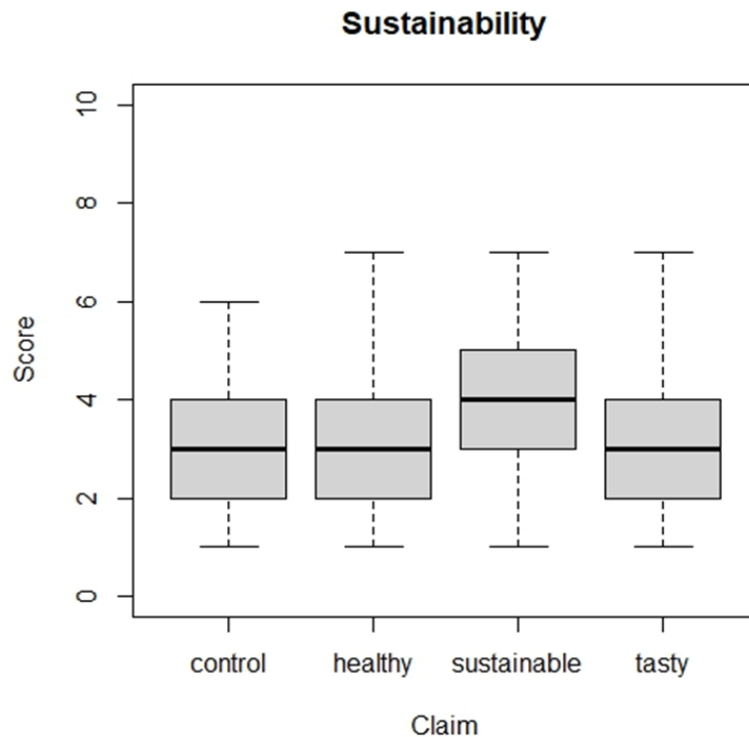

Figure 8. Box plot of the score of sustainable question in presenting stimuli with four diffrent claims.

Tastiness:

The result of ANOVA test showed significant mean difference of tasty score (F-value=6.04, P<0.01) between claims. The observed mean difference in participant responses to questions regarding tastiness was found to be statistically significant when participants were exposed to

packaging with a tasty claim, as compared to both the control and healthy claim (P < 0.01).
However, this difference was not statistically significant when participants were presented with
packaging bearing a sustainable claim. (see Table 6 and Figure 9).

Table 6: The Tukey test results for the tasty question across various labels:

Comparison	Diff	Lower Bound (Lwr)	Upper Bound (Upr)	p-value (p adj)
Healthy-Control	0.07	-0.31	0.45	0.97
Sustainable-Control	0.26	-0.12	0.65	0.29
Tasty-Control	0.58	0.19	0.96	0.00
Sustainable-Healthy	0.19	-0.19	0.58	0.56
Tasty-Healthy	0.51	0.13	0.89	0.00
Tasty-Sustainable	0.31	-0.07	0.70	0.15

This table delineates the results of a Tukey test conducted to examine the mean differences in tastiness scores across four
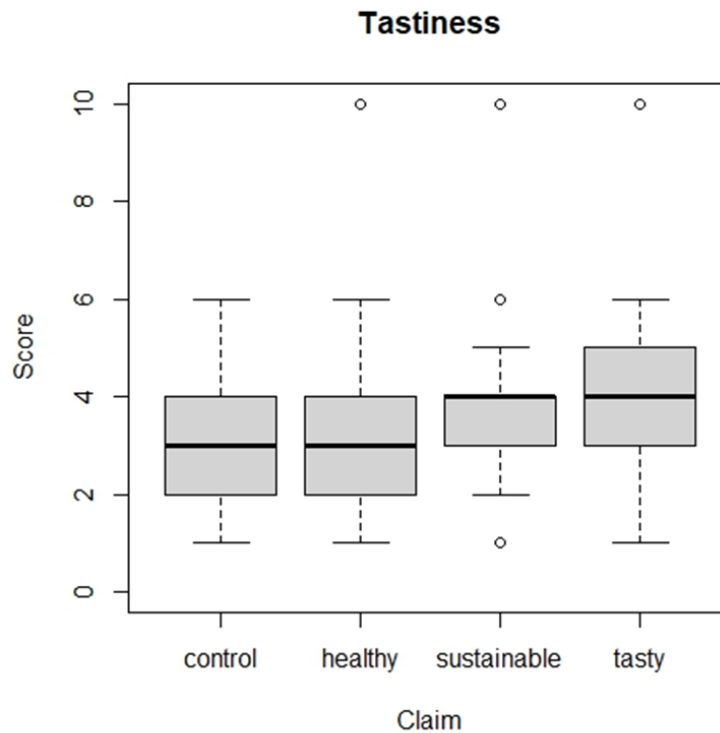diverse claim labels.

Figure 9: Box plot of the score of tasty question in presenting stimuli with four diffrent claims.

Healthiness:

We conducted an ANOVA test to compare the scores of each question across different claims,
the mean diffrence were significant (F-value= 8.59 and P<0.01).

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The mean difference in participant responses to questions about healthiness was statistically significant when they were exposed to packaging with a 'healthy' claim, as compared to both the control and 'tasty' claims ($P < 0.01$). However, this difference was not statistically significant when participants were presented with packaging that bore a 'sustainable' claim. (Table 7 and Figures 10).

Table 7: The Tukey test results for the healthy question across various labels:

Comparison	Diff	Lower Bound (Lwr)	Upper Bound (Upr)	p-value (p adj)
Healthy vs Control	0.68	0.21	1.14	0.00
Sustainable vs Control	0.66	0.19	1.12	0.00
Tasty vs Control	0.03	-0.43	0.50	0.98
Sustainable vs Healthy	-0.02	-0.49	0.45	0.97
Tasty vs Healthy	-0.64	-1.11	-0.18	0.00
Tasty vs Sustainable	-0.62	-1.09	-0.16	0.00

This table delineates the results of a Tukey conducted to examine the mean differences in Healthiness scores across four diverse claim labels.
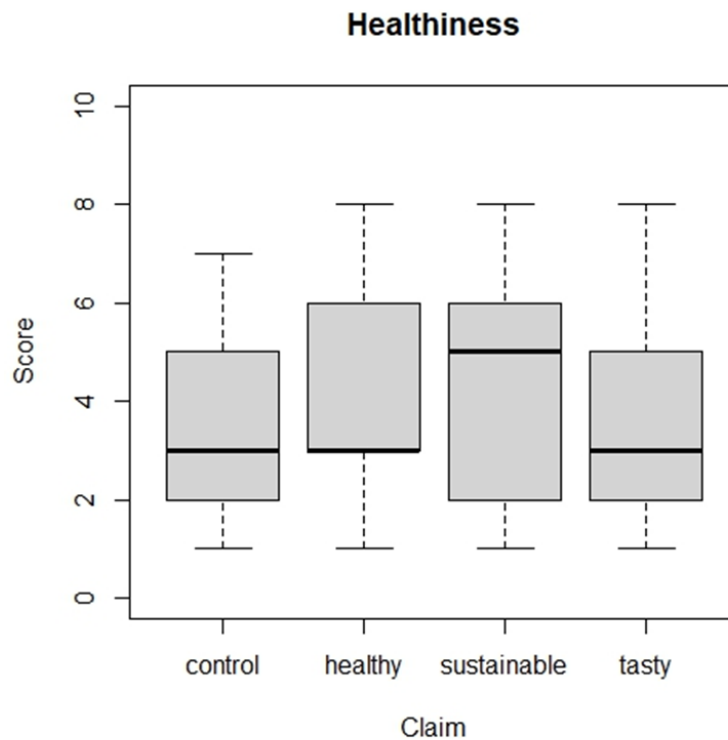

Figure 10: Box plot of the score of healthiness question in presenting stimuli with four diffrent claims.

3.3.   Matte VS Glossy:

In our research, we investigated how consumers perceive products with different surface finishes (matte and glossy). Specifically, we explored which finish is considered healthier, tastier, and more sustainable. To achieve this, we conducted ANOVA tests, analyzing participants' responses to questions about healthiness, tastiness, and sustainability after each trial and subsequently, a Tukey test was conducted to explore pairwise comparisons. The study involved four groups of bread: white bread in glossy packages, white bread in matte packages, whole grain bread in glossy packages, and whole grain bread in matte packages.

Sustainability:

The ANOVA test showed a significant difference in mean sustainability evaluations across different varieties of bread and their packaging (F-value = 8.02, P < 0.01).

The comparison between Glossy-whole grain and Glossy-white indicted a statistically significant difference(P<0.01). Similarly, the comparison between Matte-whole grain and Glossy-white resulted was signifying significance (P<0.01). Lastly, the comparison between Glossy-whole grain and Matte-white demonstrating statistical significance (P<0.01).

On the other hand, the comparisons between Matte-white and Glossy-white, Matte-whole grain and Matte-white, and Matte-whole grain and Glossy-whole grain all had p-values greater than 0.05, indicating no significant differences. (Table 8 and Figure 11)

Table 8: The Tukey test results for the sustainable question across various bread type and packaging.

Comparison	Diff	Lower Bound (Lwr)	Upper Bound (Upr)	p-value (p adj)
Matte-white vs. Glossy-white	0.01	-0.34	0.37	0.97
Glossy-whole vs. Glossy-white	0.48	0.13	0.84	0.00
Matte-whole vs. Glossy-white	0.49	0.13	0.84	0.00
Glossy-whole vs. Matte-white	0.47	0.12	0.82	0.00
Matte-whole vs. Matte-white	0.47	0.12	0.83	0.00
Matte-whole vs. Glossy-whole	0.00	-0.35	0.36	0.96

The Tukey test results indicate that there is no significant difference in sustainability perception between packages of the same type of bread. However, this difference becomes statistically significant when comparing different types of bread.
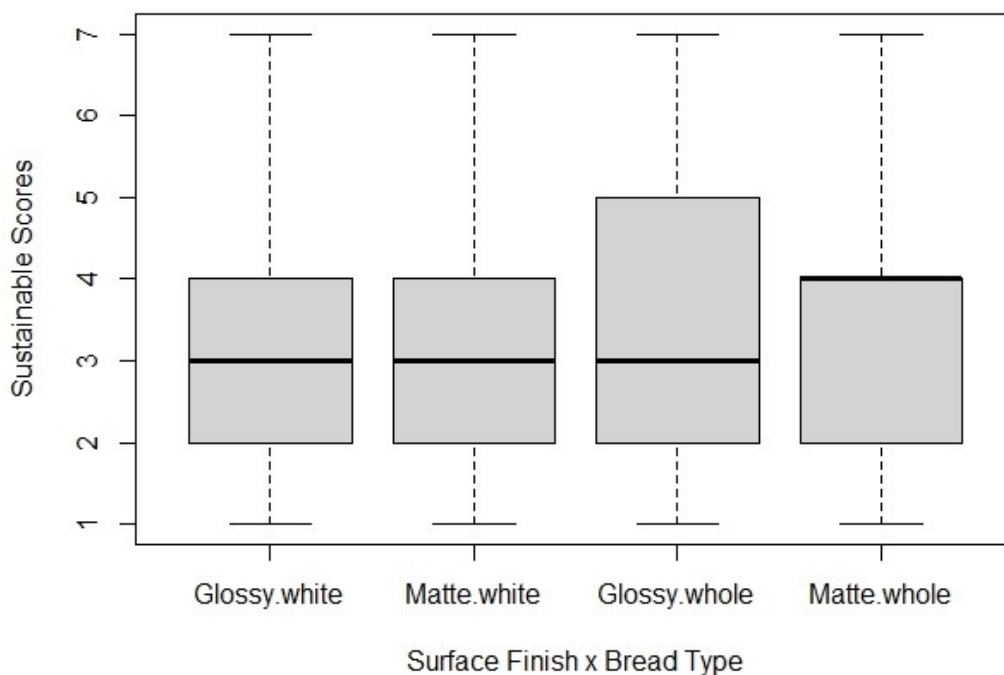
Figure 11: Boxplot of sustainable score by surface finish and bread type.

Tastiness:

The influence of surface finish on tastiness perceptions was examined within the context of different bread types: glossy whole grain, glossy white, matte whole grain, and matte white. The ANOVA test revealed a statistically significant difference in mean tastiness ratings across these bread types and their respective packaging (F-value = 8.74, P < 0.01).

Subsequently, a Tukey test was conducted to explore pairwise comparisons. Glossy-whole and Glossy-white yielded a p-value of less than 0.01, indicating a statistically significant difference. Similarly, the comparison between Matte-whole and Glossy-white also resulted in a p-value of less than 0.01, signifying significance. Lastly, the comparison between Glossy-whole and Matte-white had a p-value of less than 0.01, demonstrating statistical significance.

On the other hand, the comparisons between Matte-white and Glossy-white, Matte-whole and Matte-white, and Matte-whole and Glossy-whole all had p-values greater than 0.05, indicating no significant differences (see Table 9 and Figure 12)

Table 9: The Tukey test results for the tasty question across various bread type and packaging.

Comparison	Diff	Lower Bound (Lwr)	Upper Bound (Upr)	p-value (p adj)
Matte-white vs. Glossy-white	0.07	-0.31	0.45	0.97
Glossy-whole vs. Glossy-white	0.61	0.23	0.99	0.00
Matte-whole vs. Glossy-white	0.52	0.14	0.90	0.00
Glossy-whole vs. Matte-white	0.54	0.16	0.92	0.00
Matte-whole vs. Matte-white	0.45	0.07	0.83	0.01
Matte-whole vs. Glossy-whole	-0.09	-0.47	0.29	0.92

The Tukey test results indicate that there is no significant difference in tasty perception between packages of the same type of bread. However, this difference becomes statistically significant when comparing different types of bread.
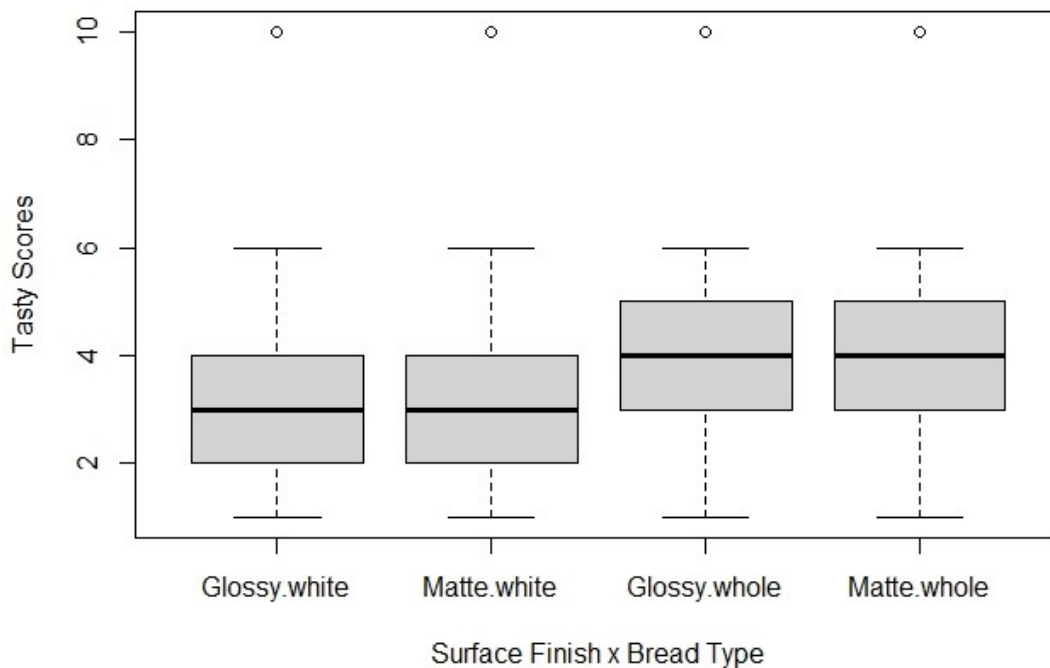

Figure 12: Boxplot of tasty score by surface finish and bread type.

Healthiness:

The ANOVA test results revealed a statistically significant difference in healthy perceptions among four bread types: glossy whole grain, glossy white, matte whole grain, and matte white (F-value = 35.27, P < 0.01). Specifically, the comparisons between glossy whole grain and glossy white, matte whole grain and glossy white, and glossy whole grain and matte white all yielded p-values of less than 0.01, signifying significant differences. However, no significant

differences were observed in the comparisons between matte white and glossy white, matte whole grain and matte white, or matte whole grain and glossy whole grain. In summary, surface finish significantly influenced healthy perceptions in the glossy whole grain bread group compared to other bread types, emphasizing the role of packaging aesthetics in shaping consumer experiences with food products. (Table 10 and Figure 13).

Table 10: The Tukey test results for the healthy question across various bread type and packaging.

Comparison	Diff	Lower Bound (Lwr)	Upper Bound (Upr)	p-value (p adj)
Matte-white vs. Glossy-white	0.11	-0.33	0.56	0.91
Glossy-whole vs. Glossy-white	1.30	0.85	1.75	0.00
Matte-whole vs. Glossy-white	1.34	0.89	1.79	0.00
Glossy-whole vs. Matte-white	1.19	0.74	1.64	0.00
Matte-whole vs. Matte-white	1.23	0.78	1.68	0.00
Matte-whole vs. Glossy-whole	0.04	-0.41	0.49	0.99

The Tukey test results indicate that there is no significant difference in health perception between packages of the same type of bread. However, this difference becomes statistically significant when comparing different types of bread.
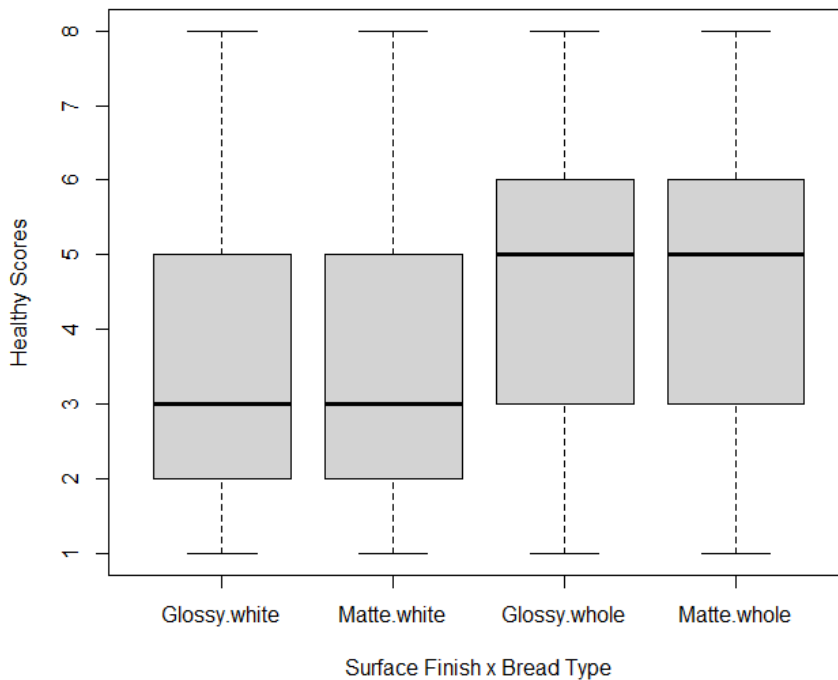

Figure 13: Boxplot of healthy score by surface finish and bread type.

3.4. Price knowledge:

We investigated participants' awareness of product prices. To achieve this, we administered two specific questionnaires: the "Comparison Shopping and In-Store Promotions (Check Prices)" questionnaire and the "Grocery Market Knowledge (Price)" questionnaire. Notably, the average level of price knowledge among participants exceeded the established cut-off point, as previously reported by Eberhardt, Kenning, et al. (2009). However, it is crucial to acknowledge that our participant pool consisted of individuals from diverse countries, each with varying levels of price knowledge related to specific products.

To account for this variability, we employed normalization techniques for the willingness-to-pay values within our regression model. By doing so, we ensured comparability across participants and facilitated a meaningful analysis. (Table 11 and Figure 14).

Table 11: Descriptive Statics:

	N	Mean	Std. Deviation
Checking Price Tags	59	2.05	1.10
In-store Promotions	59	3.81	1.26
Grocery Market Knowledge	59	3.56	1.23
Valid N (listwise)	59		

The table provides the descriptive statistics of the participants' knowledge of prices (Comparison Shopping, In-Store Promotions, and Grocery Market Knowledge). A lower score indicates a higher level of price knowledge.
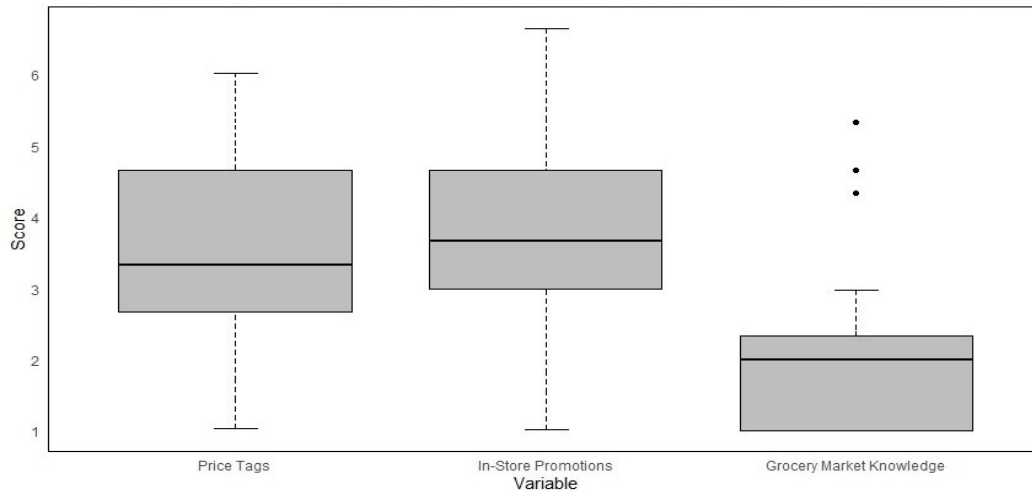
Figure 14:Boxplot of the score of comparison shopping, in-store promotions, and grocery market knowledge.

3.5. Accuracy of Social orientation value:

In the context of validating the Social Orientation Value (SVO), we employed The Balanced Inventory of Desirable Responding Short Form (BIDR-16). This instrument comprises two distinct subscales: Self-Deceptive Enhancement (SDE), which captures honest yet overly positive responses, and Impression Management (IM), reflecting a bias toward pleasing others. Notably, higher scores on these scales raise questions about the validity of the SVO questionnaire. To illustrate this, please refer to Figure 7 and 8. Our study participants exhibited typical levels in both subscales, consistent with findings reported in prior literature by Hart, Ritchie, et al. (2015) (Hart, Ritchie et al. 2015).

Also, a t-test was conducted to compare mean differences between the "prosocial" and "proself" conditions, focusing on two SVO variables. For SDE, the estimated mean difference was 0.556, with a corresponding t-statistic of 3.611 and a p-value of 0.580. Regarding IM, the estimated mean difference was -0.312, with a t-statistic of 3.410 and a p-value of 0.756. In both the prosocial and proself conditions for both SDE and IM, there was no significant difference in means (Table 12 and Figure 15).

Table 12: Descriptive Statics:

	N	Mean	Std. Deviation
SDE	59	3.44	1.0
IM	59	3.66	1.07
Valid N (listwise)	59		

The table provides the descriptive statistics of the participants' Desirable Responding including Self-Deceptive Enhancement (SDE) and Impression Management (IM).
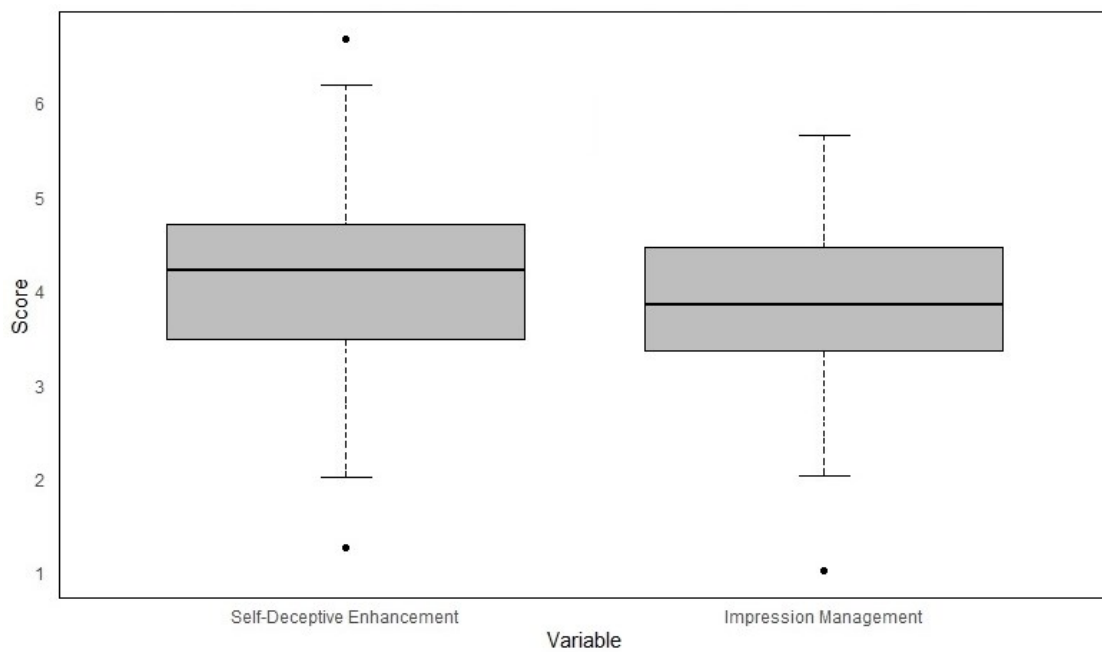

Figure 15:Boxplot of the score of self-deceptive enhancement and impression management.

4. Discussion:

In the realm of whole grain products, sensory appeal serves a dual function, acting as both a significant barrier and a facilitator. This is particularly evident during lectures where the topic of discussion revolves around these products. Our research has been primarily focused on exploring the impact of various packaging elements on consumer behavior, with a specific emphasis on their willingness to pay. The primary objective of this study is to gain a deeper understanding of how these packaging features can influence shopping decisions.

However, it is essential to acknowledge that individual personality also play a significant role in decision-making. Drawing from lectures, we have specifically examined consumers' social value orientation, which can significantly affect their propensity for environmentally friendly shopping. While previous studies have touched upon this variable, our research aims to provide deeper insights into its implications.

Our study examined the influence of packaging surface finish on consumer perceptions of bread. Even though this feature was only significant in one of our four models, the predictive power of all four models was comparable, suggesting that we cannot dismiss the role of this parameter in packaging.

In the fourth model, we noted an interesting trend: participants who initially paid attention to this packaging feature demonstrated a higher willingness to pay for matte packages. However, as they continued to pay more attention, this impact diminished. This observation suggests that while matte packages tend to catch the consumer's eye initially, the preference shifts towards glossy packages in the context of bread shopping as consumers pay more attention. This highlights the dynamic nature of consumer preferences and the importance of considering these shifts when designing packaging.

Interestingly, we found that the surface finish played a role in preserving the perceived healthiness and tastiness of the product. Our research results indicate that people generally

consider whole grain products to be healthier and tastier, but this effect was more pronounced for sustainable products. This finding adds a new dimension to the findings of Marckhgott (2019) and Ye (2020), suggesting that the nature of the product can shape consumer expectations of healthiness and tastiness, not just the surface finish.

Our research identified claims as a significant feature of packaging across almost all models. Specifically, we found that sustainable and healthy claims positively influenced willingness to pay (WTP) in all models, a finding that contradicts the results of Hoefkens and Verbeke (2013). Furthermore, our results aligned with the common belief that healthier foods are often perceived as less tasty. However, this difference was not significant when comparing sustainable claims.

In conclusion, based on WTP and the perceptions of tastiness, healthiness, and sustainability, we found that sustainable claims had the most significant impact on WTP for bread packaging. However, it's worth noting that when participants paid more attention to the type of bread, the importance of healthy claims increased, particularly for whole grain bread.

This suggests that despite consumers perceiving bread with healthy claims as less tasty, they are more likely to purchase them when these claims are present.

Regarding the type of bread, our models showed that WTP for whole grain bread was higher among participants. In general, they perceived whole grain bread, whether in matte or glossy packaging, as healthier, more sustainable, and slightly tastier.

Interestingly, our findings also revealed that people's social value orientation did not significantly affect their WTP. This suggests that other factors, such as the claims and bread type, may play a more crucial role in shaping consumer behavior in the context of bread shopping.

4.1. Limitations of our study and future directions:

The first limitation pertains to the evaluation of participants' willingness to pay. We hypothesize that a simplistic query regarding willingness to pay may influence the authenticity of consumer responses. This could be improved by simulating a real shopping situation.

The second limitation could be the demographic composition of our participants. The majority of our participants were female, which may have influenced their shopping tendencies. Additionally, the wide age range of our participants could be a confounding factor. These demographic variables should be taken into consideration in future experiments.

Lastly, many of our participants exhibited a prosocial value orientation. This could potentially explain the lack of significance of this variable in our models. To address this, it may be beneficial to administer the Social Value Orientation (SVO) scale a week prior to the experiment. Subsequently, participants could be invited from both the prosocial and proself groups in an equal and random manner.

4.2. Conclusion:

In conclusion, based on WTP and the perceptions of tastiness, healthiness, and sustainability, we found that sustainable claims had the most significant impact on WTP for bread packaging. However, it's worth noting that when participants paid more attention to the type of bread, the importance of healthy claims increased, particularly for whole grain bread.

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Interestingly, our findings also revealed that people's social value orientation did not significantly affect their WTP. This suggests that other factors, such as the aforementioned claims and bread type, may play a more crucial role in shaping consumer behavior in the context of bread shopping.

In light of these findings, it is clear that while individual personality traits and social value orientations do play a role in consumer behavior, the impact of packaging elements and product claims cannot be underestimated. These factors significantly influence consumer perceptions and willingness to pay, thereby shaping shopping decisions. Future research could further explore these dynamics and their implications for marketing and product development strategies.

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